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HEARING

ON

NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2015

AND

OVERSIGHT OF PREVIOUSLY AUTHORIZED PROGRAMS

BEFORE THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES
ONE HUNDRED THIRTEENTH CONGRESS

SECOND SESSION

SUBCOMMITTEE ON STRATEGIC FORCES HEARING

ON

FISCAL YEAR 2015 NATIONAL DEFENSE AUTHORIZATION BUDGET REQUEST FOR NATIONAL SECURITY SPACE ACTIVITIES

HEARING HELD
APRIL 3, 2014

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FISCAL YEAR 2015 NATIONAL DEFENSE AUTHORIZATION BUDGET REQUEST FOR NATIONAL SECURITY SPACE ACTIVITIES

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON STRATEGIC FORCES,
Washington, DC, Thursday, April 3, 2014.

The subcommittee met, pursuant to call, at 1:59 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. This hearing of the House Armed Services Subcommittee on Strategic Forces will come to order. I want to welcome all of our witnesses here and thank them for their time, not only for being here, but the time it took to prepare for this hearing. It is very helpful to us.

We have with us today General William Shelton, Commander of Air Force Space Command; Mr. Gil Klinger, Deputy Assistant Secretary of Defense, Space and Intelligence Office; Mr. Doug Loverro, Deputy Assistant Secretary of Defense for Space Policy; Ms. Betty Sapp, Director of the National Reconnaissance Office; and Lt. General John W. "Jay" Raymond, Commander, Joint Functional Component Command for Space.

And what I am going to do is submit the rest of my opening statement for the record so we can get to the opening statements of the witnesses. And with that, I will yield to my ranking member, my friend and colleague from Tennessee, Mr. Cooper.

[The prepared statement of Mr. Rogers can be found in the Appendix on page 25.]

STATEMENT OF HON. JIM COOPER, A REPRESENTATIVE FROM TENNESSEE, RANKING MEMBER, SUBCOMMITTEE ON STRATEGIC FORCES

Mr. COOPER. Thank you, Mr. Chairman. I would like to follow your fine example and do the same. And we welcome the witnesses. Thank you.

Mr. ROGERS. Thank you very much. General Shelton, we will start with you. You are recognized for 5 minutes.

STATEMENT OF GEN WILLIAM L. SHELTON, USAF, COMMANDER, U.S. AIR FORCE SPACE COMMAND, U.S. AIR FORCE

General SHELTON. Mr. Chairman, Representative Cooper, and distinguished members of the subcommittee, it is an honor to appear before you once again as the commander of Air Force Space Command. It is also my privilege to appear with these colleagues from the national security space enterprise.

Our nation's advantage in space is no longer a given. The ever-evolving space environment is increasingly contested as potential adversary capabilities grow in number and sophistication. Providing budget stability and flexibility in this very dynamic strategic environment is necessary to maintain and bolster the viability of our nation's space capabilities.

Given this new normal in space, I believe it is—I believe we are at a strategic crossroad. It is a reality that requires us to address how we protect our space systems, challenge traditional acquisition practices, and consider alternative space architectures that are more resilient and affordable.

I thank you for your support, and I look forward to working with Congress and this committee to keep you abreast of our efforts to provide relilient, capable, and affordable space capabilities for the joint force and for the nation. And I would also like to add that just this morning, we had a very successful defense meteorological satellite program launch out of Vandenberg Air Force Base on an Atlas V. Just bragging a little bit.

Mr. ROGERS. Don't blame you. Is that it?

General SHELTON. That is it, sir.

[The prepared statement of General Shelton can be found in the Appendix on page 27.]

Mr. ROGERS. Thank you very much. Mr. Klinger, you are recognized.

STATEMENT OF GIL I. KLINGER, DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR SPACE AND INTELLIGENCE, DEPARTMENT OF DEFENSE

Mr. KLINGER. Thank you, Chairman Rogers, Congressman Cooper, and members of the committee. The space domain has changed significantly in 50 years. This environmental change has occurred concurrently with the steady recovery and improvement of our space acquisition programs and practices. Our progress affords us an opportunity to take stock of risks resulting from the significant increase in threats to our space capabilities as well as the potential opportunities associated with the growth of both U.S. and foreign commercial and allied space capabilities and services.

This rapid evolution and expansion of threats may create a potential strategic imbalance, in which adversaries are increasingly able to use space to support military operations and also threaten our ability to sustain use of our space capabilities. Meanwhile, our abilities have lagged to protect our own use of space and also deny the advantages of space to an adversary. We must rectify this imbalance as a national priority.

We must consider the impact resulting from the Budget Control Act and sequestration. The simple truth is that most space systems on which the U.S. Government depends are likely to remain highly

capital intensive, relatively costly investments. Moreover, many of the changes likely to be required to adapt to the changed threat require additional investments at precisely the same time as the Department is managing a significant drawdown in most other warfare areas.

Perhaps no change has had more profound impact that the fundamental shift in the breadth, depth, and diversity of both the uses to which space capabilities are applied and the user population. In the past 25 years, a range of diverse space capabilities have become to defense and intelligence users what the dial tone on the telephone long ago became for all of us: a service whose presence we take for granted until the moment its availability is interrupted.

Furthermore, our belated realization that space would become a contested battlespace leaves us with few planned or routinely exercised alternative means to meet our needs in the event of these interruptions. This change, when combined with the other shifts described here, confront the space acquisition community with a single major challenge, to maintain service continuity while simultaneously investing in technology innovation.

We are at a strategic crossroads. We still utilize the advantages provided by capabilities brought about by past large-scale investments that often enjoyed a largely unfettered call on resources. Without wholesale sacrifices in other domains, we simply cannot afford that path in the future.

The fiscal year 2015 President's budget reflects the DOD's [Department of Defense's] commitment to measured, affordable, pragmatic progress as we plan our future space capabilities. The Space Based Infrared System, Advanced Extremely High Frequency [AEHF], and Global Positioning System [GPS] are utilizing Space Modernization Initiative investments to improve affordability and capability in order to remain effective in the changed strategic and fiscal environment.

The Department adjusted the profile for the Evolved Expendable Launch Vehicle, EELV program, and implemented a dual track strategy to reduce cost and stabilize key elements of the space industrial base. This approach consists of executing a contract for launch services over 5 years with the only existing qualified provider, while implementing a new entrant certification process in partnership with NASA [National Aeronautics and Space Administration] and the NRO [National Reconnaissance Office] that enables new entrants to compete as soon as they are certified. We believe this strategy achieves the optimal balance between required mission assurance and affordability.

While we continue to use the Russian RD–180 engine to support NSS [National Security Space] missions, the Department has been prepared for the possibility of a potential RD–180 supply disruption and has put in place several measures to mitigate the risk and impact. First, the nation has maintained an additional capability to launch national security payloads with the domestically produced Delta IV variant to the EELV. Second, as competition becomes a reality and domestic engine technology progresses, we become less susceptible to this foreign supply risk. Finally, our industry partner continues to maintain a supply of RD–180 engines in the United

States, thereby insulating the Department against any near term disruptions to the launch manifest.

We are evaluating whether it is in the long term U.S. national security interest and that of significant elements of our space industrial base to develop a next generation U.S. designed and built engine. This approach is part of the Department's reexamination of its strategy to ensure it is still capable of providing asssured access to space.

I would like to thank you for your continued support and thoughtful engagement with us as we prepare for our future challenges. I would be pleased to take your questions.

[The prepared statement of Mr. Klinger can be found in the Appendix on page 44.]

Mr. ROGERS. Thank you, Mr. Klinger. Mr. Loverro, you are recognized.

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

Mr. LOVERRO. Thank you. Chairman Rogers, Ranking Member Cooper, and members of the subcommittee, I am pleased to join my colleagues to testify on the Department of Defense space programs and policies.

I first testified in front of this subcommittee on these topics about 1 year ago, and I welcome the opportunity to continue that discussion today. As I stated last year, space remains, and will continue to remain, vital to our national security. It underpins DOD capabilities worldwide. It enables U.S. global operations to be executed with precision on a worldwide basis, with reduced resources, fewer deployed troops, lower casualties, and decreased collateral damage.

Space empowers both our forces and those of our allies to win faster, and bring more of our warfighters home safely. It is a key to U.S. power projection, providing a strong deterrent to our potential adversaries and a source of confidence to our friends. But the evolving strategic environment increasingly challenges U.S. space advantages.

Space is no longer the sole province of world powers. It is a frontier that is now open to all. In the last several decades, space has become more competitive, more congested, and contested. Those terms, the so-called three C's, have been used extensively, and I believe it serves us well to put them into context.

On the first, as an American, I welcome the competitive aspect of today's space environment. I am highly confident that with the right policies, the United States is well positioned to remain ahead in that environment. The changes you authorized 2 years ago on export control reform, and the changes NASA and the Department of Defense have embraced on commercial launch, are just two of the many steps we are taking. I am not worried about the competitive nature of space.

On the second "C," congestion, I am not quite so welcoming, but I am optimistic. Congestion and debris in space is a real issue, and it threatens to put our use of space at risk. But the policies and

programs of the United States, programs like the Air Force's Space Fence, are aimed at reducing that risk.

Likewise, the work that we and the Department of State are doing internationally at the United Nations to set rules of the road for outer space, are aimed at bringing a similar focus on this issue to the community of spacefaring nations. So I am somewhat confident that we are on the right course in dealing with congestion.

But what worries me the most, is the last "C," the contested nature of space, which we now face. Over the last 15 years, other nations have watched us closely and have recognized that if they are to challenge the United States, they must challenge us in space. And they are endeavoring to do so.

The United States has successfully addressed such challenges before in other domains, and now we must likewise respond in space. We don't do so against the backdrop of a decreasing budget that challenges both the ability and speed with which we will act, but that in no way diminishes the importance of successfully sustaining the crucial advantages that space provides.

Our strategic approach for these issues remains consistent with what we outlined in the 2011 National Security Space Strategy, and reaffirmed in DOD Space Policy in 2012. In the written testimony I submitted to the subcommittee, I have outlined the five key elements of this strategic approach: promoting the responsible and peaceful use of space, enhancing the resilience of DOD space architectures, partnering with like-minded nations in international organizations and commercial firms, and deterring aggression and defeating attacks while preparing to operate in a degraded environment.

My testimony describes these in specific details. I look forward to your questions.

[The prepared statement of Mr. Loverro can be found in the Appendix on page 66.]

Mr. ROGERS. Thank you. Ms. Sapp, you are recognized.

STATEMENT OF BETTY J. SAPP, DIRECTOR, NATIONAL RECONNAISSANCE OFFICE

Ms. SAPP. Chairman Rogers, Ranking Member Cooper, and other distinguished members of the committee, I am pleased to appear before you today on behalf of the NRO. It is a real honor for me to appear today beside my DOD partners. I would like to begin with a few words about the state of the NRO today.

Last year, our acquisition program successfully delivered and launched two new satellites into orbit. We are on track to continue our launch and acquisition success this year. We have one launch that we have done and three more to go.

Our research and development program has done equally well, allowing us revolutionary increases in collection capability at risk levels compatible with successful acquisition programs. For the fifth year in a row, the NRO received a clean audit opinion on our financial statements, further proof of our commitment to excellence and conscientious stewardship of taxpayer dollars.

Lastly, I would like to highlight the real bottom line for the NRO, our support to the warfighter. The NRO provides a wide array of focused capabilities to help solve specific critical ISR [intel-

ligence, surveillance, and reconnaissance] needs for the DOD. This past year, the NRO deployed a high-altitude system known as HALO to support three-dimensional, high-resolution mapping of geographically restricted areas in Afghanistan. HALO flew 65 missions between September and December, collecting over 72,000 square kilometers of precision, wide-area mapping data, with an accuracy of 20 to 40 centimeters.

HALO gave intel analysts potential insurgent routes and operational planners a precise terrain data necessary to develop force protection and interdiction missions. HALO is just one example of the NRO services, products, and tools directly contributing to the highest priority missions across the Department. And I am extremely proud of the critical contributions our systems and our personnel provide on a daily basis.

The tremendous successes we have enjoyed in acquisition, launch, R&D [research and development], and in critical mission support activities are a testament to the quality of the NRO people. Ensuring we maintain that quality is fundamental to our future success. This year we are taking steps toward a more stable integral workforce to do just that.

We will also continue to rely on the DOD and the Intelligence Community to provide us with rotational personnel who will bring the diversity of thinking also necessary for organizational success. Our goal is to ensure that we have the NRO workforce that can continue to provide the nation with premiere space reconnaissance capabilities for national security.

I want to thank the committee for the support you have shown me, and the men and women of the NRO. Thank you again for the opportunity to be here today.

[The prepared statement of Ms. Sapp can be found in the Appendix on page 81.]

Mr. ROGERS. I thank you. And General Raymond, you are recognized.

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

General RAYMOND. Chairman Rogers, Representative Cooper, and members of the subcommittee, it is an honor to appear before you as the United States Strategic Command's Commander of the Joint Functional Component Command for Space. This is my first opportunity to address the committee and I look forward to working with each of you to advance our nation's space capabilities.

I am proud to represent the 3,300 soldiers, sailors, airmen, and Marines, and civilians that make up the Joint Functional Component Command [JFCC]. 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.

To meet the demands of the dynamic space environment, my command is focused on three operational objectives: providing timely warning and assessment; supporting national users and joint and coalition forces; and three, protecting and defending our space

capabilities. JFCC Space is, and will continue to be, the world premier provider of space capabilities, even as it faces constantly evolving operating and threatened environment.

I am confident that the men and women of JFCC Space are prepared to meet these challenges with a spirit of dedication innovation and devotion to duty, providing the warfighter assured access to the world's premier space capabilities. I thank the committee for your continued support as we strive to preserve and enhance the space capabilities which are so vital to our nation. Thank you.

[The prepared statement of General Raymond can be found in the Appendix on page 91.]

Mr. ROGERS. I thank you and thank all of you for those opening remarks. We will start with questions now. I recognize myself first.

We all know the importance of the launch, and without an effective launch program we don't have a space program. But unfortunately we have—but fortunately, we have an exceptional space launch program and as we just heard a little while ago, United Launch Alliance, their Delta and Atlas rocket lines are up to 168 successful launches in a row.

With that said, we currently use a rocket engine made by Russia, the RD–180, to launch many of our most important satellites into space. Do you think that developing a competitively acquired, next generation engine, available to all U.S. providers, that could effectively replace the RD–180 is important? Start with you, General Shelton, and we will go down the line.

General SHELTON. Mr. Chairman, we are studying the problem of potential interruption of RD–180 supply right now. Those study results will be available in late May.

And certainly one of the options we are thinking about is production of an indigenously produced engine. It certainly has it advantages, two that I can think of right off the top of my head. One is no longer relying on a foreign supplier. And secondly, an increase in the U.S. rocket engine industrial base.

I think both of those would make a great contribution to the overall launch program, and I would be a strong supporter of that, if we can find the money to do it.

Mr. ROGERS. Well, and that is the point I want to remind all the witnesses. Money is our problem. Your job is to come up with strategy and how to execute what we need to get done and let us worry about the money.

Mr. Klinger, I know you made reference to this in your opening remarks, but I would hear your thoughts in response to that direct question.

Mr. KLINGER. Thank you, sir. Excuse me. I think General, I would echo General Shelton's comments. I would just add a couple of things.

I think in the long run it is in the interest in the United States Government to develop a next generation, U.S.-produced rocket engine. That said, in addition to the 45-day study to which General Shelton referred, we are going to have to find a way to reconcile three different kinds of objectives that are to some degree not intentioned, but they will probably compete for the same body of resources.

We, of course, are looking for a next generation—if we pursue a next generation engine, it would be based on liquid oxygen and kerosene. If you look—as you well know, the ballistic missile community relies on solid rocket motors and both the Navy and the Air Force are interested in pursuing upgrades and modernization to our solid rocket motor capability.

At the same time, as we look to our partners in the civil space program, NASA, they rely on cryogenic engines. Because my personal belief is that this is a national level decision, in terms of a new engine, I think part of the work we have to do in the executive branch over time is to reconcile those needs with what will inevitably be scarce resources.

Mr. ROGERS. Mr. Loverro.

Mr. LOVERRO. Yes, Mr. Chairman. Again, I think I can echo both General Shelton and Mr. Klinger, and I suspect you will get five echoes of the same answer as we move down the table here.

There is no question in my mind. Our national space transportation policy and the policy of the U.S. encourage us to have U.S. domestic launch capability and that just doesn't say half of or part of it. It says U.S. domestic launch capability. I don't think you can meet that policy and not face the question of having domestically produced a engine in this nation.

I think we need to find a way to do that. It is a critical space industrial based thing for the long term. Not just for the short term, but for the long term. And it is critical to make sure that we maintain a secure supply of equipment like this as we have seen in recent months.

So, I very much support the notion that we need to do this. Clearly it is a balancing of resources. I think that there are many, many ways to address this issue from a funding perspective, some that you have mentioned. Other ways to do this industrially. There is not just one company who is reliant on Russian engines; there are many.

And there are at least several agencies of the U.S. Government who are so interested. So we certainly believe that this is something we need to address.

Mr. ROGERS. Great. Ms. Sapp.

Ms. SAPP. As Doug said, I am one of those agencies that is very interested. I obviously buy ULA [United Launch Alliance] boosters and I buy those through the Air Force. So we count on the Air Force to have those available for us. We have all recognized that the RD–180 is a vulnerability, a risk. We have known for quite some time. And certainly we would all feel better if that was produced in the United States.

Mr. ROGERS. General Raymond, I won't burden you with this one because you are a user. But I do appreciate those comments. And I did expect all of y'all to make that response. But it is important for us to put on the record that people in your positions acknowledge this is something that is important for us to do as a nation.

Next, I want to talk about the acquisition strategy for the Evolved Expendable Launch Vehicle program. I understand that there are two elements of this strategy in the near term. There is a block buy contract with ULA as well as opportunities for competition with new entrants.

General Shelton, can you tell us why the program is currently structured the way it is, the current status, and the benefits to this approach?

General SHELTON. Mr. Chairman, it is pretty simple. It is constructed this way because that was the most cost effective way to go at launch capability. We have got to have a way to get national security payloads into space. We want to make it more affordable.

So the first phase of this program was intended to give United Launch Alliance the only certified provider, the only capability of getting the full suite of national security payloads into space. Giving them a launch—rather a business base that they could spread out over time gives them an economic order quantities with their second and third tier suppliers. It gives them the ability to plan for longer term. They don't have to take as much corporate risk so they can give us a much better deal.

The introduction of competition was also considered in this. We don't have anybody certified yet. Obviously SpaceX is coming along, and we will have them certified, we are confident in the not too distant future, a lot of work to do before we get there, but we think we can get them to certification. Then they can compete for a subset of our national security payloads, because they don't have lift capability yet that would lift all of it. But we will put them in competition and it will be a heads-up competition on mission assurance, price, and other factors.

And then in the third phase—really, it is phase 1, phase 1A, and this phase 2, we will be full and open competition for what was originally intended to be 14 different missions. Because of the budget pressures we have come under, because the GPS constellation is doing much better, we were able to push some satellites out beyond the FYDP [Future Years Defense Program] and that gives us only seven, maybe an eighth, but for sure seven missions that we would be able to compete.

I know some people are concerned about that. They think it is taking away competitive capability. That was budget based. It was not based on any reduction of our desire to have competition. In fact, we would like competition just as soon as possible.

We think we will have at least one mission for competition next year and then we will see what the next few years bring along. But it will be at least seven missions.

Mr. ROGERS. What do you think would be the impact of breaking up the currently structured block buy?

General SHELTON. Yes, sir. I talked about cost effective being the first thing. There is no question that would add extra expense into the launch program. And I am talking about significant expense. Any option you would consider, if you said, okay, we are going to have to be able [to] compete all the rockets that we have got in play right now, it is definitely going to drive the prices up because, again, those economic order quantities wouldn't be there.

If we were restricted from using the RD–180 engine, that would drive us to Delta only. Delta is a little bit more expensive, in fact, significantly more expensive in some cases than the Atlas. So almost anything we did to the current strategy is going to drive costs.

Mr. ROGERS. Great. Thank you very much. The chair now recognizes Mr. Cooper.

Mr. COOPER. Thank you Mr. Chairman. Mr. Loverro, in your testimony, I was pleased to see that you would responded to some of our questions last year, and that AFRICOM [Africa Command] is shifting a lot of its satellite needs away from a Chinese satellite to commercially available. And you state in your testimony that process will be complete this May?

Mr. LOVERRO. Yes, sir. We have been very aggressive about that. I made a commitment to this committee last year that we would push as hard as we could to go ahead and make that shift. And we have done that, working with AFRICOM, who has been a fantastic partner in doing so.

In fact, I would say they have led the pack in doing so. They have managed to find alternatives for 75 percent of that communication capability. The last 25 percent they have not been able to get off yet, but they anticipate—we fully anticipate that by May we will be off that last 25 percent. If that changes, I will certainly let you know. But we are on the exact right path, and I really want to thank the commander of AFRICOM and his communicators for the work they have done to support that.

Mr. COOPER. I also see in your testimony that you had plans to move a C-Band radar from Antigua to Western Australia. And that would have allowed us to look at low altitude things, but I presume not low enough to have seen that lost Malaysian airplane, right?

Mr. LOVERRO. No, no sir. Probably not. It is not tuned for that. That radar right now is being disassembled in Antigua on its way to Australia. But even if it had been there, I don't think it would have been much good for that.

Mr. COOPER. Finally, on your testimony, you talk about the declassification of the geo-orbiting satellites that will allow us to monitor debris at that level. So that would be kind of the high version of the Space Fence?

Mr. LOVERRO. Yes, sir. Not quite like the Space Fence. The Space Fence has a far greater ability to, excuse the vernacular, suck up a whole bunch of data and go ahead and sort through that. GSSAP [Geosynchronous Space Situational Awareness Program] is—because of the nature of how the geosynchronous orbit works, it is a much slower process. But it allows us to see things we can't see from the ground. And that is to identify pieces of debris or other hazards that may exist up in geosynchronous orbit.

Mr. COOPER. I appreciate General Raymond being newly on duty here and I asked him earlier today what it was like to tell folks who had satellites in orbit that their satellite might be in danger from space debris. I couldn't help but think, is it appropriate, possible, to even charge for those calls on a subscription basis? Because that is an incredibly valuable service we are offering to the world for free. I am not sure that they necessarily appreciate the time and effort it takes to warn them about their own assets. Is that even a conceivable thing for the community to do? Because these warnings aren't free.

General RAYMOND. Sir, thanks for highlighting the work that our airmen, sailors, and soldiers, and Marines do for the world. We actively track over 23,000 objects in space. About 1,100 of those are

active satellites and we provide warning of potential collision between either satellites or debris.

It is in our best interest to do that as well. Because as we have seen in other cases where we have either had a breakup or a satellite break up into pieces, it impacts our ability to operate in the space domain, as well. So it is in our best interest as well for a safe and secure operating environment and we do that for the world, and for ourselves at the same time.

Mr. COOPER. If you wouldn't mind, if it wouldn't be too much trouble to compile some simple list about who are the most frequent users of your services are, that would be a helpful thing for us to start understanding.

[The information referred to can be found in the Appendix on page 121.]

General RAYMOND. I will, sir.

Mr. COOPER. General Shelton, this is apparently the third year that the Air Force has chosen not to support Operationally Responsive Space, ORS. So that's presumably money the Air Force thinks we could save by zeroing out that item in the budget?

General SHELTON. Yes, sir. This really is budget driven. And it is not that we don't support the ORS concepts. In fact, what we would like to do is push ORS concepts into all space and missile centered system programs. So that should be the way we acquire satellites in the future, using those principles of acquisition and authorities, using the speed of acquisition, using some of those special techniques in terms of how we build satellites.

So we are pushing that across the center. We are doing a good job of incorporating those lessons learned. What we were talking about was a specific program, separate and distinct, and so we have recently decided to go ahead with an ORS—I believe it is being called an ORS 5, which would be a trail blazer for the Space Based Space Surveillance follow-on satellite, and teach us some lessons as we go into the acquisition for that program. So I think we are using the principles to good effect.

Mr. COOPER. But this might be a way that this committee—this Congress could save some money.

General SHELTON. That was what we had proposed, sir.

Mr. COOPER. Yes. I have no more questions, Mr. Chairman.

Mr. ROGERS. The chair now recognizes Mr. Lamborn. Oh, Mr. Coffman. I am sorry. They are Coloradans, you know; they all look alike.

[Laughter.]

Mr. COFFMAN. Thank you.

Mr. ROGERS. Mr. Coffman.

Mr. COFFMAN. Thank you, Mr. Chairman. First of all, I think speaking to all of you, I think that Russia is certainly not an ally of the United States. They are not a reliable partner with the United States. And for us to be reliant upon them for our rocket engines is, I just think it is unwise and I think we need to move forward with finding a domestic supplier for that.

General Shelton, the Air Force has proposed to purchase one GPS satellite this year instead of two, as originally planned. Over the program, how much money would be saved if we purchased in

a more economic manner as was originally planned, two satellites, this year?

General SHELTON. Sir, I am going to have to take that one for the record. I can't tell you that right off the top of my head. I know that again, one of those budget driven decisions. It is maybe not the most economic way to do it. But given the money we had available to us, this was the most efficient way to get it done, you know, with the constrained top line.

[The information referred to can be found in the Appendix on page 121.]

Mr. COFFMAN. Sure, okay. Mr. Klinger, did the Cost Assessment and Program Evaluation [CAPE] review this and offer an opinion on the most economical way to buy those satellites?

Mr. KLINGER. I think the way I would answer your question is, sir, that the CAPE did an analysis when we incurred, as you are probably familiar, a Nunn-McCurdy breach with respect to the EELV program when we came out of sustainment. During that time, CAPE did conduct another independent cost estimate.

We did vet both within the Air Force itself as well as in cooperation with the Office of the Secretary of Defense [OSD], very closely, the array of choices we had prior to coming to resolution of the contract that you are now familiar with, with regard to the 36-core block buys. So that was thoroughly vetted both within the Air Force and throughout the Department.

Mr. COFFMAN. Okay. General Shelton, I think we have one launch provider that is certified to carry the entire national security manifest. Is that correct?

General SHELTON. Yes, sir. That is true.

Mr. COFFMAN. Okay. Do any potential new entrants currently possess the necessary facilities required to process and launch the full manifest?

General SHELTON. Not yet, sir. SpaceX is obviously the Falcon IX version 1.1——

Mr. COFFMAN. Okay.

General SHELTON [continuing]. Can go up to a certain level. They have got plans to develop a heavy vehicle but that is not that far along yet.

Mr. COFFMAN. Okay. Would you agree that the new entrants be certified to support the full manifest before being allowed to bid?

General SHELTON. No, sir. Not necessarily. We would allow them to bid and will allow them to bid without that full suite of capability, the full lift capability, for all of our payloads. So we are happy to compete one satellite at a time.

Mr. COFFMAN. Okay. Will new entrants be required to comply with the same auditing oversight and accounting rules that are currently applied to ULA?

General SHELTON. I believe that is true, but that is an acquisition question that I would——

Mr. COFFMAN. Okay.

General SHELTON [continuing]. Ask Mr. Klinger if he wouldn't mind commenting on that.

Mr. COFFMAN. Sure.

Mr. KLINGER. I think the terms of the specific contract for a new entrant, since that would be awarded competitively, the Air Force

would have to decide that. But certainly from a mission assurance perspective, there is no question in my mind that the Air Force will insist, as would the National Reconnaissance Office, I believe Ms. Sapp would agree, on the same level of mission assurance requirements associated with what we utilize now for the EELV systems that we currently have.

Mr. COFFMAN. Okay. General Shelton, Mr. Klinger, Ms. Sapp, what steps has the Department of Defense taken to improve the management of requirements in order to reduce program risk?

General SHELTON. Are you talking about requirements just across the board?

Mr. COFFMAN. Right.

General SHELTON. Yes, sir. We are very judicious about our requirements to make sure that, one, we aren't gold-plating things, but also that we don't allow the requirements to creep up on us in the midst of the procurement. That is what really drives a lot of cost and technical risk as well. So we are very disciplined about how we maintain a hold on the requirements.

Mr. KLINGER. Sir, I think both within OSD and across the services, we have a number of initiatives going on to improve our ability to respond and improve our acquisition system. But one example that I would highlight under my boss, Frank Kendall, the Under Secretary for Acquisition, Technology and Logistics, one of the things that he is working hard on, with the services, and in particular the joint staff, is to pull the early phases of acquisition of any system closer to the requirements development process, thereby enabling an iterative process of exchange of information between the users who ultimately define the operational requirements for a given system, and the acquirers who have to then make that into a system implementation.

The bottom-line goal of this is to ensure that we have a clear picture of what we are paying for in terms of performance, and where the bright points are where—so that we are not paying 20 or 30 percent for the last 2 or 3 percent of performance of a given system. That is a work in progress.

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

Mr. ROGERS. I thank the gentleman. The chair now recognizes Mr. Carson.

Mr. CARSON. Thank you, Mr. Chairman. For Lieutenant General Raymond, has STRATCOM [Strategic Command] evaluated disaggregation or provided any position on the issue, sir? And how does disaggregation contribute to deterrence?

General RAYMOND. Sir, what STRATCOM does is talks about the importance about being able to protect and defend our capabilities, the how you go about doing it, the architectural part of that is more of a services organize, train, and equip. And I would offer General Shelton up to make a comment on that.

Mr. CARSON. Yes, sir.

General SHELTON. Yes, sir. There are a number of studies underway right now to determine whether or not disaggregation is the right approach. It seems like it is a good thing to pursue based on the need for additional resilience in our constellations given the new threats that are coming into the space environments.

So, hosted payloads is a possibility, disaggregation is a possibility, having more reliance on commercial sources, having international cooperation. There are a number of things that we are studying right now to determine the best way ahead to address the new threats in space and also to address the possibility of premature failure of our assets, making them more resilient is the overall goal.

Mr. CARSON. Yes, sir. And General Shelton, to that point sir, as threats to space evolve and become more vulnerable to your earlier point, are we planning contingencies for that matter where we simply don't rely on space at all? Is adequate training an ongoing issue in this regard?

General SHELTON. Yes, sir. In my opinion, there is not an alternative that I see, near term or mid-term, an alternative to reliance on space capability. We don't get to choose where we are going to fight. We don't get to choose where disasters might occur. And our reliance on space is so heavy that there is just really no alternative out there. So, just like we haven't decided to walk away from the airplane because it got tough to fight in the environment——

Mr. CARSON. Yes, sir.

General SHELTON [continuing]. We need to figure out how we are going to be able to fight through this environment, as well.

Mr. CARSON. That is good. Thank you, Mr. Chairman. I yield back.

Mr. ROGERS. I thank the gentleman. The chair now recognizes the gentleman from Alabama, Mr. Brooks, 5 minutes.

Mr. BROOKS. Thank you, Mr. Chairman. I have a question for Mr. Klinger and General Shelton. I am holding a piece of paper, a document that my staff informs me is being used by United Launch Alliance competitors to claim that ULA's Evolved Expendable Launch Vehicle, single launch costs have more than tripled.

Mr. Klinger and General Shelton, do you agree with how this information is being used? And can you describe the vast requirements that United Launch Alliance must meet and how and why the block buy supported the reduction of costs?

General SHELTON. Sir, I would tell you that information is not being used correctly. I would tell you that it is an extrapolation of 2012 data up through 2030. It doesn't give us any credit for the block buy approach. It doesn't give us any credit for the introduction of competition.

It doesn't give us any credit for the remarkable success record that we have seen with this program. It just tries to paint a picture of one versus another and it is literally apples and oranges from my viewpoint.

Mr. BROOKS. Mr. Klinger, do you have anything to add?

Mr. KLINGER. Yes, sir. In addition to echoing General Shelton's comments, I would offer the following thoughts.

One has to place the EELV program's development against the backdrop of the environment in which we are operating. Put bluntly, when we started this program in the late 1990s, we made a series of assumptions, both mainly about the development of a large commercial demand that the U.S. Government was going to take advantage of, and therefore defray a lot of our costs. And that is

why the original costs for the EELV boosters was set at a level that was much lower than our current costs.

But the reality is the following: virtually every assumption we made about the world that would come to be realized at the start of the program has not come to pass. Effectively the bottom fell out of the commercial space launch market with the collapse of the Internet boom, because a number of commercial ventures that would have placed a large number of satellites into orbit, and therefore required a large number of boosters, never happened. Therefore the larger burden associated with EELV costs was therefore transferred to the government.

I don't believe that the context in which that information is being used is accurate. I would offer the following point. As my colleagues have mentioned that we are all in favor of competition, here is one example had we had competition earlier that cost increase, though contextually inaccurate, probably would have been mitigated because there would have been a greater incentive first for Lockheed Martin, then Boeing, and subsequently United Launch Alliance to streamline their operations and find reasons to cut costs. In fact, I think we are reaping the benefits of the impending competition right now, when you look at the new contract that the Air Force has signed with the government, about the 36 cores.

Mr. BROOKS. If I can have a follow-up question that is similar to the first one. And this one is for General Shelton, Mr. Klinger, and Mr. Loverro. The Air Force has signed a contract with the United Launch Alliance for a block buy for 36 rocket cores over 5 years. This was a new approach, rather than buying on an ad hoc, as needed basis.

Can you tell how this approach came about and what the benefits are? How much money has the taxpayer saved as a result of the block buy? And what would be the risk of breaking the contract?

General SHELTON. Let me go at these in reverse order. The risk would be significant, sir, because we would have to do a significant amount of work—engineering work, probably, to get payloads onto a different kind of booster.

The other risk that would be significant would be cost. There would undoubtedly, undoubtedly be much, much greater cost per booster in the program, because, again, we don't have economic order quantities assigned to that current provider, the only currently certified provider.

It came about because all those things were in place. We had one certified provider. We needed to give the industrial base some certainty on the business base. So that is the approach that was taken and as I said earlier to the chairman, it was all about cost effectiveness.

Mr. BROOKS. Do any of the other gentlemen have anything to add?

Mr. KLINGER. I would offer, in addition to echoing General Shelton's points, I think one measures costs not only in dollar value but in this case, from an acquisition perspective, in the adverse impact on the industrial base. I don't think one can overstate the importance of the benefits that that block buy provides to a sec-

tor of our space industrial base that was at best on unsteady footing.

And I am not talking about the prime contractors here. As General Shelton mentioned, it is the second and third tier suppliers, who supply components and subsystems for ULA boosters, that are in a much better condition than they otherwise would have been, had we not had the block buy.

I think the short answer to what would happen if we had to break that contract, we don't know what it would ultimately cost. We know that it is at least in excess of $370 million dollars. We don't know the exact figure.

But what we do know is that, as General Shelton also mentioned, we would simply have to probably go back and negotiate on a mission-by-mission basis for launch services. And our experience, as you know, our experience with that from a cost standpoint has not been good.

Mr. ROGERS. The chair now recognizes Mr. Lamborn for 5 minutes.

Mr. LAMBORN. Thank you Mr. Chairman for having this hearing. General Shelton, good to see you again. And I know we have touched on some of these questions before, so this is maybe a little bit of recapping.

But how many launches has the Air Force done as part of the Evolved Expendable Launch Vehicle program, how many of them were successful? And who was the provider of those various launches?

General SHELTON. Yes, sir. We have done 68 national security launches under the EELV program. There have been 68 successes and United Launch Alliance is the provider.

Mr. LAMBORN. Okay, thank you. Changing gears, and I don't know who would be the best person to respond to this, but it has to do with space situational awareness and JMS [Joint Space Operations Center Mission System], and we have talked about this in previous hearings. And I know that there has been talk about establishing contracts with commercial providers for some of the capabilities of JMS.

So can you update us on how that is working and how those relationships are developing, if so? And then I have maybe a follow-up on that.

General SHELTON. Yes, sir. We have been very successful with the JMS program, introducing commercial software, what we call commercial-off-the-shelf software. Two companies are on contract right now, AI and AGI, and both of those are providing great services to us.

So we have broken through some of the initial concerns about that and like I said, we have got at least a couple of providers on contract now.

Mr. LAMBORN. What would you recommend, General, as far as a way forward that we can exploit the advantages that using a commercial partner, a private sector partner, to reduce risk of just having one supplier or maybe putting some of the cost risk upon the vendor instead of the taxpayer and the DOD assuming—what are some of the things you see going forward in that relationship? And what can we do as a committee to help out?

General SHELTON. Sir, I think the best thing the committee can do is to continue to support the program, because the overall architecture of the program absolutely was designed to be open and available for drop in and pull out kinds of software packages. So we have got this architecture that is now ready to plug things in, use it for a while. If we don't like that, if there is another thing that comes along, we pull that old software out and plug in new. So it is absolutely ready for commercial sources.

Mr. LAMBORN. Okay, thank you. And to finish up with some of the launches that have been postponed, and this may have been asked or described before I got in the room. I was a few minutes late getting here because of something else. But, what is the status of launches that have been postponed and when will they be taken up?

General SHELTON. Yes, sir. I believe what you are referring to is there were 14—we contracted with ULA for 36 cores. There were 14 missions that we thought that we were ready to compete. As we developed the fiscal year 2015 budget, because of affordability and because the GPS constellation was doing well, we were able to slip out some of those satellites outside the FYDP. So they will still be available for competition. Just not in this particular phase of the program. So, it is not like those requirements go away. It is just the timing of those.

Now, one satellite is frankly too heavy for the only, what appears to be the only additional new entrant to the game, here. And another one was reassigned to ULA to keep our 36-core commitment.

So, the 14 boil down to 7 in this particular budget. There may be an eighth we can look at. We are looking at that right now as an opportunity to provide a competitive opportunity for that eighth satellite.

Mr. LAMBORN. Okay, thank you. And Ms. Sapp, for the NRO and the important work that it does, is there anything more that our committee can do? I am just going to throw a general question out for you. Is there anything more that we can be doing to helping make sure that you have the resources and the assets you need to successfully do your job?

Ms. SAPP. No. I appreciate the question. The NRO does quite a bit to support the DOD and we really appreciate this committee's support of the NRO.

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

Mr. ROGERS. I thank the gentleman. And the chair now recognizes Mr. Langevin for his questions.

Mr. LANGEVIN. Thank you, Mr. Chairman. I want to thank the panel for their testimony and for the great and important work they are doing on behalf of the country. I guess I would like to turn first to, well, to space launch if I may.

EELV launch costs have steadily risen over the last decade. DOD and ULA have recently cited gains and efficiencies. Now if you have already covered this, you can let me know. I know I came in late, but my question is why weren't these efficiencies and cost savings pursued and achieved before the new competitors, such as SpaceX, arrived in the marketplace? And how has the potential for competition affected price?

Mr. KLINGER. I think, Congressman, that we did cover a piece of this. But I will add to my earlier remarks. I think if you look at the start of the EELV program in terms of the initial program, we effectively had no choice.

We were flying out the Titan IV. We had also incurred a series of five catastrophic launch failures over a very short period of time. Three of those were Titan IV failures. Two of those were Delta III failures. So we were in a position that we had to create, along with industry, a new launch capability for national security payloads.

The costs have risen, as I mentioned earlier, in no small part because all of the assumptions, and the major assumptions that we made, that underpinned the original creation of the EELV program have simply not come to pass, or turned out to be wrong, most notably amongst them, the disappearance of what was anticipated to be a very significant increase in commercial demand for space launch capabilities. In fact, that is what the government was counting on to defray a large portion of the costs and the result of which would have been significantly decreased launch service costs by virtue of the volume of launches that would be provided beyond those that were needed by the government.

In terms of competition, I think it is a situation in which we are now seeing the benefits of impending competition reflected in two ways. Number one, the most concrete way is the 36-core block buy, which I think 5 or 7 years ago would have been much harder to achieve, in no small measure because there was absolutely no—it would have been no incentive at that point for the United Launch Alliance to move down a path in which it was going to not only be willing to engage in that type of negotiation with the government, but in addition, ULA would not have really had any incentive to streamline its own internal operations because it was a monopoly provider, or the sole provider in effect at the time. So I think that the large change in the landscape in the last 3 or 4 years has not only been the impending, for them, specter of competition, on the landscape.

The other thing is that, I think you are familiar with the Better Buying Power initiatives that OSD and the services have been implementing. And in some sense, those initiatives directed at lowering our costs are bearing fruit in terms of the contracts like the one we see in EELV.

Mr. LANGEVIN. All right. Before my time expires, let me also switch to, and General perhaps this will be you or for Director Sapp. As we face increasing counter space threats, what are the benefits and challenges of disaggregation for the space architecture, and how will the Department decide whether to apply disaggregated architecture principles to future space system acquisitions?

General SHELTON. Yes, sir. We are in the midst of those studies right now, trying to determine if that is the appropriate response to the threats we see in space. Disaggregation obviously spreads the capability over more platforms. It is distributed architecture as opposed to creating big satellites that would be potential targets.

And even if you talk about a premature failure of a satellite, it would leave a large geographic hole in important constellations, such as Advanced Extremely High Frequency satellite, or the Space

Based Infrared System. Those systems that are very necessary in times of conflict to the United States.

So I think those are existential capabilities. I think it is essential that we look at survivability and resilience in those constellations.

Mr. LANGEVIN. Thank you, General. I appreciate that. I know my time expired, so I thank the panel for being here. I will have some additional questions I would like to submit for the record. And I would appreciate a response on those. Thank you, Mr. Chairman. I yield back.

Mr. ROGERS. I thank the gentleman, and the chair recognizes Mr. Bridenstine, 5 minutes.

Mr. BRIDENSTINE. Well, thank you, Mr. Chairman. We spend a lot of money on both military and commercial satellite communication systems. And I wanted to ask you how well these two enterprises, both the military and the commercial satellite communication systems are managed? And if there are benefits, and what those benefits might be to having a single manager? General Shelton?

General SHELTON. When you say single manager, Congressman, are you talking about single manager inside the Department of Defense, or across the United States Government, or——

Mr. BRIDENSTINE. So, my understanding is we purchase, you know, communications from commercial satellite providers, and we have our own military satellites as well.

General SHELTON. Yes, sir.

Mr. BRIDENSTINE. And between these two, are they managed by the same person? Are they managed separately? When you think about—I guess my overall question is, when you think about procurement, multi-year procurement of commercial satellite communication systems is something that I think could save money, and enable us to be more productive for the future. But I wanted to get your assessment on that.

General SHELTON. Now I understand the question. We are in some pathfinder efforts right now to look at the way we acquire commercial services. We obviously have, as you said, we have dedicated military satellites for what we would call wideband communications. But that is not nearly enough bandwidth to even support the efforts in Afghanistan, previous efforts in Iraq, and really the efforts around the world.

So, we also go out on what I would call the spot market and buy those commercial services. A very inefficient way to do business. So our pathfinder is looking at, what if we bought a transponder on a commercial satellite? How would that work out? What if we went increasingly all commercial and didn't have dedicated military wideband satellites?

So there is a range of options here, and we are looking at the full suite of those options, trying to determine what would be most cost effective.

Mr. BRIDENSTINE. When you buy commercial, General, can you specify—when you buy commercial, are you buying with OCO [Overseas Contingency Operations] funds? Is there a procurement program for it? Can you talk about that?

General SHELTON. There are—I think a lot of it is OCO funded. But through the Defense Information Services Agency, DISA, they

go out and procure those services. So some of it is, again, just bandwidth demand that is out there steady-state, they procure that with non-OCO funds. But the strictly wartime effort bandwidth that is required is obviously OCO funded.

Mr. BRIDENSTINE. As far as a base level of necessary communications that STRATCOM can assess will be needed for the future, you know, there are challenges, right? We don't know where the next conflict may be. We don't know necessarily if we are going to have the communications capability in whatever region that may be. How do we mitigate some of these risks?

General SHELTON. That has been the basis of providing the dedicated military satellite communications capability, at least a basis, a worldwide basis, that you can count on. And then you could surge from there with commercial capability. As we look to the Pacific, there is not as much bandwidth available to go after in some of those areas in the Pacific. So we will have to have a different strategy. Hence, these pathfinder efforts.

Mr. BRIDENSTINE. Okay. Mr. Klinger.

Mr. KLINGER. Congressman, just a couple of things to add to the points General Shelton made. We have an ongoing analysis of alternatives that is underway in the Department, focused on protected satellite communications to include looking at non-space alternatives. And the focus of that effort is to identify alternatives beyond advanced AEHF vehicle six, which is the last vehicle in the existing program.

We also are trying to assess the viability of acquisition options that will balance the need to save money with the need to maintain operational effectiveness. And that really requires on three things, the stability of the requirement, the stability of the funding, and whether in fact there are substantial savings to be had by procuring—using a different approach.

You made reference earlier to multi-year procurement. I would just note the following: we and the committees continue to look at that. But there are some structural obstacles, and I would note scoring in particular, not to get into the arcane details of the budget process. But finding a way to preclude or mitigate the requirement that the Department would have to budget in a single year for a multi-year procurement of commercial services, is a major issue that we would need to work through with the Congress.

Mr. BRIDENSTINE. Thank you.

Mr. ROGERS. Thank the gentleman, and thank the witnesses. We are going to recess. Well, no, we are going to adjourn this open hearing. But before we do I want to remind you that we are going to leave the record open for 10 days for Members who have additional questions that we couldn't get to in this hearing—submitting them—I would ask you to respond to those in a timely manner. And with that we will adjourn this hearing and come back after this series of votes, which we should be back in about 20–25 minutes, and go to the closed hearing.

[Whereupon, at 2:59 p.m., the subcommittee was adjourned.]

A P P E N D I X

APRIL 3, 2014

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

APRIL 3, 2014

Opening Remarks
Honorable Mike Rogers
Chairman, Subcommittee on Strategic Forces
House Armed Services Committee

Hearing on the Fiscal Year 2015 National Defense Authorization Budget Request for National Security Space Activities

April 3, 2014

Good afternoon. I want to welcome everyone to the Strategic Forces Subcommittee's hearing on the fiscal year 2015 budget request for national security space activities. Our distinguished panel of experts this afternoon are:

- General William Shelton, Commander of Air Force Space Command;
- Mr. Gil Klinger, Deputy Assistant Secretary of Defense, Space and Intelligence Office;
- Mr. Doug Loverro, Deputy Assistant Secretary of Defense for Space Policy;
- Ms. Betty Sapp, Director of the National Reconnaissance Office
- Lieutenant General John W. "Jay" Raymond, Commander, Joint Functional Component Command for Space

I appreciate your time in appearing before this subcommittee. You are the leaders of our national security space program, and we greatly value your perspectives.

The importance of space to United States national security is unquestionable. Our adversaries and potential adversaries have watched with awe and concern with the American way of war since 1991; we would be naïve and foolish to think that they would not develop the means to deny us our advantages. Space has clearly been one such means.

The threats to our space systems are real, serious, and growing. To protect these critical assets, and to deter adversaries from future acts of space aggression, a fully developed multi-faceted space security and defense program is needed.

We need real protection and defenses. We don't send our tanks, ships, or aircraft to war without defenses, and we should treat this domain no differently – because our potential adversaries certainly aren't. This will require leadership, commitment and technical ingenuity that our Defense Department and military industrial base has brought to bear on many issues in the past.

I am aware that the Department is continuing to closely analyze disaggregation as a basis of our response to the growing threats. I remain concerned with this approach as the cost and benefits seem questionable. Along with the studies the Department is conducting on this area, Congress also commissioned several, which we look forward to receiving results of before moving forward on these concepts.

Separately, I believe that now more than ever, we must spend our defense dollars smarter. I commend the Department on the smart investments it has made through block buy purchases with Advanced Extremely High Frequency Satellite, Space-Based Infrared Systems, and the Evolved Expendable Launch Vehicle program. These acquisition strategies have saved the taxpayers billions of dollars. But we still have more work to do, for instance, commercial satellite communications is one area that we must work to improve through new acquisition methods, such as multi-year procurements.

Thank you again for being with us today, and I look forward to your testimony.

Ranking Member Cooper, over to you for your statement.

DEPARTMENT OF THE AIR FORCE

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

SUBJECT: Fiscal Year 2015 National Defense Authorization Budget Request for Space Programs

STATEMENT OF: General William L. Shelton
Commander, Air Force Space Command

April 3, 2014

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

Introduction

Chairman Rogers, Representative Cooper and distinguished Members of the Subcommittee, it is an honor to appear before you once again as the Commander of Air Force Space Command (AFSPC). As the Air Force space and cyberspace lead, I am responsible for organizing, training and equipping more than 40,000 military and civilian employees to provide Air Force space and cyberspace capabilities for the Combatant Commands and for the Nation. My team works hard to deliver these capabilities around the world, every hour, every day.

Space and cyberspace capabilities are foundational to the Joint Force Commander's ability to deter aggression and to execute global operations across the entire range of military operations, from humanitarian and disaster relief through major combat operations. Our military satellites and computer networks are technological marvels, providing mission-critical global access, persistence, and awareness. These systems not only provide essential, game-changing capabilities for our joint forces, they are increasingly vital assets for the global community and world economy.

Specifically in space, our sustained mission success integrating these capabilities into our military operations has encouraged potential adversaries to further develop counterspace technologies and attempt to exploit our systems and information. Therefore, I believe we are at a strategic crossroad in space. With the threats to our space systems increasing and defense budget uncertainty, the status quo is no longer a viable option. This "new normal" in space requires us to address protection of mission-critical systems, challenge traditional acquisition practices, and analyze new operational constructs.

The grand challenge before us is to assure essential space services will be available at the time and place of our choosing, while simultaneously lowering the cost of executing these

missions. Finally, the budget situation of the last year certainly reminded us that our ability to provide these services now and into the future is fragile.

Mandate for Change: Future Space Capabilities at a Strategic Crossroad

The space environment has fundamentally changed since our fledgling efforts in the late-1950s and early 1960s. Our space systems were designed to operate in a relatively benign environment, and the detente between the United States and the Soviet Union kept the peace--even in space. There were few space-faring nations, and even fewer with indigenous launch capability. Today, there are more than 170 nations with some form of financial interest in a variety of satellites, and 11 nations that can independently launch satellites into space. The rapid expansion in space traffic over the past 50+ years occurred largely without conflict, but that era is coming to an end.

The joint force dependence on space assets yields a corresponding vulnerability we know others seek to exploit. Counterspace developments by potential adversaries are varied and include everything from jamming to kinetic kill anti-satellite weapons. Global Positioning System (GPS) jammers are widely available, complicating our employment of GPS navigation and timing signals in weapons and platforms. Satellite communications jammers are also available, which may challenge over-the-horizon communications when needed most. Also, some nations have developed and successfully demonstrated anti-satellite weapon capabilities which could threaten our satellites in times of conflict. Unfortunately, all projections indicate these threatening capabilities will become more robust and proliferated, and they will be operational on a shorter than predicted timeline.

In addition to adversarial counterspace programs, the growing debris problem is also a concern to spacecraft operators in all space sectors: military, civil and commercial. 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 objects smaller than 10 centimeters. And our models project more than 500,000 man-made objects greater in size than one centimeter in orbit today--many of these small objects represent a potentially catastrophic risk to fragile-by-design spacecraft.

We are also addressing the President's direction to support the National Broadband Plan by finding balance between assured access, spectrum sharing and reallocation/repurposing. Use of radio spectrum for ground-space communications must be protected from both a regulatory perspective and from targeted adversary action.

With the rapidly expanding adversary threats to our spacecraft, the growing debris population and decreasing budgets, we must adapt our satellite constellation architectures to become more resilient, while simultaneously making them more affordable. Just as combat aircraft necessarily evolved with the threat, we can no longer expect satellites built for a permissive environment to operate effectively in an increasingly contested space domain.

Due to the cost of launching satellites, our design philosophy has been to maximize the functionality on a given satellite, which translates to increased weight, size and corresponding cost. As a result, we build just enough satellites, just in time, to sustain our constellations. This philosophy worked well over the years, but in the new normal of space, we are vulnerable to the cheap shot or to premature failure. For example, loss of a single satellite in our missile warning or our protected communications constellations would potentially leave large gaps in a vital capability. We must consider different architecture options that will provide adequate and resilient capability at an affordable cost. Our die is cast through the mid-2020s with the outstanding satellites we are buying and successfully placing on orbit to support national security

objectives and joint operations. Because of lengthy acquisition timelines, to affect these architectures in the post-2025 timeframe, we need to complete ongoing studies soon to determine the most efficient approach for the future.

Confronting Budget Challenges

Based on available funding, we made difficult decisions in the Command to survive Fiscal Year (FY) 13. The Budget Control Act of 2011 resulted in significant FY13 cuts to the Operations and Maintenance (O&M) budget at Air Force Space Command, which in turn compelled irreversible changes and significant risk to space operations going into FY14. The welcome relief and flexibility provided by the FY14 Appropriations Act is sustained in the FY15 President's Budget—our space operations budget requires this level of support to maintain our current operational posture and manage risk in changing operating conditions.

Impact of Sequestration

Despite our cost reduction efforts, last year's sequestration cuts required drastic actions at AFSPC. We cut $304.8 million from our O&M budget for FY14 alone to comply with the Budget Control Act. Achieving that magnitude of reductions required continued civilian workforce pay freezes, a 25 percent reduction of contractor services within my headquarters (on top of a 50 percent reduction the year before), inactivation of some operational capabilities, and most notably $100 million of additional risk in Weapon System Sustainment funding. This means that in FY15, vital sustainment activities are delayed or deferred, which could translate into system outages of increased duration or severity. Additionally, AFSPC uses a significant portion of our O&M budget to fund mission-essential contractor operators for our space and cyberspace missions--there is no flexibility here. Our search for savings over the last several

years of declining budgets virtually eliminated any margin in O&M; therefore, the cuts began to erode these contracts which are essential to perform and sustain our mission.

While the Bipartisan Budget Act of 2013 alleviates a portion of the cuts we were facing in FY14 and FY15, we remain concerned that continued sequestration-induced budget cuts in FY16 and beyond, as well as overall funding instability, could undermine our space capability for years to come.

Challenging Legacy Space Architectures and Traditional Acquisition Practices

This past year, we continued success in our acquisition programs to provide greater mission assurance and cost savings. As we transition from development to production, we have captured success through lean processing, smart testing and appropriate oversight and reporting. The Space and Missile Systems Center (SMC) made tremendous strides implementing "should-cost" initiatives that resulted in real program savings of more than $1.4 billion across the Future Years Defense Program. The result of these actions can be seen in streamlined assembly, testing and delivery of a number of programs to include Advanced Extremely High Frequency (AEHF), Space-Based Infrared System (SBIRS), Wideband Global Satellite Communications (WGS) and GPS III.

Space Modernization Initiative (SMI)

In 2011, AFSPC adopted the Efficient Space Procurement (ESP) concept to reduce procurement risk and lower overall cost by transitioning from buying satellites one-at-a-time to buying satellites in blocks using fixed price contracts. This approach allowed us to take advantage of economic order quantities and the efficiencies inherent in a stable production line. We then used a portion of these savings to invest back into mission areas under SMI. The overall SMI strategy is to invest in program efforts that create increased trade space for future

decisions. Study contracts under SMI are helping us better plan for a challenging future by exploring affordable technology alternatives and architectures in missile warning, communications, global positioning, navigation and timing mission areas.

SMI-funded studies position AFSPC to take advantage of opportunities such as greater commercial satellite availability, a competitive medium launch market and faster commercial production cycles. SMI also postures the Air Force to rapidly address emerging kinetic and non-kinetic threats. These investments are critical to our ability to define future options to increase resiliency in this dynamic operational space environment.

Resilient Architectures

As we work toward increased resiliency and affordability, we are examining a range of options, one of which is disaggregation. Disaggregation concepts call for the dispersion of space-based missions, functions or sensors across multiple systems or platforms. By separating payloads on different satellites we will complicate a potential adversary's targeting calculus, decrease size and system complexity, and enable use of smaller boosters--with the goal of simultaneously driving down cost.

In addition, we are evaluating constructs to host payloads on other platforms where feasible, and take better advantage of available commercial services. The trailblazing Commercial Hosted Infrared Payload program, a government infrared payload on a commercial satellite, was a technical success by any measure, and we learned significant lessons on the overall hosted payload concept.

Over the past several months, we've met with more than 65 space companies to seek their ideas on alternative architectures. From those meetings, we collected many concepts that will inform our Analyses of Alternatives (AoA) for the future of protected military satellite

communications and overhead persistent infrared systems. In addition, the Missile Defense Agency (MDA) is supporting our AoA studies with threat definition, technical evaluations and cost analysis support. AFSPC and MDA are collaborating on future space sensor architecture studies and sensor performance assessments across a broad set of joint mission areas. Finally, Federally Funded Research and Development Centers, as well as others, will complete studies this year on disaggregation and its secondary impacts on the launch industry and space architectures.

Better Buying Power

As previously mentioned, our use of the ESP approach and the Department of Defense's (DoD) Better Buying Power concepts resulted in significant positive results. SMC, under the sterling leadership of Lieutenant General Ellen Pawlikowski, awarded a block buy contract for the AEHF space vehicles 5 and 6, obtaining $1.625 billion in savings from the original independent cost estimate. Also, we anticipate the award of a contract for two more SBIRS satellites later this year, taking advantage of lessons learned on AEHF 5 and 6. Despite parts obsolescence challenges that required initial nonrecurring engineering and advance procurement efforts, we will realize significant savings using a firm, fixed-price contract.

Space Capabilities for the Joint Warfighter

Space Situational Awareness (SSA)

SSA underpins everything we do in space. Gaining and maintaining awareness in space requires data from global sensors and the integration and exploitation of that data to support operational command and control (C2). The JSpOC Mission System (JMS) is integral to improving SSA and C2. JMS Increment 1 was approved for full deployment and operationally accepted last year. This increment delivered the net-centric framework and the initial capability

advances toward better operator understanding and monitoring of the space environment. JMS Increment 2 will build on that foundation by fielding groundbreaking capabilities to include greatly improved capability to detect and characterize orbital hazards and adversary threats. Increment 2 will also enable the JSpOC to transition from the legacy Space Defense Operations Center system to expanded computational capacity and improved automation, thereby improving our ability to handle space events and allowing us to retire increasingly difficult to sustain hardware. Furthermore, it will allow integration of data from our network of space surveillance sensors, previously unavailable intelligence community data, and data from other commercial, allied and governmental sensors. The JMS program clearly represents game-changing capability for the Nation's space situational awareness.

Enhancements to the Space Surveillance Network are necessary to close sensing gaps and take full advantage of the JMS high performance computing environment. And international cooperative efforts are part of that effort. As an example, in November, 2013, Secretary Hagel and Australian Defense Minister Johnston signed a Memorandum of Understanding finalizing arrangements to move the Defense Advanced Research Projects Agency's Space Surveillance Telescope from its original site in New Mexico to a site in Western Australia. The high capacity and extremely accurate capabilities of this telescope will significantly enhance SSA in deep space. The telescope will be relocated and operational in 2016 to monitor geosynchronous orbits over the Pacific region. Similarly, we have reached an agreement to place a C-Band Radar in Australia to help with southern hemisphere SSA coverage.

Another big step forward is the new S-Band Radar, commonly known as the Space Fence. We will build this critical SSA sensor on Kwajalein Atoll, and remotely operate from Huntsville, AL. This radar will track much smaller objects and cover almost all orbital

inclinations with a capacity to track many thousands of objects daily. Budget uncertainty contributed to a one year delay, but the contract should be awarded this Spring, with an initial operational capability date in FY19.

Our ground-based radars provide outstanding deep space tracking and space object identification capabilities, but they are not well-suited to search operations. Our ground-based optical systems are outstanding deep space search and tracking assets, but they can only perform their mission at night, and they must have clear skies to conduct imaging operations.

Based on the success of a sensor flown on a missile defense experimental satellite, in 2010 we developed and launched the Space-Based Space Surveillance (SBSS) satellite, with a 7-year design life, into low-earth orbit to augment both search and tracking of man-made objects. The follow-on program is being developed; however, it will not be launched until 2021 based on available funding. The result is a potential 4-year gap in this crucial space-based coverage, which will limit our ability to maintain timely custody of threats to our satellites in geosynchronous orbits. We have extended our network to include allied contributions to mitigate the potential loss of data. For example, the Canadian Sapphire satellite, launched in 2013, is a contributing sensor to our space surveillance efforts, but unfortunately, this satellite has a 5-year design life and is expected to be decommissioned about the same time as SBSS. We are working hard to extend the life of SBSS and other potential contributors to mitigate this potential coverage gap.

A future contributor to extend and enhance coverage is the Geosynchronous Space Situational Awareness Program (GSSAP). This system will collect SSA data allowing for more accurate tracking and characterization of man-made orbiting objects in a near-geosynchronous orbit. Data from GSSAP will contribute to timely and accurate orbital predictions, enhance our

knowledge of the geosynchronous environment and further enable space flight safety to include satellite collision avoidance. GSSAP is expected to launch in 2014.

Assured Access to Space

It is essential that we sustain a reliable capability to launch national security satellites into space. To that end, we continued our unprecedented string of successful launches in 2013. Alongside our industry partner, United Launch Alliance, we executed an all-time high of 11 launches of the Evolved Expendable Launch Vehicle (EELV).

The commercial space launch industry made substantial progress last year with successful launches by Orbital Sciences and SpaceX. Our launch acquisition strategy aims to take advantage of the competition made possible by these new entrants once they are fully certified under the approved new entrant certification protocol. We have been very successful placing new satellites in orbit by placing a premium on mission assurance. As we move forward in an era of competition for launch services, we must remain focused on mission assurance to ensure national security payloads are safely and reliably delivered to space.

Our launch and range infrastructure has served the space enterprise well over the years, but the infrastructure overall is old and it requires considerable sustainment and modernization efforts. And due to the previously mentioned O&M budget shortfalls, we took action to right-size our infrastructure on both coasts and at our down-range sites. Our National Security Space Essential Range will not compromise public safety or mission assurance, but we will continue to balance sustainability and modernization to overcome obsolescence, as well as implementing better contract mechanisms to control costs.

Military Satellite Communications

2013 was a successful year for AFSPC military satellite communications as well. The Air Force launched the third AEHF satellite in September 2013, delivering increased capacity for survivable, secure, protected and jam-resistant satellite communication for strategic and tactical warfighters as well as our most senior national leadership and international partners. The Air Force also successfully launched the fifth and sixth WGS satellites within 76 days of each other. These satellites significantly increase high-capacity satellite communication to joint forces around the world.

The WGS program exemplifies the opportunities to leverage commercial satellite technologies to reduce the cost of providing space systems. However, we need to go further. At SMC, our program managers collaborated with industry to explore other possibilities. Through the use of broad area announcement solicitations, SMC awarded contracts to 17 vendors to examine concepts for secure satellite communications at a lower cost.

Position, Navigation and Timing (PNT)

By the end of 2013, we completed production of all 12 GPS IIF satellites. The fourth GPS IIF satellite was launched in 2013, and we plan to launch three satellites in 2014, three more satellites in 2015 and the final two GPS IIF satellites in 2016.

As has been widely reported, the navigation payload delivery for GPS III is delayed beyond the contracted date. Although we don't believe this will result in any impact to our ability to provide gold standard PNT services to the world, we are concerned about the impact to the overall GPS III program. We are working remedies with the prime contractor for this delay.

We also expect the Next-Generation GPS Control Segment Block 1 to transition to operations in 2016. In November, we tested the system's ability to command GPS Blocks II and III satellites using space system simulators, including control of the major PNT signals. This

demonstration is a major step forward to prepare for the GPS III era of more secure and robust GPS signals to the warfighter.

Space-Based Infrared System

The SBIRS GEO-2 satellite was launched, delivered for operational trial period and operationally accepted in 2013. To date, the data provided by both SBIRS GEO-1 and GEO-2 satellites is outstanding, providing enhanced missile warning and battlespace awareness over critical portions of the world. SBIRS GEO-3 is planned to launch in 2016.

Terrestrial Environmental Monitoring

Defense Meteorological Satellite Program (DMSP) satellite number 19 will launch in April 2014 and we expect the satellite will remain operational well into the 2020s. We are concerned about potential gaps in meteorological coverage when current DoD, civilian, partner and allied meteorological satellites reach their end-of-life in the 2015-2025 timeframe. The Space-Based Environmental Monitoring AoA was conducted to study follow-on options, such as international partnerships, hosted payloads or a new satellite, for continued meteorological support to warfighters in the most cost-effective manner. The results from the AoA are currently being reviewed by the Joint Requirements Oversight Council.

Conclusion

The men and women of AFSPC remain committed to providing unsurpassed support to our warfighters and allies. Every day they bring innovation, excellence, and uncompromising focus to the Nation's space missions that are conducted 24/7 across the globe.

Our Nation's advantage in space is no longer a given. The ever-evolving space environment is increasingly contested as current and potential adversary capabilities grow in

number and sophistication. Providing budget stability and flexibility in this very dynamic strategic environment is necessary to maintain and bolster the viability of all space capabilities.

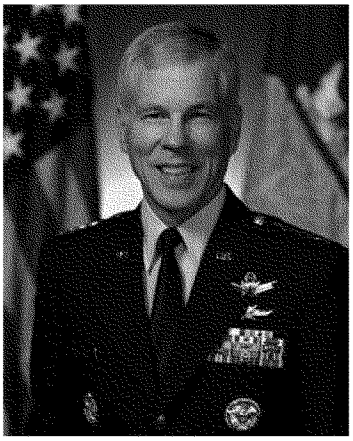
I remain committed to a course of action that acknowledges and responds to uncertainty in this new normal. The status quo is not a viable alternative in response to the new normal. We are reaching out to our talented Airmen, industry partners, allies and Congress to make the changes necessary to provide required capability that is affordable and resilient.

I thank you for your support and look forward to working with Congress and this committee to keep you abreast of our efforts to provide resilient, capable and affordable space capabilities for the joint force and the Nation.

BIOGRAPHY

UNITED STATES AIR FORCE

GENERAL WILLIAM L. SHELTON



Gen. William L. Shelton is Commander, Air Force Space Command, Peterson Air Force Base, Colo. 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 Shelton 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. He leads more than 46,000 professionals, assigned to 88 locations worldwide and deployed to an additional 35 global locations.

General Shelton entered the Air Force in 1976 as a graduate of the U.S. Air Force Academy. He has served in various assignments, including research and development testing, space operations and staff work. The general has commanded at the squadron, group, wing and numbered air force levels, and served on the staffs at major command headquarters, Air Force headquarters and the Office of the Secretary of Defense. Prior to assuming his current position, General Shelton was the Assistant Vice Chief of Staff and Director, Air Staff, U.S. Air Force, Pentagon, Washington, D.C.

EDUCATION

1976 Bachelor of Science degree in astronautical engineering, U.S. Air Force Academy, Colorado Springs, Colo.
1980 Master of Science degree in astronautical engineering, U.S. Air Force Institute of Technology, Wright-Patterson AFB, Ohio
1986 Armed Forces Staff College, Norfolk, Va.
1995 Master of Science degree in national security strategy, National War College, Fort Lesley J. McNair, Washington, D.C.
1996 Program for Senior Officials in National Security, Syracuse University and Johns Hopkins University
1997 Fellow, Seminar XXI, Massachusetts Institute of Technology, Cambridge

ASSIGNMENTS

1. August 1976 - May 1979, launch facilities manager, launch director and technical assistant to the commander, Space and Missile Test Center, Vandenberg AFB, Calif.
2. May 1979 - December 1980, graduate student, U.S. Air Force Institute of Technology, Wright-Patterson AFB, Ohio
3. January 1981 - July 1985, space shuttle flight controller, Johnson Space Center, Houston, Texas
4. July 1985 - January 1986, student, Armed Forces Staff College, Norfolk, Va.
5. January 1986 - July 1988, staff officer, Deputy Chief of Staff for Operations, Air Force Space Command, Peterson AFB, Colo.
6. August 1988 - August 1990, staff officer, Office of Space Plans and Policy, Office of the Secretary of the Air Force, Washington, D.C.

7. August 1990 - June 1992, Commander, 2nd Space Operations Squadron, Falcon AFB, Colo.
8. June 1992 - June 1993, executive officer to the Vice Commander, Air Force Space Command, Peterson AFB, Colo.
9. June 1993 - July 1994, Commander, 50th Operations Group, Falcon AFB, Colo.
10. August 1994 - June 1995, student, National War College, Fort Lesley J. McNair, Washington, D.C.
11. June 1995 - September 1997, Deputy Program Manager and Executive Assistant, Cooperative Threat Reduction Program Office, Office of the Assistant to the Secretary of Defense for Nuclear, Chemical and Biological Defense Programs, Washington, D.C.
12. September 1997 - August 1999, Commander, 90th Space Wing, Francis E. Warren AFB, Wyo.
13. September 1999 - July 2000, Chief, Space Superiority Division, Office of the Deputy Chief of Staff for Plans and Programs, Headquarters U.S. Air Force, Washington, D.C.
14. July 2000 - November 2000, Director of Manpower and Organization, Office of the Deputy Chief of Staff for Plans and Programs, Headquarters U.S. Air Force, Washington, D.C.
15. November 2000 - May 2002, Director of Requirements, Headquarters Air Force Space Command, Peterson AFB, Colo.
16. June 2002 - January 2003, Director of Plans and Programs, Headquarters AFSPC, Peterson AFB, Colo.
17. January 2003 - May 2003, Director, Air and Space Operations, Headquarters AFSPC, Peterson AFB, Colo.
18. June 2003 - January 2005, Director of Capability and Resource Integration (J8), USSTRATCOM, Offutt AFB, Neb.
19. January 2005 - May 2005, Director of Plans and Policy (J5), USSTRATCOM, Offutt AFB, Neb.
20. May 2005 - December 2008, Commander, 14th Air Force (Air Forces Strategic), AFSPC, and Commander, Joint Functional Component Command for Space, USSTRATCOM, Vandenberg AFB, Calif.
21. December 2008 - July 2009, Chief of Warfighting Integration and Chief Information Officer, Office of the Secretary of the Air Force, the Pentagon, Washington, D.C.
22. July 2009 - January 2011, Assistant Vice Chief of Staff and Director, Air Staff, U.S. Air Force, Pentagon, Washington, D.C.
23. January 2011 - present, Commander, Air Force Space Command, Peterson AFB, Colo.

SUMMARY OF JOINT ASSIGNMENTS
1. June 1995 - September 1997, Deputy Program Manager and Executive Assistant, Cooperative Threat Reduction Program Office, Office of the Assistant to the Secretary of Defense for Nuclear, Chemical and Biological Defense Programs, Washington, D.C., as a colonel
2. June 2003 - January 2005, Director of Capability and Resource Integration (J8), USSTRATCOM, Offutt AFB, Neb., as a brigadier general and major general
3. January 2005 - May 2005, Director of Plans and Policy (J5), USSTRATCOM, Offutt AFB, Neb., as a major general
4. May 2005 - July 2006, Commander, Joint Space Operations, USSTRATCOM, Vandenberg AFB, Calif., as a major general
5. July 2006 - December 2008, Commander, Joint Functional Component Command for Space, USSTRATCOM, Vandenberg AFB, Calif., as a major general and lieutenant general

BADGES
Master Space Operations Badge
Basic Cyberspace Badge
Parachutist Badge

MAJOR AWARDS AND DECORATIONS
Distinguished Service Medal with oak leaf cluster
Defense Superior Service Medal with oak leaf cluster
Legion of Merit with oak leaf cluster
Defense Meritorious Service Medal with oak leaf cluster
Meritorious Service Medal with four oak leaf clusters
Air Force Commendation Medal
Joint Meritorious Unit Award with two oak leaf clusters
Air Force Outstanding Unit Award with silver and two bronze oak leaf clusters
Air Force Organizational Excellence Award with oak leaf cluster

EFFECTIVE DATES OF PROMOTION
Second Lieutenant June 2, 1976
First Lieutenant June 2, 1978
Captain June 2, 1980
Major May 1, 1985
Lieutenant Colonel March 1, 1990
Colonel Feb. 1, 1994
Brigadier General Jan. 1, 2001
Major General July 1, 2004
Lieutenant General Dec. 20, 2007
General Jan. 5, 2011

(Current as of January 2011)

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

STATEMENT OF

MR. GIL I. KLINGER
DEPUTY ASSISTANT SECRETARY OF DEFENSE
FOR SPACE, STRATEGIC, AND INTELLIGENCE SYSTEMS

BEFORE THE HOUSE COMMITTEE
ON ARMED SERVICES
SUBCOMMITTEE ON STRATEGIC FORCES

APRIL 3, 2014

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

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Introduction

Our current national security space systems and, to some degree, even those we are planning for in the near future have their origins in response to the requirements that existed in the Cold War stand-off with the then Soviet Union. For the first thirty years of the Space Age our systems were designed principally to respond to the threat of nuclear war with the USSR. The Defense Support Program, the Defense Satellite Communications System (DSCS), and Extremely-High Frequency Military Strategic and Tactical Relay (MILSTAR) satellite communications systems, as well as our overhead imagery and signals intelligence architectures, are prime examples of acquisitions that focused initially and almost exclusively on supporting the capability to monitor Soviet strategic and theater nuclear forces' developments and to warn of and respond to a large-scale Soviet ballistic missile attack. For much of this period, the two superpowers had exclusive access to space. Although the Soviet Union possessed an anti-satellite capability, the presumed circumstances of its use were seen in the context of a nuclear war; space was not considered a likely theater of conflict.

The space domain has changed significantly in fifty years. It has evolved from a scarcely populated, essentially uncontested destination to an almost certain theater of future combat operations. The environment has seen many types of activity proliferate: the number of spacefaring nations has risen increased dramatically since Sputnik; users of space systems and products have multiplied; space capabilities and activities have become enmeshed in the security and economic affairs of many nations. For the United States, Space has become pervasive in all aspects of our thinking about military operations and warfare – from major campaigns like Operation ENDURING FREEDOM to

smaller scale relief operations in response to humanitarian crises, such as Operation UNIFIED ASSISTANCE to aid tsunami victims. Our asymmetric advantage in space also creates asymmetric vulnerabilities. Our potential adversaries recognize our dependence on space and continue to develop and field a range of capabilities and means designed to deny our ability to use space.

This change in the environment has occurred concurrently with the steady recovery and improvement of our space acquisition programs and practices. Schedule delays have generally subsided and our costs have come under control. Air Force program managers and the Program Executive Officer for Space have been able to use the leverage provided by the Better Buying Power Initiatives, undertaken by the 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. Finally, the performance of our new systems continues to meet and often exceed expectations.

Across the majority of our space "lines of business," systems in acquisition are transitioning from the development to the production stage. Though our production rates are minimal, as compared to virtually any other system or capability acquired by the Department of Defense, this transition reflects the Government maintaining a stable requirements baseline and both Government and our industry members capitalizing on shared and successful development and manufacturing-related technical risk reductions and mitigations.

Our progress and successes managing space acquisitions also affords us an opportunity to "take stock" of risks resulting from the significant increase in threats to our space capabilities, as well as the potential opportunities associated with the growth of both U.S. commercial and allied space capabilities and services. In every aspect of the space acquisition process, and accepting and internalizing the implications that attend space as an almost certain theater of active combat operations, we and our industrial members need to think differently about how we prioritize requirements for, develop, produce, and operate our next generation space capabilities. In parallel, and equally important in the current and likely future fiscal environment, we need to integrate into our architecture development and force structure planning the advantages of utilizing more commercial and/or allied capabilities and services.

My boss, Frank Kendall, the Under Secretary of Defense for Acquisition, Technology and Logistics, has challenged us to look forward 20 to 30 years to identify the types of space capabilities that are likely to be needed by the Department of Defense to cope with evolutionary and potential revolutionary changes to existing and near-term threats, as well as the threats and opportunities emerging from continued technological change. In doing so, our goal is to try to define the more specific near-term actions and investments that we can implement now and in the near future, thereby enabling us to achieve those capabilities. We, and our colleagues in the Defense Department and Intelligence Community are working hard to minimize our predictive errors, recognizing concurrently that whatever predictions we make about future threats and technologies will be imprecise and likely inaccurate. Events

transpiring in the Ukraine over the past several weeks have been a humbling reminder of the difficulty in trying to plan for the future with any degree of confidence. Therefore, we plan to emphasize development of space capabilities across the science and technology, research and development, and acquisition sectors in both Government and industry that are sufficiently agile, flexible, and resilient to adapt as that world takes shape.

Part of thinking differently about future capabilities is accurately framing the context for our analysis. For purposes of planning, developing, acquiring, and operating the next generations of U.S. space capabilities, this context or operating environment can be characterized as one reshaped by "five tectonic shifts":

The Threat:

Even as our dependence on space capabilities, goods, and services continues to increase, and although we maintain a substantial asymmetric advantage due to those capabilities, the rapid evolution and expansion of threats to our space capabilities at every orbit regime has highlighted the converse: an asymmetric disadvantage due to the increasing susceptibilities and vulnerabilities of these systems.

We risk confronting a potential strategic imbalance in which adversaries are increasingly able to use space to support military operations, and also threaten our ability to sustain use of our space capabilities. Meanwhile our abilities have lagged to protect our own use of space and also deny that access to an adversary. Any adversary would almost certainly trade its own ability to utilize space if in return it could deny U.S. use of space to support military and intelligence operations. We must rectify this

imbalance as a national security priority. To do so, we need to significantly change: (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 how fast 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, space control, and intelligence support; and (6) related policy, strategy, doctrine, concepts of operations, and TTPs. These last topics are best left to my colleagues here today and throughout the national security space community.

Budget:

There is a two-fold impact that has resulted from the consequences of The Budget Control Act, sequestration, and the high likelihood that substantial resources to fund major space acquisition program "new starts" are very unlikely to either be proposed or funded for the next several years. Despite significant progress in space acquisition and the promise of even more cost reduction resulting from Better Buying Power affordability initiatives, the simple truth is that most space systems are and will remain highly capital intensive, relatively expensive investments. Moreover, many of the changes likely to be required to adapt to the changed threat, and resulting from other changes described here will require additional, new investments at precisely the same time as the Department is managing a significant drawdown in most other warfare areas. Finally, the costs for most of the architectural "block changes" that offer

opportunities to adapt and improve our capabilities will be incurred over roughly the same time period, raising the prospect of the "stacking" of a number of unaffordable budgetary and programmatic bow waves. Even as we continue to address affordability in individual programs, we are concerned about our overall ability to maintain stable budgets for the capabilities we will need in the future.

"Friends and Neighbors":

The cost related "barriers to entry" for access to space remain high. Nevertheless, the economic and security advantages provided by space capabilities, coupled with the proliferation of many of the required technologies have incentivized a growing number of nations to develop indigenous space capabilities. In addition, the costs and complexity to use space–related goods and services has become both easier and in many cases relatively inexpensive. Many nations can simply partner with spacefaring nations and commercial entities, and invest, for example, in hosted payloads, thereby forgoing the high cost of developing and maintaining a launch infrastructure and space industrial base. A range of commercial and government-to-government arrangements can provide access to end-to-end communication, imagery, and/or positioning, navigation, and timing services. These developments offer both opportunities and threats for U.S national security. For the space acquisition community to take advantage of these opportunities, we will need to significantly shorten our requirements development and decision-making cycle times. More basically, we will need to think differently about the levels of services and capabilities that will be "good enough" to satisfy our requirements, rather than continue to focus

our attention on developing capabilities ourselves that satisfy all of our most stressing requirements. This cultural change alone represents a major adjustment in thinking for the national security space community in general and the space acquisition community in particular.

Changing Technology:

The role reversal that began almost 25 years ago and turned the U.S Government to more of a technology "follower" than leader continues to accelerate, and broaden in scope. In parallel, the proliferation of space faring nations and the growth of a vibrant worldwide commercial space sector has accelerated development of, and lowered the costs of manufacturing for many technologies whose development and production previously required large scale U.S. Government investment. Like the emergence of new space-faring nations and commercial providers, the sustained space-related technology developments and deployments certainly require that we alter the calculus for our future space acquisitions; and for the emphasis we place on, and the resources we allocate to our own science and technology investments. More than ever before, we also need to devote greater attention and resources to intelligence collection and analysis devoted to predicting and understanding technology change. As perhaps just one simple, but critical example of the "new normal" we must realize: we have to shorten the time from requirements definition to "authority to proceed".

The "Dial Tone:"

Perhaps no change has had more profound impact than the fundamental shift in the breadth, depth, and diversity to both the uses to which space capabilities are

applied, and to the user population. Space capabilities, and the expectations and demands of those who use them have been transformed. At their creation and for much of the first 30 years of the "space age," satellites comprised a largely highly classified niche capability focused on a relatively small, geographically limited user clientele, with relatively limited, homogenous requirements and relatively modest performance expectations often constrained by technology and engineering limitations. In the past 25 years, space capabilities have become to defense and intelligence users what the dial tone on the telephone long ago became for all of us: a commodity service whose presence we take for granted until the moment its availability is interrupted. Our dependence on space has become inextricably linked to our other critical capabilities. Our belated realization that space would become a contested battlespace leaves us with few planned or exercised alternative means to meet our needs, should the availability of our space assets be interrupt.

The consequences and implications of this "transformation" for our military and intelligence users have now become familiar to the members of this committee; I also described some of them earlier in my statement. This fundamental change, when combined with the other shifts described here confront the space acquisition community -- and, in my view, to all aspects of our national security space community and its industrial base foundation -- with two, largely opposing sets of challenges: simultaneously maintaining service continuity and technology innovation. Absent significant changes in "how we do space writ large," it is likely to be increasingly difficult to reconcile these challenges. For the space acquisition and supporting science and

technology community, the dilemma is to: sustain the resources and capabilities to concurrently maintain a continuity of services that is a sine qua non of U.S. national power; cope with increasingly potent threats; foster a level of science, technology, and development investment to catalyze the next generation "breakthrough" capabilities; and effectively make use of commercial and allied goods and services. All of this must be accomplished in an environment of flat and potentially diminishing resources. Nevertheless, maintaining U.S. national security in the future will depend on developing, acquiring, partnering, and/or buying space capabilities and services that strike an affordable balance between "sustaining the dial tone" while maintaining critical niche superiority and overall pre-eminence.

We have an enormous amount of work to do to adapt effectively and in a timely manner to these changes. The required work and adaptations will affect the entirety of national security space activities in both government and industry. From policy, strategy, requirements, through all phases of the acquisition cycle, and also to doctrine, training, concepts of operations and tactics, techniques, and procedures, our national security community must "think about and 'do' space" very differently. I have already mentioned some of the changes that are required, and we have already begun the process of "retooling" some of our processes, as well embedding a heightened sense of urgency to executing affordable and lower cost acquisitions.

Despite these changes, a great deal of work remains to be done. Just two examples illustrate our challenges: we need to elevate the importance of implementing measures to improve resiliency for our space capabilities--providing an ability to

withstand attempts to damage or destroy them and continue to function--so that these modifications and improvements are able to compete for resources, as or even more effectively than has historically been true for improvements to performance. Second, our processes and decision timelines, but first our thinking, must recognize the increasing potential of many of these goods and services to play an integral role in our future architectures and to meet an increasing share of our requirements. These capabilities must come to be thought of as the "first option" for meeting our needs, rather than as an adjunct or afterthought when we decide what systems to replenish and/or maintain as U.S. Government developed, acquired, and operated.

We are at a strategic crossroads or inflection point for the future of national security space capabilities. We still enjoy the advantages of capabilities brought about by past large-scale investments and expenditures that often enjoyed a largely unfettered call on resources. Without wholesale sacrifices in other domains, we simply can't afford that path in the future. As we move forward, we must address affordability – effectively as a performance requirement-- as well as measurability, and demonstrable effectiveness as we evaluate the mission-based needs of the future. We have to explore the entire range of alternatives, including space-based and non-space-based systems to determine what will provide the level of service we need, while meeting those criteria.

We are already beginning to make measurable progress. Our current approach improving resilience consists of three elements: (1) improving our on-orbit systems, using software upgrades from the ground, as well as implementing combat-relevant tactics, techniques, and procedures in our operations; (2) making prudent changes to

systems already in acquisition, thereby minimizing costly redesigns and disruption to factory flows; and (3) applying a more comprehensive and holistic approach to improving resilience as we implement block changes to the next generation of capabilities and architectures.

The pre-requisite for improved resilience, our situational awareness, must be transformed from an historic focus on flight safety and collision avoidance, to a high performance battle management and command and control capability and infrastructures capable of managing operations in a contested theater of operations. Currently, in its air, maritime, and terrestrial domains, the Air Force, Navy, Army, and Marines and the combatant commanders they support enjoy a level of situational awareness that is impossible in the space domain, but will be essential in the future. In other domains, warfighters plan for attrition as a natural consequence of the campaign or engagement. Force structures are developed and fielded that account for this inevitability. Consistent with reassessed priorities, affordability, and likely effectiveness, we need to bring similar thinking to our architectural and force structure planning for space capabilities.

The Fiscal Year 2015 (FY15) President's Budget reflects the DoD's commitment to measured, "pragmatic progress" as we plan our future space capabilities. Programs are beginning to accept some degree of manageable risk, measured against affordability and the availability of alternate means to meet our requirements. As only one example, the Fiscal Year 2015 (FY15) President's Budget built on the results of an Analysis of Alternatives to accept additional risk of a gap in weather forecasting and environmental

sensing capability by moving the Weather Satellite Follow-on program schedule to the right. Risk was judged to be acceptable because we believe that we could count on civil, commercial and/or foreign partners for the immediate future and use the additional time to craft a longer term replenishment strategy.

The Department modified and re-phased a number of space programs for the FY15 President's Budget. These are reflected in several key program initiatives that leverage planning for future follow-on systems and take advantage of operational benefits associated with support to the warfighter.

In keeping with Departmental strategic guidance, the Space Based Infrared System (SBIRS), Advanced Extremely-High Frequency (AEHF), and Global Positioning System (GPS) are utilizing Space Modernization Initiative (SMI) investments to ensure affordability, capability, and resiliency for these mission areas in order to remain competitive in the strategic environment. SBIRS, AEHF, and GPS have 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 affordable technology alternatives and architectures. Depending on several factors such as the health of the constellation, parts obsolescence, and technology breakthroughs, each SMI investment plan addresses program-specific challenges and threats to ensure continued capability.

The Department is delaying the GPS-III space vehicle procurement timeline to reflect the on-orbit constellation's long lifetime. Although this action moves the procurement of 3 GPS-III satellites outside the FYDP, the new constellation profile does

not impact the 24 GPS satellite requirement.

The Department ensured full funding for a Space Fence Site 1 contract in FY14, the Space-Based Surveillance System (SBSS) Follow-on, and a number of other classified initiatives. SBSS Follow-on funding will be delayed by one year as we review space-based capabilities to meet mission requirements.

Working with the Congress, the Department has ensured stability in the acquisition of SBIRS geosynchronous Earth orbit (GEO) satellites 5 and 6. Awards of long-lead advanced procurement contracts in FY12 and FY13 have provided the necessary hedge against schedule and technical risk to the SBIRS GEO 5-6 Satellite Replenishment Production (SRP) effort currently pending contract award. Regardless of any delays, these long-lead advanced procurement activities have poised the program for successful transition to GEO 5-6 production when the production contract is awarded.

Finally, the Department adjusted the profile for the Evolved Expendable Launch Vehicle (EELV) program. The December 2013 contract award took advantage of efficiencies jointly identified by the Government and the EELV contractor. The Department took special care to simultaneously ensure changes in EELV balanced Economic Order Purchasing that will lower costs and stabilize the industrial base while also implementing the procedures and processes to enable certified new entrants to enter into a competitive marketplace. These decisions are consistent with our broader goals for mission-based acquisition planning and we are ensuring that architecture efforts inform these decisions. Some of those architecture efforts, such as the

Protected SATCOM and SBIRS Follow-on Analyses of Alternatives and a number of new NRO architecture plans and initiatives are in various stages of execution, but they represent opportunities for effective evolution and adaptation to our changed circumstances and operating environment.

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:

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 we cannot achieve this without an efficient and reliable space launch capability, that is robust, responsive and resilient, and enables our space operations. The incredible success of 68 successful operational EELV missions since 2002 and 99 National Security missions since 1998 came after a string of failures in the late 1990's that caused us to refocus on mission assurance. The cost of a single launch failure, especially one with a multibillion dollar satellite on board, can very quickly overwhelm any savings achieved by aggressive acquisition strategies. This is why we consider certification of new entrants, and mission assurance for all providers to be essential elements of our launch program .As we implement the certification process for New Entrants to the EELV program we are continuing this focus in cooperation with each of the prospective EELV New Entrants. Our rigorous multi-step certification process will ensure all new launch service providers

meet the existing high USG levels of design and operational reliability. This USG Mission Assurance process has evolved over the last 15 years, and is tailored to the risk tolerance of the payload to be launched. We will continue to evolve this process as new entrants are on-ramped onto the EELV program.

The Department shared a congressional concern over the past few years over the high costs of maintaining a successful domestic space launch capability. The Air Force took steps to significantly restructure the EELV program in 2012 and we subsequently devised a strategy to take advantage of this restructure, balancing efficient procurement with the stabilization of the industrial base and the ability to expand the program to allow for competition as early as possible. As a direct result of this strategy, and our concerted efforts to apply the Department's Better Buying Power principles to the program, we successfully negotiated and awarded a contract which will acquire new EELV cores and the capability to launch those and previously procured cores. This effectively stabilizes the U.S. launch industrial base while continuing to support a strategy that has saved the Department and taxpayers more than $4.4 billion dollars.

The Air Force's strategy to introduce competition into the EELV program provides the opportunity for multiple potential launch providers, such as SpaceX and Orbital Sciences Corporation and potentially others, to successfully complete the New Entrant Certification process through the joint development of New Entrant Assessment Certification Plans for each of the certification launches, opportunity for joint Cooperative Research and Development Agreement (CRADA) with the Air Force, explicit

Statements of Intent and initial assessments. The Air Force has also procured competitive launch services from SpaceX for the joint National Aeronautics and Space Administration (NASA) / National Oceanic and Atmospheric Administration (NOAA) Deep Space Climate Observatory payload and a Space Test Program mission, STP-2. These missions represent more risk tolerant launch opportunities that will provide operational experience to the company with the Government's current Mission Assurance processes, positioning them to compete more effectively for future EELV-class National Security Space (NSS) missions.

The AF has also begun the process of developing an early integration contact with SpaceX to ensure that once the company is certified as an EELV provider they will be prepared to aggressively compete for any available NSS launch service.

The certification launches are only a portion of the rigorous multistep certification process that I discussed earlier. The AF EELV New Entrant Certification Team continues to assess launch operations activities, associated readiness reviews, design certification reviews, and reliability certification activities.

Operationally Responsive Space (ORS)

We share the interest of Congress in achieving shorter development times for space capabilities. But fully implementing operationally responsive space would require significant resources to address the satellite to launch vehicle integration and lack of reserve or spare satellite inventory that are binding constraints. In May 2013 the Defense Space Council directed the development of a strategy for best use of ORS appropriated funds to address the way forward. In addition, CDRUSSTRATCOM

identified four need areas, based on the Joint Force Commanders' stated Immediate Needs, to make the best use of the remaining FY13 appropriated ORS funds.

The Department has not allocated separate resources for ORS in FY13, 14 or 15; we have empowered the Program Executive Officer (PEO) for Space to use the streamlined authorities and processes developed in ORS to address critical gaps, tackle risk mitigations needs in the development of follow-on programs and apply affordability measures where applicable. We are maintaining oversight of this approach through the ORS Executive Committee at the OSD level.

In addition to the careful management by PEO Space, we will continue to keep the ORS program focused on developing solution options to satisfy COCOM urgent needs as we develop the strategy to leverage ORS enablers and infrastructure and integrate ORS principles into DoD Space acquisition. We believe this meets the intent of the FY07 NDAA which chartered the ORS office to contribute to the development of capabilities to fulfill joint military operational requirements and to coordinate and execute ORS efforts across the Department's planning, acquisition and operations functions. It also meets the direction of the FY13 NDAA for the PEO Space to be the Acquisition Executive and to provide streamlined authorities for ORS projects.

Commercial Satellite Communications Services

The Office of the Chief Information Officer and AT&L have jointly undertaken a study to address options for providing wideband satellite communications capability in the near, mid, and long term. As you know, our current capability is comprised of Department of Defense systems (Defense Satellite Communications System Phase III

(DSCS III) and Wideband Global SATCOM (WGS) satellite) and commercial SATCOM leases. The current distribution of capability was driven by the exigencies of Operations Enduring Freedom (in Afghanistan) and Iraqi Freedom (in Iraq) and the availability of Overseas Contingency Operations (OCO) supplemental funds. The CIO and AT&L study team is analyzing the utilization of the leased capabilities to inform recommendations on acquisition and governance approaches to improve efficiency and lower cost as we move forward. The report on this first phase is in final editing and review.

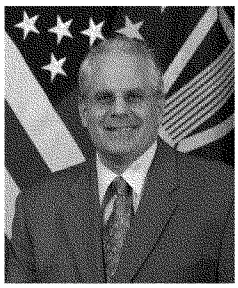
Additionally, AF Space and Missile Systems Center (SMC) is still pressing forward with the Commercial SATCOM Pathfinder project to buy an on-orbit wideband transponder. They have already released a draft RFP, conducted industry days, plan to release the final RFP on 8 April, and award the contract by the end of June.

Dependence on Russian Engines (RD-180)

The majority of NSS payloads are launched on vehicles acquired under the Evolved Expendable Launch Vehicle (EELV) program which acquires the Atlas V and Delta IV families of launch vehicles. The Russian produced RD-180 rocket engine is 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 events have renewed our existing concerns about this practice.

Since the origins of the EELV program, the Department has prepared for the possibility of a potential RD-180 supply disruption and has put in place several measures to mitigate the risk and impact. This strategy includes multiple independent hedges against this supply risk and is cost effective. First, the nation has maintained an additional domestic capability with the Delta IV variant of the EELV to launch national security payloads. In addition, the Department is introducing competition that will increase and diversify its ability to launch national security payloads. Lastly, our industry partner maintains a multi-year supply of RD-180 engines in the United States, thereby insulating the Department against any near-term disruptions to the launch manifest. Nevertheless, we are evaluating whether it's in the long term U.S. national security interests, and that of significant elements of our space industrial base, to develop a next generation US designed and built engine. This approach and others is part of the Department's reexamination of its strategy to ensure it is still capable of providing assured access to space. The study will include both immediate and longer-term responses to a potential interruption of supply including manifesting of missions to the Delta IV launch vehicle, evaluating the options for developing a replacement engine, as well as the possible utilization of EELV New Entrants to supplement existing government space lift capability. The Department is coordinating its efforts with those underway at the National Security Council and the Office of Science and Technology Policy on the National Rocket Propulsion Strategy requested by Congress in the Section 1095 of the National Defense Authorization Act of 2012. We expect this study to be complete later

this Spring and its results will help to guide us in developing a future assured access to space strategy for every NSS payload.



Gil I. Klinger

Deputy Assistant Secretary of Defense,
Space and Intelligence

Mr. Gil Klinger is the Deputy Assistant Secretary of Defense for Space and Intelligence within the Undersecretary of Defense for Acquisition, Technology, and Logistics where he is responsible for acquisition oversight of all space and intelligence programs executed by the Department of Defense.

Immediately prior to assuming leadership of SIO, Mr. Klinger was the Assistant Deputy Director of National Intelligence for Architecture Engineering & Integration where he led Intelligence Community activities assessing the adequacy of the intelligence collection enterprise, identified shortfalls and solutions, managed teams focused on specific short- and long-term issues in response to Director of National Intelligence taskings, and provided domain and subject matter expertise to the Office of the Director of National Intelligence across a broad range of disciplines and collection areas.

Prior to his assignment at the Office of the Director of National Intelligence, Mr. Klinger was the Director of Space Policy, National Security Council Staff, where he was the lead member of the Executive Office of the President on all space issues. He is principal author of five national space polices, including the first new U.S. space exploration vision in more than a generation.

His previous assignments included serving as Director of Policy, National Reconnaissance Office; Acting Deputy Under Secretary of Defense (DUSD) for Space, and the position of Principal Assistant (DUSD/Space), within the Office of the Deputy Under Secretary of Defense for Acquisition and Technology, where he received the 1997 Presidential Rank Meritorious Executive Award, one of the two highest awards given to civil servants within the U.S. government; Director, Space and Advanced Technology Strategy, also within the Office of the Under Secretary of Defense for Policy; and Staff Assistant, Deputy Director for Strategic Forces Policy, Office of the Under Secretary of Defense for Policy, where he was awarded the Distinguished Civilian Service Medal, the highest award given to civil servants within the Department of Defense.

Mr. Klinger began his career in government service with his competitive selection to the Presidential Management Internship Program with the Office of the Secretary of Defense.

Mr. Klinger graduated Phi Beta Kappa and summa cum laude from the State University of New York at Albany with an undergraduate degree in European History and Political Science. He received his master's degree in Public Policy from the John F. Kennedy School of Government at Harvard University.

Mr. Klinger has been a member of the Senior Executive Service since 1992 and a member of the Senior Intelligence Service since 1999.

To his everlasting good fortune, Mr. Klinger is married to Ms. Susannah O'Donnell, a personal trainer, who grew up all over the world as part of a Foreign Service family. Gil, Susy, and their seven year old daughter Ainsley live in Sterling, along with Heidi the dog, Nittany the cat, and Bob and Cutie the turtles.

STATEMENT OF

MR. DOUGLAS L. LOVERRO
DEPUTY ASSISTANT SECRETARY OF DEFENSE
FOR SPACE POLICY

BEFORE THE HOUSE
COMMITTEE ON ARMED SERVICES
SUBCOMMITTEE ON STRATEGIC FORCES

APRIL 3, 2014

NOT FOR DISTRIBUTION UNTIL RELEASED BY
THE HOUSE ARMED SERVICES COMMITTEE

Introduction

Chairman Rogers, Ranking Member Cooper, and Members of the Subcommittee, I am pleased to join Ms. Sapp, General Shelton, Mr. Klinger, and Lt Gen Raymond to testify on Department of Defense (DoD) space programs and policies. I first testified in front of this subcommittee on these topics one year ago, and I welcome the opportunity to continue that discussion today.

As I stated last year, space remains vital to our national security. It underpins DoD capabilities worldwide at every level of engagement, from humanitarian assistance to all levels of combat. It enables U.S. operations to be executed with precision on a global basis with reduced resources, fewer deployed troops, lower casualties, and decreased collateral damage. Space empowers both our forces, and those of our allies, to win faster and to bring more of our warfighters home safely. It is a key to U.S. power projection, providing a strong deterrent to our potential adversaries and a source of confidence to our friends.

But the evolving strategic environment increasingly challenges U.S. space advantages. Space is no longer the sole province of world powers – it is a frontier that is now open to all. In the last several decades, space has become more competitive, congested, and contested. I am confident that with the right policies, the United States is well-positioned to remain ahead in the competitive environment. I am equally confident that we are on course to deal with congestion. But what worries me the most is the contested environment we now face. Over the last 15 years, other nations have watched us closely and have recognized that if they are to challenge the United States, they must challenge us in space.

The United States has successfully addressed such challenges before in air, sea, and land domains, and now we must address space. We do so against the backdrop of decreasing budgets,

but that in no way diminishes the importance of successfully sustaining our crucial advantages in space.

Our strategic approach remains consistent with what we outlined in the 2011 National Security Space Strategy and reaffirmed in DoD Directive 3100.10, the DoD Space Policy, released in late 2012. In my testimony today, I will outline the five key elements of this strategic approach and describe specific steps we are taking to implement our approach.

Promoting the Responsible, Peaceful, and Safe Use of Space

As still the world's leading space power, the United States is uniquely positioned to define and promote the responsible, peaceful, and safe use of space. We need to do this to ensure that we can continue to reap the military benefits that space provides and, more importantly, the civil, scientific, and economic opportunities it presents. Space is woven into the fabric of modern economies and the United States, beyond all others, has led the way in using that to our national advantage. We are taking steps to make sure that access to and use of space is not threatened by irresponsible actions. The Department of Defense is working closely with the Department of State to establish an International Code of Conduct and other "rules of the road" for the safe and sustainable use of space. Those rules include common sense standards for debris limitation, launch notification, on-orbit monitoring, and collision avoidance. The United States already follows these practices and, by encouraging their adoption by others, could help ensure that space remains sustainable for the future

I know there are some who question the wisdom of these multilateral activities. They are worried that in establishing international norms of behavior we would limit our response options. Let me assure you, we do not intend to allow that to happen. We have worked side-by-side with

the Joint Staff, Combatant Commands, Military Services, Defense Agencies, and Intelligence Community to make sure that any agreement we develop enhances security and does not threaten current or future U.S. capabilities.

I am not so naïve as to believe that a simple set of rules will solve all of the major issues we face – they will not; nor would I expect that they will inhibit those who would try to threaten our use of space. But common sense rules that can be embraced by a majority of space-faring nations will help stem the rise of uncontrollable debris, add demonstratively to spaceflight safety, and clearly differentiate those who use space responsibly from those who do not.

Our efforts here go beyond mere words – they are backed by actions. As I have discussed before, a key aspect of improving spaceflight safety, and assuring we can monitor the space environment more closely, is our space situational awareness (SSA) capabilities. We have been working on this for some time, and I am happy to report that we have made some real progress over the last year. That progress comes in two forms – new sensors and information sharing agreements.

On the sensor front, we have remained on a constant path for the last several years to reposition sensors where they can do the most good and to invest in new sensors where needed. Last year we reported that we had entered into an agreement with Australia to relocate and repurpose a launch tracking radar, the C-Band radar, from Antigua to western Australia to aid in our ability to monitor activities at low altitude in the southern hemisphere. That work is now underway. We complemented that effort with a second agreement signed with Australia this past November to relocate the DARPA-developed Space Surveillance Telescope to western Australia to give us an unmatched ability to track deep space objects in that critical region of the world. Additionally, after years of focused effort, and a sequestration-imposed six-month delay, the Air

Force will soon award the contract for the first Space Fence site. The Space Fence will provide an unprecedented ability to track an order-of-magnitude greater number of objects in low earth orbit, supporting long-term spaceflight safety.

The Department has also made great strides in sharing SSA information with other space operators. Over the past year, U.S. Strategic Command (USSTRATCOM) has continued to pursue SSA sharing agreements with commercial companies and foreign governments, consistent with existing legislative authority. This year, USSTRATCOM signed five agreements with other governments – Australia, Japan, Italy, Canada, and France – and increased to forty-one our agreements with commercial satellite operators. Many more agreements are in varying stages of negotiation. We are committed to providing SSA services to enhance spaceflight safety for all.

While the purpose of these agreements is to allow us to share more advanced space flight safety products with other space-faring nations, they really serve to lay the groundwork for the next stage of effort – two-way data sharing. The space environment is too big and too complex for a single nation to bear the entire cost of monitoring it. Cost-effective SSA requires cooperation among space actors. The increasingly congested space environment means that an unparalleled level of information sharing is needed to promote safe and responsible operations in space and to reduce the likelihood of mishaps, misperceptions, and mistrust. We are currently engaged in detailed technical discussions with several nations that have space situational awareness capabilities to explore opportunities for two-way information exchange. This type of sharing will increase SSA information available to the United States while limiting unnecessary duplication of SSA capabilities. In short, we save money and improve safety for us and our allies.

Improving DoD Space Capabilities

Improved SSA is but one facet of the next pillar of our strategy – improving our own space capabilities. This element boils down to a single refrain – make DoD space systems and architectures more resilient. Yes, we need to continue to improve how space systems operate, the services they provide, and the capabilities they create; yes, we need to make space systems less expensive; but above all others, we have to focus on making those capabilities more resilient. The most capable and cost-effective space capability in the world is of little use if it is not there when the warfighter needs it. If we are to overcome the challenges posed by others, resilience is job one.

We have been talking about resilience for some time, but often I am unsure if we have clearly defined what we mean. In fact, I am sure we have confused several audiences. Before I describe specific investments in resilient space architectures, allow me to explain the concept.

Resilience, in fact, is not an end in and of itself; rather we seek to assure the mission benefit that our capabilities provide – omnipresent positioning from the Global Positioning System (GPS), global surveillance from overhead intelligence, surveillance, and reconnaissance (ISR), and worldwide information availability from Satellite Communications (SATCOM). As we see it, that assurance can be achieved through a combination of (1) strengthened or resilient space architectures, (2) the ability to replenish lost or degraded capabilities, and (3) defensive operations to provide warning of and interruption to an adversary's attack. Making architectures more resilient is a combination of adequate protection, increased numbers of satellites, service diversity, appropriate distribution, well-reasoned disaggregation, and operational ambiguity – all to create a service that can stand up to an adversary's attack. These are the same force structure

ideas we use in every other field of warfighting to help our systems survive in a hostile environment.

With these concepts in hand, we have begun to consider resilience in a variety of architectural and programmatic discussions. For the first time ever, for example, our protected SATCOM analysis of alternatives is focusing on resilience. The same will be true when we look at overhead persistent infrared monitoring later this year. From an investment standpoint, we have identified extremely cost-effective enhancements in automated anti-jamming for our Wideband Global SATCOM system (WGS) to increase protection in a jammed environment. We are committed to assuring that GPS can face the rigors of a hostile battlefield environment by continuing our investment in our military (or "M-code") user equipment program. And the Department continues to use Space Modernization Initiative (SMI) investments to improve affordability and capability of our current Space Based Infrared System (SBIRS) and Advanced Extremely-High Frequency (AEHF) architectures. SMI funds are also being used to invest in evolutionary follow-ons to those architectures that disaggregate strategic and tactical elements and look at ways to distribute and proliferate the resulting pieces. Every aspect of these decisions is driven by our focus on improving space system resilience.

Partnering with Like-Minded Nations, International Organizations, and Commercial Firms

Resilience, however, will not be achieved through U.S. investment alone. The reality of the budget is such that we cannot just hope to "buy our way out" of these challenges. They are too complex, and they are too long term. Instead we have taken a more expansive approach:

joining with other like-minded space-faring nations and commercial partners to create a coalition approach to space, just as we have done in other warfighting domains.

Space is no longer limited to just a few nations. It is a major force structure component for each of our allies, and that is force structure we can all share. Whether we are talking about the dozens of radar and electro-optical imaging satellites that the United States and our allies already have on orbit, the rapidly multiplying navigation constellations whose satellites will soon number over 100, or the ever-growing array of weather and SATCOM capabilities at the world's disposal, we have begun to recognize that the United States neither can, nor does it need to, go it alone in space. This is a fundamental shift in how we approach this problem. Just as in other fields of combat where we combine with allied land, sea, and air forces, so too can we combine our space forces with equally effective results and for very little increased investment.

For example, by 2020 we anticipate that at least six nations or regional intergovernmental organizations will have fielded independent space navigation systems – our GPS network, the European Union's Galileo, Japan's Quasi Zenith Satellite System (QZSS), the Indian Regional Navigation Space System (IRNSS), China's Compass system, and Russia's GLONASS. Those constellations will include nearly 140 satellites, with a dizzying number of new signals and services. While it may be possible for an adversary to deny GPS signals through jamming, physical antisatellite attacks, or a cyber-attack on a ground control network, it is much more difficult to eliminate multiple services at the same time. Assuring U.S. warfighters have access to the bulk of these systems is a very powerful way to make sure no warfighter will ever have to face battle without the incredible benefit of space-enabled positioning, navigation, and timing (PNT). To that end, we have begun negotiations with like-minded PNT owner/operators to

ensure the United States has that access. We must likewise ensure our equipment is capable of receiving these different signals – just as is already happening in commercial applications.

The same is true for other space services and is already bearing fruit in our plan for future space weather capabilities. We closely examined what we could get from others – international partners, U.S. civil agencies, the commercial sector, and even non-space services – and we defined a new, minimal, DoD owned- and operated-system that is an order-of-magnitude less expensive than the previously planned system it replaces. Together this "system of systems" meets U.S. warfighting needs in a way that stymies an adversary's ability to threaten the resulting whole. A combination of diversity, distribution, disaggregation, and proliferation can increase resilience while reducing needed investment.

This approach is particularly well-suited to areas in which the commercial world plays a major role, such as remote sensing. In this area, we are aligning several of our policy elements to take advantage of and hasten the diversity- and proliferation-driven resilience I have been discussing. Building on over a decade of experience with traditional commercial providers, we are reexamining commercial remote sensing licensing policy, while leveraging new authorities to tailor export controls for systems that are widely available commercially. Our aim is to posture U.S. industry – both traditional commercial providers and entrepreneurial start-ups – to compete successfully in a burgeoning global marketplace.

Deterring Aggression

The fourth strategic element is to prevent and deter aggression against our space systems. In fact, all of the policy elements I have covered thus far – promoting responsible use, improving our own capabilities, and partnering with allies and commercial space providers – are also aimed

squarely at this fourth strategy element. Those efforts are complemented by a focus on SSA to provide timely and accurate indications and warning prior to an attack and attribution during and after an attack, with a focus on command and control systems that support our ability to respond appropriately.

Let me discuss two efforts aimed at those objectives. First is our Joint Space Operations Center (JSpOC) Mission Systems (JMS). That program delivered its first operational increment early last year, and we are on track to complete increment two in fiscal year 2017. That will be followed by additional increments that support characterizing attacks and coordinating operational responses.

The second is the Geosynchronous Space Situational Awareness Program (GSSAP) recently announced by Gen Shelton. This previously classified program will deliver two satellites later this year for launch into near geosynchronous orbit (GEO). From that unique vantage point they will survey objects in the GEO belt and allow us both to track known objects and debris and to monitor potential threats that may be aimed at this critically important region. In short, threats can no longer hide in deep space. Our decision to declassify this program was simple. We need to monitor what happens 22,000 miles above the Earth, and we want to make sure that everyone knows we can do so. We believe that such efforts add immeasurably to both the safety of space flight and the stability that derives from the ability to attribute actions – to the benefit of all space-faring nations and all who rely on space-based services.

Taken together, all of these elements combine to enhance stability and deterrence – seeking to reduce the likelihood of attack, to provide the necessary indications and warning to take evasive actions prior to an attack, to deny benefits to the adversary if such attacks are

undertaken, to attribute the source of the attack, and to make it impractical for an adversary to isolate the United States from the community of space-faring nations that will be affected.

Defeating Attacks and Preparing to Operate in a Degraded Environment

Even with all these efforts in place, however, attacks may occur. Our last strategic element is to assure we can defeat attacks and prepare to withstand them should they occur. Much of our effort in this area is coordinated through our Space Security Defense Program (SSDP). SSDP was established last year as an outgrowth of the Space Protection Program initiated in 2008 by Air Force Space Command and the National Reconnaissance Office. SSDP is developing methods to protect and defend our space systems by finding ways to counter the ever growing list of threats they will face.

Several of the initiatives I have already mentioned today, such as the WGS automatic anti-jamming capability, are derived from work of SSDP. We have requested increased funding for SSDP this year to allow them to examine non-material solutions, such as changes to tactics and procedures, that can be implemented today. While our long-term intent is to move to more resilient and more defendable space architectures, we have over a decade before those systems will even begin to deploy, and we need to protect ourselves and our on-orbit systems now.

Other Matters

Let me conclude by moving from our overall strategy to address specific matters in which I know there is continuing interest. First, last year you challenged me to explain why the United States was leasing communication links from a Chinese provider to support U.S. Africa Command (USAFRICOM). I agreed that while the initial lease was driven by operational need,

it was not an appropriate long-term solution. I pledged that we would address the issue as quickly as possible. I am happy to report that we have. Working with us, USAFRICOM has made significant progress over the last year in moving DoD SATCOM leases from the Chinese Apstar system to other commercial satellite providers in the region. We have already transitioned over 75% of the Apstar bandwidth to other satellites, and our intent is to be completely transitioned by May of this year.

Second, we are developing a better strategy for making long-term commitments to commercial SATCOM providers to reduce cost, increase capability, and add resilience. Later this year, Air Force Space Command will purchase a commercial transponder, one that is already in space, for use by USAFRICOM. This is not a lease – instead it is government ownership of an on-orbit asset that will be managed and operated by the commercial provider at a small fraction of the cost that it would take to lease this capability on an annual basis. Not only will this transponder help to accelerate the move off of Apstar, it will provide needed experience with this new method of acquiring commercial SATCOM, potentially ushering in a revolutionary way to do so worldwide.

Third, we recently welcomed the President's new National Space Transportation Policy, released November 21, 2013. This policy will help ensure the United States stays on the cutting edge by maintaining space transportation capabilities that are innovative, reliable, efficient, competitive, and perhaps most importantly, affordable. This policy supports DoD's ongoing efforts to provide stability to the industrial base that currently provides launch vehicles to the national security community by mandating that all programmatic decisions are made in a manner that considers the health of the U.S. space transportation industrial base. The policy also calls for a level playing field for competition that can spur innovation, improve capabilities, and

reduce costs, without increasing risk. The President's budget request already bears evidence that this strategy is working: the EELV request has been reduced significantly. Those benefits will become even greater in the future as we fully qualify new entrant launch providers, an effort that is already well underway.

Fourth, we continue to make progress in building coalition space operations. Led by USSTRATCOM, the Department is working with close allies on cooperation, not only in the systems we fly, but in the operations we perform. This initiative paves the way for far closer operational collaboration with allies than we have ever had, with the aim of eventually broadening participation to include additional space-faring countries.

Finally, just as the United States develops its space capabilities and leverages them to support military operations, so too do other countries. We are increasingly seeing rival nations begin to integrate space into their own operations in the same way as the United States and our allies have done for years. This is not unexpected. But it does mean that the benefits we ourselves derive from space will begin to be available to those that we may someday have to face in combat. We recognize that this is the reality of the future and we are beginning to prepare to face a more capable adversary. We appreciate the increased interest from the Congress in this area and look forward to working with you over the coming years to assure our strategies and plans in this area are thoroughly deliberated.

Conclusion

Mr. Chairman, 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, our interagency partners, our allies, and U.S. industry to continue implementing this new approach to space.

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 Space 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 for the Record

Ms. Betty Sapp

Director, National Reconnaissance Office

Before the House Armed Services Committee

Subcommittee on Strategic Forces

3 April 2014

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

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. Gil Klinger, Deputy Assistant Secretary of Defense for Space and Intelligence, Lt General John Raymond, Commander, United States Strategic Command, Joint Functional Component Command for Space, and General William Shelton, Commander, Air Force Space Command. 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, partnerships, and value of the NRO contributions to National Security.

NRO Priorities

The NRO remains committed to maintaining its stellar record of acquisition and program successes, while also delivering a more capable, resilient, and affordable future NRO architecture to respond to emerging threats and dynamic mission needs. Over the coming years, the NRO will incorporate revolutionary new technologies into our architecture that will provide enhanced support to the warfighter

while also improving the resiliency of our systems. These technologies are made possible in part by our investments in research and development, and we will continue these strong investments to drive enhanced future capabilities. We also continue to improve our relationships with our key mission partners to adapt on-orbit systems and capabilities to support current warfighter needs.

State of the NRO

I would like to begin with a few words about the current state of the NRO. We are committed to smart acquisition investments and practices to ensure the continued coverage and availability of our vital National Security systems and we work tirelessly to continue to deliver these systems on time and within budget. To that end, last year our acquisition programs successfully delivered and launched two new satellites into orbit, and just last week we successfully launched yet another critical capability for our nation. In addition to our primary missions, one of our launches also carried 12 university and government CubeSat payloads for the NRO and the National Aeronautics and Space Administration (NASA). Our CubeSat program allows us to demonstrate new technologies at an affordable cost while also strengthening our ties with university Science, Technology, Engineering and Mathematics programs. We are on track to continue our launch and program successes through the remainder of the year as well, with two more satellite launches scheduled for later this year. 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.

The NRO remains committed to maintaining the health of the launch vehicle industrial base to provide our systems with assured access to space. The NRO, in partnership with the Air Force, recently finalized a new Evolved Expendable Launch Vehicle (EELV) acquisition strategy aimed at promoting competition among certified launch providers while also stabilizing launch cost and sustaining the industrial base. Consistent with the New Entrant Launch Vehicle Strategy, the NRO, Air Force, and NASA, are working together to evaluate new entrant launch vehicle capabilities. We are working with launch providers to ensure the new commercial capabilities being developed can provide the same robust levels of mission success that have been the cornerstone of our EELV program; we are also relying on our Air Force mission partner to hold a competitive acquisition for one of our launches later this year, provided Air Force certification is completed. We are dedicated 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.

The tremendous successes of our satellite programs are a testament to the strength of our workforce. As you know, we draw our personnel from across the DoD and Intelligence Community (IC), and the talented people of the NRO allow our significant and continued mission success. This year we are taking steps to develop a core NRO workforce to further strengthen our workforce and to provide continuing opportunities for growth and development to our personnel.

A dedicated NRO workforce will provide us with enhanced stability across core NRO functions and increase our ability to evolve the workforce in the long-term while allowing us to continue to leverage rotational personnel for their innovation and experience. By strengthening our core NRO workforce while also leveraging community workforce strengths, the NRO will continue to provide the Nation with the premier space reconnaissance capabilities for National security.

Thanks to our talented personnel, we have also made tremendous strides in the development and optimization of our Ground and Communications systems. Our Ground Enterprise continues to develop innovative techniques and find new ways to process mission data, providing an architecture that is responsive to user needs, more resilient in the face of projected threats, and much more efficient and effective in providing mission capabilities. Additionally, we continue to improve our network and cloud security processes and optimize our network infrastructure as we integrate with the IC Information Technology Enterprise.

In addition to developing, acquiring, launching, and operating the world's most technically advanced systems, we have also sustained our success in optimizing our business systems. For the fifth 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 our effective financial management. NRO's internal processes for proper funds management and accurate financial reports have been

validated, and we are successfully positioned to continue to sustain this clean audit into the future.

SPACE PROTECTION

The NRO fully recognizes that space is an increasingly contested and congested environment. While foreign nations understand our country's reliance on space and seek means to deny our space advantages, our ability to operate in the presence of threats helps to deter foreign actions and maintain a strategic advantage. To that end, the NRO has worked jointly with the Air Force to align the NRO's space protection activities with Air Force Space Command, the DoD, and the broader space community. The collaboration across the defense and intelligence communities enhances the NRO's capability to effectively plan for emerging threats, and greatly strengthens the architecture to ensure continued operational freedom.

NRO CONTRIBUTIONS: CRITICAL TO THE FIGHT.

Lastly, I would like to highlight the real bottom line for the NRO - our support to the warfighter. 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: counter-Improvised Explosive Device (IED) efforts; identifying and tracking High-Value Targets; and improved battlespace awareness.

However, the most important capability we provide to the fight is our people - our on-site problem-solvers. We typically have about 70 men and women deployed into harm's way on any given day serving as liaison officers to units, providing technical expertise, or supporting those focused NRO programs. 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. At the request of the DoD, the NRO developed and fielded the Communications Externals Geo-fusion System (CEGS). One of the key capabilities of the system has been to cue emitter locations in near real-time to full-motion-video operators, effectively speeding up the "find" portion of the ISR mission. The ability to combine CEGS geolocations with GEOINT has been used with great success, and has regularly contributed to enhanced battlefield awareness during combat operations, insurgent attacks, and convoy operations.

Another highly successful program has been our Tactical Defense Space Reconnaissance (TacDSR) program, which pursues highly-selective, short-term, high-impact advanced research and development efforts to integrate 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. Since its inception, the TacDSR program has successfully transitioned more than 70 percent of all TacDSR programs to DoD 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 improve the warfighter's common operational picture and enhance his effectiveness in finding, fixing, and finishing targets.

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.

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 2015 NATIONAL DEFENSE AUTHORIZATION BUDGET REQUEST

FOR SPACE PROGRAMS

3 APRIL 2014

INTRODUCTION

Chairman Rogers, Representative Cooper, and members of the Subcommittee, it is an honor to appear before you as United States Strategic Command's Commander of the Joint Functional Component Command for Space (JFCC SPACE). This is my first opportunity to address the committee and I look forward to working with you to advance our nation's space capabilities.

It is my highest honor to represent the 3,300 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.

SPACE ENVIRONMENT

For decades, the United States leveraged space to our advantage, but the strategic environment has changed and that advantage is no longer guaranteed. The space domain is characterized today by ever-increasing congestion and competition for limited resources. Assured access to space is challenged by the exponential growth in operations driven by international users. Satellite communications bandwidth is a finite resource with a commensurate level of competition for access and use.

Today JFCC SPACE routinely tracks tens of thousands of objects in orbit around the Earth, but the true amount of debris may be 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 our operational satellites.

Potential adversaries possess, and continue to develop, a broad set of capabilities that could threaten U.S. access to space while increasing their relative strategic advantage. Several countries have charted a course to develop capabilities in an effort to deny us the use of space, even as they improve their own launch and on-orbit capabilities. Specifically, China improved their space-based imagery and radar and tested a rapid launch capability. Some nations have developed and demonstrated anti-satellite weapon capabilities that represent a potential threat to our space capabilities. Many of these activities could be considered dual-use civilian and military efforts, but have lacked transparency with regard to purpose and intent.

Adversary capabilities could range from brute force jamming of Global Positioning System (GPS) and satellite communications (SATCOM) signals, to highly sophisticated anti-satellite weapons intended to damage or destroy their targets. Today there are eleven space-faring nations that have an indigenous space launch capability. Additionally, at least 50 nations, dozens of companies and a multitude of educational and nonprofit institutions are operating satellites in space. 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 progressively more difficult. A responsive and flexible global force must 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: provide timely and accurate warning and assessment, support national users and Joint and Coalition forces, and protect and defend our space capabilities and prepare for contingency operations. All of these objectives require increased situational awareness and enhanced command and control (C2).

SPACE SITUATIONAL AWARENESS

Space Situational Awareness (SSA) is fundamental to effective operation and defense of our capabilities. SSA allows us to maintain the current and predictive knowledge of the space domain and the operational environment upon which space operations depend. We rely on SSA to provide 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 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 tens of thousands of objects, and by producing approximately 1,400 conjunction summary messages on a daily basis to inform satellite operators of impending close approaches. Those operators must then assess the risk posed to their assets and weigh the benefit of maneuvering a spacecraft to avoid a collision against the cost of consuming precious fuel and reducing mission life. One of our most vital missions is providing collision avoidance data to NASA in order to protect the International Space Station.

A continuing trend of multi-payload launches with an ever decreasing satellite size will add to on-orbit congestion. In 2012, 72 new satellites were placed in orbit; in one 7-day period

in 2013, 78 new satellites were placed in orbit. The trend includes deployment of cubesats -- cube-shaped satellites, 10 centimeters on a side, that are highly capable for their size. In February 2014, the International Space Station (ISS) deployed 33 CubeSats The upcoming Falcon-9 ISS cargo resupply mission is programmed to deploy 5 additional CubeSats, including a Cubesat that deploys 104 chipsats, which are smaller than a credit card. Detecting and tracking multiple objects of chipsat size over 250 miles above the earth is beyond the current capabilities of fielded systems. We anticipate further increase in the complexity of the SSA mission through the deployment of hundreds and perhaps thousands of additional small satellites in the next few years – a challenge that will require increasingly capable sensors analytic tools and highly-trained analysts.

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.

Service provided capabilities such as, the Geosynchronous SSA Program (GSSAP), the Space Fence, and the Space Surveillance Telescope will fill a critical shortfall in the SSA mission with increased tracking and characterization of objects in space.

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..

We have entered into SSA sharing agreements with 41 commercial firms and five nations. Over last year, , USSTRATCOM, with interagency coordination, finalized eight commercial and five international agreements. Seven 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). Recently, the first such sensor was incorporated, the Canadian Sapphire satellite, and work is being done to place a US Space surveillance telescope and radar in Australia. These successes represent initial steps toward the goal of leveraging existing and planned SSA capabilities of allies and space partners..

Combined space operations are USSTRATCOM's response to US 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.

SUPPORT 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. Our space systems and capabilities exist for this purpose. While it is not my intent to cross into the Services' organize, train, and equip

responsibilities; the space capabilities they develop and provide 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 the architecture that improves capabilities. These capabilities 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.

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. Currently, three of our six strategically-placed phased array radars have been upgraded to provide improved detection capabilities and enable autonomous missile defense. Two of the remaining radars are expected to be upgraded by year's end.

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 2013 alone, 9,584 infrared events and 625 missile warning reports were generated and distributed to national leaders and the combatant commands, twice the number recorded in 2012. 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 also provides 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 if it is 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 Forces additional flexibility in a dynamic operational environment. The Joint Force requires a

complementary suite of satellite communications capabilities, and 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 provide forces a vital C2 mechanism for not only wartime operations, but humanitarian assistance 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. Our current space systems and set of tactics, techniques, and procedures (TTPs) were not developed with the need to operate in today's contested and congested environment. Nevertheless, these systems will be operating for years to come. In order to effectively operate using the current capabilities, JFCC SPACE will lead the effort in the development of options and TTPs that provide the highest possible level of protection against evolving threats. Further, we will develop or modify 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.

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 US 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.

ENHANCE OUR ABILITY TO COMMAND AND CONTROL

The JSpOC Mission System (JMS) is currently in the process of replacing our legacy command and control systems designed in the 1980s and fielded in the 1990s. JMS is designed as a decision aid supporting the full range of JFCC SPACE operations. It is not intended to, nor can it, replace our highly trained space operators who remain the primary element of effective decision-making. 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 (COA) and provide support to senior leader decision-makers. JMS advanced data processing is critical to the effectiveness of our Joint space forces who must adapt to keep pace with and anticipate the demands of operating in an increasingly congested and contested space domain. Each deployed increment of JMS will significantly enhance our ability to understand the space situation with an improved, integrated operating picture and increased ability to respond to a dynamic space environment. We will continue to build upon this initial capability to ensure our commanders and operators have the situational awareness, tools, and the infrastructure needed to accomplish the mission. Rather than simply processing events, JMS will enable the operator to investigate events and test hypotheses, including most-likely and most-dangerous scenarios, in order to fully develop response options for commanders.

CONCLUSION

We find ourselves in a strategic space environment that requires active stewardship to preserve the capabilities on which our Nation relies. JFCC SPACE is responding to these challenges and will continue to be the world's premier provider of space capabilities - even as it faces a constantly evolving operational and threat environment. This is in large part due to a spirit of dedicated innovation and devotion to duty that drives our Soldiers, Sailors, Airmen, Marines, and Civil Servants to aggressively meet and overcome any and all operational challenges with the resources we are allocated. We will continue to develop new TTPs, and employ new technologies and methodologies to maintain and extend our advantage in space. We will continue to strengthen relationships with allies and industry partners to ensure capabilities derived from and provided by space operations are available for all who peaceably require them. While we continue to face new challenges in space, I am extremely confident that the men and women of JFCC SPACE are prepared to meet these challenges and will continue to provide the warfighter assured access to the world's premier space capabilities. I thank the Committee for your continued support as we strive to preserve and enhance the space capabilities which are vital to our nation.

U.S. Strategic Command Biography

Lieutenant General John "Jay" W. Raymond
Commander, JFCC-Space

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 â€" 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 â€" 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 August 19, 2009
Major General May 4, 2012
Lieutenant General January 31, 2014

(Current as of January 2014)

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DOCUMENTS SUBMITTED FOR THE RECORD

APRIL 3, 2014

Attachment 1: JFCC SPACE Conjunction Assessment Customers

Primary Owner/Operator	Country
Aalborg University, Denmark	DEN
ABAE—Agencia Bolivariano para Actividades Espaciales	VENZ
Al Yah Satellite Communications	UAE
Algerian Space Agency	ALG
Algerian Space Agency	ALG
Amateur Radio Research and Development Corporation (AMRAD)	US
AMSAT	US
AMSAT UK	UK
Arab Satellite Communication Organization (ArabSat)	AB
Asia Broadcast Satellite	RP
Astronautic Technology Sdn Bhd	MALA
Auburn University	US
Azerkosmos	AZER
Bigelow Aerospace	US
Boeing	US
Boeing/USAF/CCAR	US
Bolivian Space Agency	BOL
Boston University	US
Broadcasting Satellite System Corporation (B–SAT)	JPN
Budapest University of Technology and Economics	HUN
California Polytechnic University, San Luis Obispo	US
Canadian Department of National Defence (DND)	CA
Canadian Space Agency	CA
Carlo Gavazzi Space	GER
Centre National d'Etudes Spatiales (CNES)	FR
Cornell University	US
Darpa	US
Defence Science Organisation	STCT
Deimos Imaging	SPN
Delft University of Technology	NETH
DigitalGlobe	US
Echostar	US

Attachment 1: JFCC SPACE Conjunction Assessment Customers—Continued

Primary Owner/Operator	Country
Ecuadorian Civilian Space Agency (EXA)	ECU
Emirates Institution for Advanced Science and Technology (EIAST)	UAE
EOS Creative Technology Solutions	AUS
European Aeronautic Defense and Space (EADS) Company, Astrium	FR
European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)	EUME
European Space Agency	ESA
Eutelsat	EUTE
FaCH (Chilean Air Force)	Chile
Federal Polytechnic School of Laussane (EPFL)	SWTZ
FH Aachen, University of Applied Sciences	GER
French Defence Force	FR
GE	US
Geo-Informatics and Space Technology Development Agency (GISTDA—Thai Ministry of Science and Technology's Space Agency)	THAI
German Aerospace Center (GSOC)	GER
German Space Situational Awareness Centre (GSSAC)	GER
Gil Moore—Utah State University	US
Globalstar	GLOB
GOMSpace	DEN
Government of Japan	JPN
Hellas Sat	GREC
Hisdesat	SPN
Hispasat	SPN
Høgskolen i Narvik (HiN)	NOR
ImageSat International	ISRA
Indian Space Research Organisation	IND
Indosat	INDO
Inmarsat	IM
Institute for Radio Astronomy of the Pontificia Universidad Católica del Perú (INRAS–PUCP)	PER
Institute of Space Technology, Pakistan	PAKI
INTA—National Institute for Aerospace Technology	SPN
Intelsat	ITSO/US
IPSTAR	THAI
Iridium	US
ISIS	UK
Isreal Ministry of Defense	ISRA

Attachment 1: JFCC SPACE Conjunction Assessment Customers—Continued

Primary Owner/Operator	Country
Istanbul Technical University	TURK
Italian Air Force	IT
Italian Space Agency	IT
Japan Civil Aviation Bureau	JPN
Japan Space Systems	JPN
Japanese Aerospace Exploration Agency (JAXA)	JPN
Japanese Amateur Radio League	JPN
Kagawa University, School of Engineering	JPN
Kagoshima University	JPN
Kentucky Space LLC	US
King Abdulaziz City for Science and Technology (KACST)	SAUD
Korea Advanced Institute of Science and Technology	SKOR
Korea Aerospace Research Institute	SKOR
KT	SKOR
Kyushu Institute of Technology (KIT)	JPN
Lawrence Livermore National Lab	US
Lithuanian Space Association	LTU
Los Alamos National Lab	US
MDA	CA
MEASAT (Malaysia East Asia Satellite)	MALA
Meggiorin Group	IT
Ministry of Science, Technology & Productive Innovation	ARGN
Missile Defence Agency	US
MIT Lincoln Laboratory	US
Montana State University	US
Morehead State University	US
nanosatisfi	US
Nanyang Technological University	SING
NASA	US
NASA AMES	US
NASA GSFC	US
National Academy of Sciences of Republic of Belarus	BELA
National Authority for Remote Sensing and Space Sciences	EGYP
National Institute for Space Research, Brazil	BRAZ
National Space Organization (NSPO)	ROC
Naval Postgraduate School	US
Naval Research Lab	US

Attachment 1: JFCC SPACE Conjunction Assessment Customers—Continued

Primary Owner/Operator	Country
NIGCOMSAT	NIG
Nihon University—Aerospace Structural Engineering Laboratory	JPN
Nilesat	EGYP
NOAA	US
Norwegian Space Centre	NORWAY
O3b	O3B
OHB System	GER
Optus	AUS
Orbcomm	ORB
Osaka Institute of Technology	JPN
Osaka Prefecture University (OPU)	JPN
PAKSAT	PAKI
Paradigm (EADS—European Aeronautic Defence and Space Company)	NATO
Planet Labs	US
Politecnico di Torino	IT
PRC	PRC
RapidEye	GER
Regional African Satellite Communication Organization (RASCOM)	RASC
Romanian Space Agency	ROM
Saint Louis University	US
Sandia National Laboratories	US
Sapienza, University of Rome	IT
SatMex	MEX
SES	BERM
Shinshu University	JPN
SingTel	STCT
Sky Perfect JSAT Corporation	JPN
SkyBox Imaging	US
SMDC/AFSC	US
South African National Space Agency (SANSA)	SAFR
Southern Stars	US
Space Research Centre of the Polish Academy of Sciences	POL
Space Science Laboratory—UC Berkeley	US
Spacecom	ISRA
SpaceQuest	ARGN
SRM University	IND
STADIKO	GERM

Attachment 1: JFCC SPACE Conjunction Assessment Customers—Continued

Primary Owner/Operator	Country
Star One	BRAZ
State Space Agency of Ukraine	UKR
Surrey Satellite Technology Ltd	NIG
Swedish Space Corporation	SWED
Tama Art University	JPN
Technical University of Berlin, Institute of Aeronautics and Astronautics	GER
Technical University of Madrid	SPN
Technische Universität Dresden, Germany, Students' Research Group for Spacecraft Engineering in Dresden (STARD).	GER
Technische Universitat Munchen—Institute of Astronautics	GER
Teikyou University	JPN
Telecomm	MEX
Telenor Group	NOR
Telepazio	IT
Telesat	CA
Telkom, Indonesia	INDO
Terma	DEN
Thaicom	THAI
Thomas Jefferson High School	US
Thuraya	UAE
Tohoku University—Space Robotics Lab	JPN
Tokyo Institute of Technology, Dept of Mechanical and Aerospace Engineering	JPN
TÜBİTAK UZAY (Space Technologies Research Institute)	TURK
Turkish Air Force	TURK
TURKSAT	TURK
UKSpOC	UK
Universidad Alas Peruanas (UAP)	PER
University of Alabama Huntsville	US
University of Applied Sciences and Arts of Southern Switzerland (SUPSI)	SWIT
University of Colorado	US
University of Florida	US
University of Hawaii	US
University of Louisiana, Lafayette	US
University of Maryland	US
University of Michigan	US
University of New Mexico	US
University of Surrey Space Centre	UK

Attachment 1: JFCC SPACE Conjunction Assessment Customers—Continued

Primary Owner/Operator	Country
University of Tartu	EST
University of Tokyo	JPN
University of Toronto Institute for Aerospace Studies—Space Flight Laboratory	ASRA
University of Tsukuba	JPN
University of Vigo	SPN
University of Wuerzburg	GER
US Air Force Academy	US
US Military Academy	US
US Naval Academy	US
US Naval Academy/Drexel University	US
US Navy	US
USAF	US
USSOCOM	US
Utah State University	US
Vermont Technical College	US
Vietnam Academy of Science and Technology (VAST)	VTMN
Vietnam National Satellite Centre	VTNM
Vietnam Posts and Telecommunications Group (VNPT)	VTNM
Vimpel	CIS
Warsaw University of Technology	POL
Weather News Inc	JPN

Attachment 2: JFCC SPACE Orbital Data Request Customers

Organization	Country
CONAE (Argentinian Space Agency)	Argentina
DSTO	Australia
Inside Systems Pty Ltd	Australia
Von Karman Institute	Belgium
CSSS	CA
Canadian Surveillance of Space Office	Canada
CANSpOC	Canada
Defence Research & Development Canada (DR&DC)	Canada
DSTI–5	Canada
FACh	Chile
EUMETSAT	EUMETSAT
Astrium Eads	France
CDAOA (French Air Force-Air Defense and Air Operations Command)	France
CNES	France
ESA	Germany
GSOC	Germany
GSSAC	Germany
ISRO	India
MediaCitra Indostar (MCI)	Indonesia
Italian MOD	Italy
Telespazio	Italy
Cabinet Satellite Intelligence Center	Japan
JAXA	Japan
JSAT	Japan
SPTVJSAT	Japan
SES	Luxembourg
Satlist	Netherlands
WarfareSims.com	Norway
DEIMOS	Spain
OHB	Sweden
CalSky	Switzerland
Private	Switzerland
Yahsat	UAE
AMSAT–UK	UK
Fylingdales	UK
Surrey Space Centre, Univ of Surrey	UK
University of Southampton	UK

Attachment 2: JFCC SPACE Orbital Data Request Customers—Continued

Organization	Country
1 SOPS	US
10 SWS	US
14 AF/A5C	US
16 SPCS	US
16th Weather Squadron	US
17 ESPCS	US
20 SPCS	US
21 OSS	US
213 SWS	US
22 SOPS	US
25 SRS	US
3 SOPS	US
4 SOPS	US
4 SPCS	US
45 SW	US
46 TS	US
50 OG/Det 1	US
53 TMG	US
595 SG/DMOC–S	US
6 SOPS	US
6 SWS	US
7 SOPS/Boeing	US
7 SWS	US
76 SPCS	US
Aerospace	US
AFIT	US
AFLCMC	US
AFRL	US
AFSPC	US
AFWA	US
AGI	US
AMSAT	US
ARSTRAT	US
Boeing	US
Brilligent	US
Cal Poly	US
COBRA DANE Program Office	US

Attachment 2: JFCC SPACE Orbital Data Request Customers—Continued

Organization	Country
DARPA TTO	US
Dept. of Astronautics	US
DIA	US
Digitalglobe	US
Energia Logistics Ltd.	US
Exelis, Inc	US
FAA	US
Global Broadcast Service Joint Program Office—Mitre contract	US
Global Imaging	US
Globalstar	US
HQ ACC/A5	US
IDB Communications	US
ILS	US
Independent	US
Inmarsat	US
Institute for Defense Analysis	US
Intelligent Commercial Spaceflight, LLC	US
Intelsat	US
Iridium	US
JHUAPL	US
JMS CTF	US
LLNL	US
LMCO	US
MDA	US
Missile Defense Agency (MDSDC)	US
MIT/LL	US
Montana State University, Dept of Physics	US
MSSS	US
N2YO	US
NASA—Glenn Research Center	US
NASA/GSFC	US
NASA/JPL	US
NASA Langley Research Center	US
NASA/ODPO	US
NASA/CARA	US
NASA/JSC	US
NASA/KSC	US

Attachment 2: JFCC SPACE Orbital Data Request Customers—Continued

Organization	Country
NASA/WFF	US
NASIC	US
National Envir. Sat & Info Service/SPI	US
Naval Research Lab	US
Naval Surface Warfare Center Dahlgren Division (NSWCDD)	US
NAVSOC	US
NGA	US
NGC	US
NOAA	US
Nocarum Tech	US
Northrupp-Grummun	US
NRO	US
NSWC Corona Division	US
O3b	US
Omitron	US
Operationally Responsive Space Office—SMC/SDDS	US
OrbitingEden.com	US
OSD	US
PARCS	US
Popular Science	US
Raytheon	US
Rincon Research	US
Riverside Research (Navy Contractor)	US
RTS Space Operations	US
Sandia National Laboratories	US
SAT Services	US
SATCOM	US
Scitor/OSD Net Assessment	US
SeaSpace Corporation	US
SERCO	US
Seti	US
SIDC/AFC	US
SkyBox Imaging	US
SMC	US
SMC/SY	US
Space Environment Technologies	US
Space Test Program SMC	US

Attachment 2: JFCC SPACE Orbital Data Request Customers—Continued

Organization	Country
Spaceflight Magazine	US
SpaceX	US
SPAWAR	US
SSC LANT	US
SSL	US
Terminal Eleven	US
ULA	US
University of Illinois	US
University of Miami	US
US ARMY PEO Missile and Space	US
US Army SMDC	US
USCG	US
USGS	US
USGS EROS Center	US
USSOCOM	US
WROCI	US
zarya.info	US

WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING

APRIL 3, 2014

RESPONSE TO QUESTION SUBMITTED BY MR. COOPER

General RAYMOND. The submitted spreadsheets list all Joint Functional Component Command for Space Conjunction Assessment customers (Attachment 1), as well as the customers supported through the Space Situational Awareness Sharing/Orbital Data Request program (Attachment 2).

[The attachments referred to can be found in the Appendix beginning on page 107.]

The Joint Functional Component Command for Space provides standard and emergency Conjunction Assessment products for all satellite owner/operators for whom we have contact information. We proactively work to maintain current contact information with all owner operators to provide the most comprehensive level of service to the international space community.

The Joint Space Operations Center currently supports 204 distinct Conjunction Assessment customers from 68 countries to include 198 unique owner/operators and 6 Department of Defense squadrons. Outside the United States government the customers with the largest number of assets are: Globalstar (82), Intelsat (79), Iridium (74), SES (54), Indian Space Research Organization (34), Eutelsat (30), Orbcomm (30), Telesat (23), and CNES (18).

Orbital Data Requests are customer driven requests for services that are not provided as standard products on www.space-track.org. Requests come from Conjunction Assessment customers, launch agencies, United States government research organizations, etc. In the last two years, the Joint Space Operations Center has supported 609 Orbital Data Requests from 165 distinct customers, representing 22 countries. [See page 11.]

RESPONSE TO QUESTION SUBMITTED BY MR. COFFMAN

General SHELTON. Lockheed Martin currently has eight vehicles on contract and is focused on establishing a cost-efficient production line that plans for the addition of a ninth GPS III space vehicle. Although we have not yet received a proposal from Lockheed Martin for SV09 which would provide details to calculate cost inefficiencies associated with the reduced buy in FY15 from 2 to 1 vehicle, we expect the per-vehicle cost for SV09 to increase by approximately eighteen percent due to the inefficiencies in parts procurement, factory processing, and overhead. [See page 12.]

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

APRIL 3, 2014

QUESTIONS SUBMITTED BY MR. ROGERS

Mr. ROGERS. The National Space Policy, signed by the President, states that "The United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self-defense, deter others from interference and attack, defend our space systems and contribute to the defense of allied space systems, and, if deterrence fails, defeat efforts to attack them." Can you provide your thoughts on the importance of an effective space defense?

General SHELTON. Our nation's reliance on space systems and services demands an effective space protection strategy. The increasing threats to our space systems, the risks posed by space debris, and the potential for premature failure of a given satellite, dictates a change to our traditional architectural approaches. We are working on both material and non-material solutions (e.g., OPSEC, Critical Asset Risk Management, Military Deception, Information Assurance) to affordably manage risk, increase resiliency and enhance overall mission effectiveness.

Air Force Space Command, in concert with our partners in the National Security Space community, also is pursuing multiple solutions to dissuade and deter adversary actions against our space systems.

Mr. ROGERS. How can we should change the current system to purchase commercial satellite communications services in a more cost effective and strategic manner?

General SHELTON. Air Force Space Command is planning a set of pathfinders to work through many of the different aspects associated with the current purchase process, including investigations into the associated policy, business, requirements, circuit protection, and management risks. The first of these pathfinders is being executed by the Space and Missile Systems Center now and will award in 3Q FY14 with a projected savings of ~40% versus traditional bandwidth leasing practices. The results of these pathfinders will help inform the best balance of military satellite communications and commercial satellite communications (COMSATCOM) investment. This will, in turn, allow the Department to select a more affordable approach for future COMSATCOM procurement with substantial savings over the past methods for bandwidth leasing.

Mr. ROGERS. What is the status of the Operationally Responsive Space office?

General SHELTON. In compliance with FY13 National Defense Authorization Act (Public Law 112–239 §914), the Department realigned the ORS Office reporting chain from the DOD Executive Agent for Space to the Commander, Space and Missile Systems Center (SMC). This change in reporting chain will facilitate direct interaction between the ORS Office with SMC's other program offices. The transfer of knowledge and lessons learned will be the primary mechanism for fully integrating ORS principles into Air Force (AF) space acquisition programs. The AF is executing the transition using current funding in three phases: Phase 1 began in FY13 and includes the establishment of a Program Guidance Letter, a Concept of Operations (CONOPS), a Program Plan, the administrative transfer of personnel, and the financial transfer of personnel; Phase 2 includes the execution of current ORS Office projects and initiation of the most recent United States Strategic Command (USSTRATCOM)-validated urgent need; and Phase 3 completes the implementation of ORS tenets and authorities across the full range of space programs within SMC.

The three-phase approach to transitioning the ORS program concepts allows for an orderly execution of programs and the ability to realize the Department of Defense goal to provide more resilient and cost-effective architectures.

Mr. ROGERS. What are the current missions they are working on?

General SHELTON. The ORS Office is continuing to respond to urgent need projects and to pursue enabler efforts to meet the congressional established cost goals of $60M per mission. The ORS Office will work with other SMC offices to ensure that current ORS projects are completed and the lessons learned and principles of ORS are transitioned into SMC programs.

• ORS–1 Focus: Urgent Need. ORS–1 is delivering capability to the war fighter today and is the first dedicated system for United States Central Command (USCENTCOM). The program cost was $226M and fielded in under 32 months by

exercising streamlined acquisition, shortened decision-making chains, and novel engineering and technical solutions.

Significance: ORS–1 built the enabling infrastructure with emphasis on ground systems architecture. ORS–1 achieved numerous "firsts" adding fundamentally new capabilities to tackle some of the nation's hardest information gathering problems and a first-ever focused capability for USCENTCOM. ORS–1 provides superb collection capability and USCENTCOM, as well as other Combatant Commands, continues to rely on its capabilities as an integral component to their intelligence, surveillance and reconnaissance architecture and collection plan. These architecture advancements will be utilized for future missions.

Status: ORS–1 was officially transferred to Air Force Space Command in January 2012. The system is operated by the 50th Space Wing, 1st Space Operations Squadron.

• ORS–2 Focus: Enabler. ORS–2 is a modular, reconfigurable, multi-mission satellite bus developed using a Modular Open Systems Approach. The completed bus and its associated hardware (space common data link radio) along with the Gryphon cryptology unit (software-based encryption for satellite command and control) were delivered to the ORS Rapid Assembly, Integration and Test Facility.

Significance: ORS–2's Gryphon unit was first demonstrated on the ORS–3 enabler mission. ORS–2 will establish a baseline for future reconfigurable, scalable, and open systems.

Status: The ORS office plans to transition the system to the AFPEO/SP.

• ORS–3 Focus: Enabler. The ORS–3 mission demonstrated an integrated payload stack for a low-cost payload capability and decreased range costs through automated targeting and range safety processes. These enablers not only focus on the ability to execute a rapid call-up mission, they reduce engineering hours from months to days in both cases, resulting in decreased launch costs.

Significance: ORS–3 demonstrated commercial launch practices and addressed complexity of integration of multiple payloads for efficiencies in future launches.

Status: This launch occurred in November 2013 from the National Aeronautics and Space Administration Wallops launch facility.

• ORS–4 Focus: Enabler. The ORS–4 mission will demonstrate a new, cost-effective, small launch capability that includes the development of three new solid rocket motors. This will demonstrate an alternative launch vehicle concept that reduces total mission cost through simple and repeatable processes.

Significance: ORS–4 is the pathfinder launch to significantly drive down launch and range costs and allow more affordable access to space for a smaller-scale, modular space vehicle. The long-term benefit is to also scale the Modular Space Vehicle to house various payloads for rapid development and deployment of space assets.

Status: This launch will occur 3rd quarter FY14. A strategy of transitioning the Super Strypi is being developed by the ORS Office and its mission partner, Sandia National Laboratories. This strategy should be completed by 3Q FY14.

• ORS–5 Focus: Urgent Need. Commander USSTRATCOM tasked the ORS Office to provide a formal assessment and recommendation to support Joint Force Commanders' urgent needs compiled by the USSTRATCOM/J8 staff. ORS–5 will apply the remaining FY13/FY14 ORS funding (approximately $60M) to address space situational awareness needs.

Significance: ORS–5 will demonstrate the tenets of ORS and address the guiding principles outlined in congressional language. This mission should enable ORS to step down from the $200M missions toward the congressional cost goal of $60M. Other objectives include moving toward smaller and more cost-effective launch alternatives, use of commercial practices, and incorporation of commercially mass-manufactured components to lower cost, shorten delivery time and strengthen the industrial base.

Status: On February 25, 2014, the ORS EXCOM approved a space situational awareness payload to meet USSTRATCOM-validated urgent needs, address rapidly evolving threats and serve as a pathfinder for the Space Based Space Surveillance system follow-on. ORS–5 is planned for launch in 2017.

Mr. ROGERS. Will these missions provide value to the warfighter?

General SHELTON. ORS–2 will establish a baseline for future reconfigurable, scalable, and open systems. ORS–4 will demonstrate an alternative launch vehicle concept that reduces total mission cost through simple and repeatable processes. ORS–5 will provide significant risk reduction to the Space Based Surveillance System follow-on and serve as an opportunity to continue driving down the cost and time to space by changing how we leverage commercial capabilities and incorporating ORS principles into programs of record.

Mr. ROGERS. To what extent has DOD validated the assertion that disaggregated architectures offer to greater resiliency, operational efficiency, and/or cost savings?

What is the status of the CAPE studies on disaggregation? Are there any initial findings?

General SHELTON. Disaggregation is one technique being examined to achieve resiliency of our satellite constellations. Our goal is not to validate merely one technique, but to find the best method or combination of methods that enable the ability to continue providing required space capability in the face of adverse actions or premature failure. Toward this end, the recently concluded Weather Satellite Follow-on analysis identified disaggregated alternatives that leverage civil, international and DOD capabilities in multiple orbits. We are also engaged in analyses of alternatives for the Space Based Infrared System Follow-on (SBIRS–FO) and Protected Satellite Communications Services (PSCS) capabilities that are evaluating disaggregated options within their tradespace of possible solutions. These analyses will inform the decision on the most resilient and cost effective solutions for follow-on programs. We have yet to validate any particular technique as the best approach; however, we are certain that business as usual is unsustainable in the face of a growing threat, stressed budgets and growing demand.

Mr. ROGERS. There have been major advances in Overhead Persistent Infrared with the launch of the Space-Based Infrared System. Are we leveraging this capability to the fullest extent?

General SHELTON. We have been exploiting additional capabilities since we operationally accepted two SBIRS Geosynchronous Earth Orbit (GEO) satellites last year; however, we are still working to realize the full potential of the sensors on these satellites. The SBIRS GEO scanning sensors have been fully integrated into the Air Force Space Command OPIR constellation. They are providing excellent service and have already demonstrated capability superior to that of the legacy Defense Support Program sensors. We will not, however, achieve full capability on SBIRS GEO until the SBIRS ground segment is capable of processing data from the GEO staring sensor. This will occur with implementation of the SBIRS Block 10 ground segment upgrade in Spring 2016. The staring sensor will allow SBIRS to begin meeting all program theater missile warning and technical intelligence mission requirements. We are already sharing un-tuned staring sensor data with the technical intelligence community so they can calibrate their systems. We will not know the staring sensor's full capabilities until we have a chance to operate them following the Block 10 upgrade.

Mr. ROGERS. The National Space Policy, signed by the President, states that "The United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self-defense, deter others from interference and attack, defend our space systems and contribute to the defense of allied space systems, and, if deterrence fails, defeat efforts to attack them." Can you provide your thoughts on the importance of an effective space defense?

Mr. KLINGER. Our current national security space systems and those we are planning for in the near future trace their origins primarily in response to the Cold War stand-off with the Soviet Union. For the first thirty years of the Space Age our systems were designed principally to respond to the threat of nuclear war with the USSR. Since the end of the Cold War, the space domain has changed radically in fifty years. It has evolved from a relatively uncontested sanctuary to a likely theater of combat operations. Space has become equally pervasive in all aspects of our thinking about warfare and military operations—from major campaigns like Operation ENDURING FREEDOM to smaller scale relief operations in response to humanitarian crises, such as Operation UNIFIED ASSISTANCE to aid tsunami victims. Our asymmetrical advantage in space also creates asymmetrical vulnerabilities. Our adversaries recognize our dependence on space and continue to think of ways to respond to our space advantage.

From an acquisition perspective, it's evident that existing requirements validation, architecture development, and investment funding decisions do not account for the attrition, survivability, or resilience of our space capabilities in a contested domain. The rapidly changing environment, with new and evolving threats, in a difficult budget environment, requires a new approach to ensuring unfettered access to, and use of, space capabilities for the United States and its allies. Space domain mission assurance is essential for an effective space defense posture. In many programs the Department needs more analysis to implement optimal means of achieving that assurance. In order to implement an effective space defense, resilience should be a key performance parameter of our future space architecture, judging effectiveness relative to its contribution to resilience in addition to other requirements.

In summary, we are undergoing a fundamental cultural shift in how we view the space domain. As we begin to fundamentally think about and approach the space

domain as a theater of combat operations, we will develop and implement the required degree of resilience as part of an effective space defense posture.

Mr. ROGERS. How can we should change the current system to purchase commercial satellite communications services in a more cost effective and strategic manner?

Mr. KLINGER.

- Senate Report 113–44, dated June 20, 2013, included a section titled "Satellite communications strategy" in which the Secretary of Defense is requested to provide a 5-, 10-, and 25-year strategy for using an appropriate mix of Department of Defense (DOD) and commercial satellite communications (SATCOM) bandwidth. As part of the strategy, the Secretary was directed to consider the use of a capital working fund or other mechanisms for leasing or multi-year procurement of commercial bandwidth.
- In addition, in response to FY14 NDAA Section 913, DASD C3CB briefed the HASC on March 26, 2014 on a strategy to enable multi-year procurement of COMSATCOM services. Key objectives included a budgeting approach for stable funding, acquisition pathfinders to reduce risk, determination of best value contract terms, and planning and operational management process improvements to create the framework necessary to devise long term needs and manage for affordability and savings.
- In the strategy in response to Senate Report 113–44, DOD will address how commercial SATCOM is being used by DOD components, predict future demand, identify budgetary sources to fund the contracts, and instantiate an iterative process for managing the utilization of the purchased assets. This response is currently in final coordination within the Department and will be forwarded as soon as practicable.
- DOD recognizes that long-term contracts place the burden of defining the contract requirements, budgeting for contract execution (and potential termination), and managing the efficient utilization of the procured bandwidth on the DOD, not the satellite service provider. Consequently, execution of this strategy will require a unique management concept of operations.
- The strategy includes specific tasks and recommendations for pathfinder projects to test the results of the tasks against various multi-year contract methods.

Mr. ROGERS. To what extent has DOD validated the assertion that disaggregated architectures offer to greater resiliency, operational efficiency, and/or cost savings? What is the status of the CAPE studies on disaggregation? Are there any initial findings?

Mr. KLINGER. There is no current or planned CAPE study on disaggregation. Disaggregation is one option (as a subset of many resiliency options) that is being studied as part of AoA's for follow-on systems for Protected Satellite Communications (SATCOM) and Overhead Persistent Infrared (OPIR) capabilities. There are no preliminary findings at this time to report to the Committee.

Mr. ROGERS. There have been major advances in Overhead Persistent Infrared with the launch of the Space-Based Infrared System. Are we leveraging this capability to the fullest extent?

Mr. KLINGER. For the ground layer, data processing and exploitation of the SBIRS GEO and HEO scanner capabilities is being leveraged to the fullest extent possible and GEO starer data is already being leveraged prior to final calibration later this summer. The program accelerated delivery of calibrated starer data for the technical intelligence and battlespace awareness missions. All scanner and starer data is flowing to the National Air and Space Intelligence Center for data analysis and algorithm development. The program of record and Joint Overhead Persistent Infrared Ground (JOG) program are delivering the foundational communication capabilities to enable and enhance data dissemination and processing. The JOG program is also integrating starer data into the Space Awareness and Global Exploitation (SAGE) software tool which fuses/integrates multiple data sources and already contains a mature set of algorithms for battlespace awareness targets of interest. SBIRS Block 10 will consolidate mission control into two ops centers (one primary and one backup) in 2016, and the remaining Block 20 ground development will fuse and automate starer data for the missile warning and missile defense missions in the 2018 timeframe.

In addition, SBIRS Space Modernization Investment (SMI) funds are already addressing how best to adapt the SBIRS architecture as part of the overall OPIR enterprise. We are looking at: investigation of evolving the current SBIRS design (e.g., simplified scanner); architecture studies to understand how best to adapt the SBIRS architecture beyond GEO 6 and HEO 4 as part of the overall OPIR Enterprise; wide field-of-view (WFOV) staring sensor technology for future satellite concepts and technology insertion; and associated sensor algorithm development. All of these

SBIRS SMI efforts have universal application regardless of the specific direction resulting from the OPIR AoA.

Mr. ROGERS. The National Space Policy, signed by the President, states that "The United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self-defense, deter others from interference and attack, defend our space systems and contribute to the defense of allied space systems, and, if deterrence fails, defeat efforts to attack them." Can you provide your thoughts on the importance of an effective space defense?

Mr. LOVERRO. The United States considers the use of space to be vital to its national interests from both an economic and security standpoint. Therefore, ensuring the ability to use space for the future is of utmost importance, especially in the contested space environment we envision. DOD Space Policy (DOD Directive 3100.10, "Space Policy," October 18, 2012) describes the Department's overall strategy to deter threats to both U.S. and allied space systems by: (1) supporting the development of international norms of responsible behavior that promote the safety, stability, and security of the space domain; (2) building coalitions to enhance collective security capabilities; (3) mitigating the benefits to an adversary of attacking U.S. space systems by enhancing the resilience of our space enterprise and by ensuring that U.S. forces can operate effectively even when our space-derived capabilities have been degraded; and (4) possessing the capabilities, not limited to space, to respond to an attack on U.S. or allied space systems in an asymmetric manner by using any or all elements of national power.

As we examine the specific question of space defense, it is in the context of these broad policy guidelines. Our preferred approach is deterrence—to persuade potential adversaries to refrain from conducting an attack or otherwise compromising the responsible use of space. We believe that this goal is best achieved by clearly denying the benefits of adversary attacks through substantial increases in the resilience of our space mission architectures. Architectural resilience ensures the continuity of space-derived services, maintains the effectiveness of U.S. conventional force projection capabilities, and, married to the stated intent of the United States to respond, significantly deters any likelihood of attack. It is my view that this is the most effective form of space defense.

Making architectures more resilient is a combination of adequate protection, increased numbers of satellites, service diversity through the use of commercial, allied, and wholly owned elements, distribution of service nodes, well-reasoned disaggregation, and operational ambiguity—all to create a service that can stand up to an adversary's attack. These are the same force structure ideas we use in every other field of warfighting to help our systems survive in a hostile environment and to increase conventional force deterrence. Additionally, increases in resilience can be combined with other elements of space defense, such as active defensive operations, which can provide warning of or interruption to an adversary's attack, and the ability to replenish lost or degraded capabilities. Taken as a whole, we are confident these measures can defend critical U.S. interests in space for the long term.

Mr. ROGERS. How can we should change the current system to purchase commercial satellite communications services in a more cost effective and strategic manner?

Mr. LOVERRO. Although there are short-term opportunities for improving the processes by which we purchase commercial satellite communications (SatCom) services (e.g., longer-term leases), full incorporation of commercial SatCom services into an operationally responsive, user-focused, and mission-reliant capability will require more than simple changes to buying or contracting practices. A recent DOD tiger team outlined a step-by-step approach to addressing some of these issues and proposed actions that could be taken in the short-term to reduce risks and uncertainties by establishing tools and completing "pathfinder" activities necessary to inform a future strategic approaches.

The team's study found that, based on historical lease data, and the recent Mix of Media study, the Department requires at least 3 GHz of commercial wideband SatCom bandwidth globally to satisfy its requirements through the Future Years Defense Program (FYDP). Further, as the Department begins to formulate its vision for a follow-on to the Wideband Global System, it must fully assess the operational, fiscal, and resilience implications of a more strategic relationship with commercial SatCom service solutions.

Due diligence suggests that near-term risk mitigation strategies should be pursued immediately to gain crucial insights prior to the next series of SatCom investment decisions. Investment costs for the tiger team's recommended pathfinder activities are almost negligible compared to expected lease expenditures, and several of these activities may reduce lease expenditure costs in the near term.

But the primary benefit related to utilizing commercial SatCom services would not merely be minor reductions in cost, but rather would include the array of benefits that may only be realized once commercial SatCom services are fully incorporated into DOD's operational model. To do so, DOD must identify the right combination of prospective solutions, and current and future pathfinder activities are critical to that understanding.

Mr. ROGERS. To what extent has DOD validated the assertion that disaggregated architectures offer to greater resiliency, operational efficiency, and/or cost savings? What is the status of the CAPE studies on disaggregation? Are there any initial findings?

Mr. LOVERRO. The National Security Space Strategy and the DOD Space Policy (DOD Directive 3100.10, "Space Policy," October 18, 2012) make clear that just as in all areas of warfighting, resilience must be a factor that is considered in developing and fielding future space architectures and systems. Although disaggregation has been viewed as a promising method to enable resilience, it is but one of several approaches we are examining to achieve overall space mission assurance.

System-level studies, conducted by the Air Force, have indicated that for the two specific missions of Protected Communications (e.g., the Advanced Extremely High Frequency (AEHF) system), and Missile Warning (e.g., the Space-Based Infrared System (SBIRS)), disaggregation appears to be viable, although further analysis is needed. Those conclusions are still being examined in analyses of alternatives (AoAs) led by the Office of the Director of Cost Assessment and Program Evaluation (CAPE) and the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD/AT&L). Alternative approaches to achieve necessary space mission assurance, such as defensive operations or reconstitution, could obviate the need to enhance the resilience of our space architecture through disaggregation, and other means, but these approaches also increase costs and are, themselves, untested.

It is important to clarify, therefore, that the question is not whether disaggregation is needed to achieve resilience, but rather, whether resilience, through disaggregation, is more cost effective than other ways to achieve mission warfighting assurance, or whether the value of the mission itself warrants that investment in the first place. This is what we are examining in the relevant AoAs.

Mr. ROGERS. The National Space Policy, signed by the President, states that "The United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self-defense, deter others from interference and attack, defend our space systems and contribute to the defense of allied space systems, and, if deterrence fails, defeat efforts to attack them." Can you provide your thoughts on the importance of an effective space defense?

Ms. SAPP. The NRO places a high priority on space protection, though specific details regarding space protection are classified. Situational awareness and protection, including the monitoring of space, terrestrial, and cyber threats, is a key element of NRO's survivability strategy. Continuous monitoring of these elements establishes both a baseline of normal activity and changes to the baseline associated with foreign counterspace actions. Such monitoring and awareness are critical for indicating when potential responses/actions may be warranted. Actions available to operators include various courses of action and concepts of operation that either minimize or mitigate counterspace threats. The NRO has key partnerships with the AF to ensure that we have the strongest team possible in addressing these critical threats.

Timely and appropriate response to space situational awareness indications and warning is particularly important due to operational requirements. Because of this, the NRO places a high priority on monitoring, categorizing, and characterizing potential threats through all possible means, domains, and partnerships. The NRO continues to refine a process to better respond to satellite interference and/or attack, but these activities are largely classified. In addition, the NRO has established a process and timeline for senior interagency and congressional leadership notification in the event of suspect or confirmed satellite interference and/or attack.

Mr. ROGERS. The National Space Policy, signed by the President, states that "The United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self-defense, deter others from interference and attack, defend our space systems and contribute to the defense of allied space systems, and, if deterrence fails, defeat efforts to attack them." Can you provide your thoughts on the importance of an effective space defense?

General RAYMOND. An effective space defense is critical for national security and global economic stability.

Mr. ROGERS. Has STRATCOM evaluated disaggregation as a means to provide more resilience to current space constellations, or provided any position on the issue?

General RAYMOND. U.S. Air Force Space Command (AFSPC) and U.S. Air Force Space and Missile Systems Center (SMC) are leading the study of disaggregated space system planning. They're studying SATCOM as their initial effort to better understand the concept.

The space environment continues to evolve and there are attributes of disaggregation which may offer the possibility of attractive options; however, disaggregation requires more analysis to determine if this will be the best way ahead. Disaggregation is only one means by which we may create more resilient architectures to ensure continuity of space-derived services.

Mr. ROGERS. How are the warfighter requirements for satellite communications projected in the future? Is there a base level of necessary communications that STRATCOM can assess will be needed for the next several years?

General RAYMOND. Combatant Commands, Services, and Agencies submit satellite communications (SATCOM) requirements to the Joint Staff and USSTRATCOM for validation on a quarterly basis. These requirements are then leveraged by the DOD when planning for future Military SATCOM systems and by the Defense Information Systems Agency when contracting for Commercial SATCOM services.

QUESTIONS SUBMITTED BY MR. COOPER

Mr. COOPER. How will the Department decide whether to apply disaggregated architecture principles to future space system acquisitions? What role is there for using additional hosted payload opportunities? What, if any, additional knowledge is needed to make an informed decision on whether to disaggregate DOD space systems?

General SHELTON. DOD is conducting analyses of alternatives for the Space Based Infrared System Follow-on (SBIRS–FO) and Protected Satellite Communications Services (PSCS) capabilities. These studies are evaluating disaggregated options within their stable of possible solutions. Hosted payloads also are part of the solution set being examined in these studies. These analyses will inform the decision on the most resilient and cost effective solution for each satellite constellation.

Mr. COOPER. To what extent have these potential benefits and limitations of disaggregation been proven out in pilots, demonstrations, or other tests, such as the Commercially Hosted Infrared Payload (CHIRP)? What knowledge or lessons have these provided?

General SHELTON. CHIRP demonstrated the viability of commercially hosted overhead persistent infrared (OPIR) payloads and gave tremendous insights into the applicability of wide field-of-view (WFOV) staring technology to the missile warning, missile defense, technical intelligence, and battlespace awareness missions. The sensor's ability to provide continuous coverage within the field-of-view proved to be particularly valuable in understanding short duration infrared events. Lessons learned from CHIRP will be applied to the Tactical WFOV Testbed and other ongoing OPIR Space Modernization Initiative (SMI) activities. These explore various space architectures, to include disaggregation, and develop/test lower-cost WFOV payloads to assess performance, cost and risk. CHIRP also provided many lessons on the benefits and constraints of a commercially hosted DOD payload.

The Space and Missile Systems Center (SMC) also conducted several over the air demonstrations in CY13 to explore MILSATCOM disaggregation. These demonstrations provided early risk reduction for the Protected Tactical Waveform (PTW) which will be utilized for future disaggregated protected tactical satellite communications. These demonstrations provided insight into the maturity of many of the major PTW functions and how they behaved over the Wideband Global Satellites and Intelsat. Successful demonstration of the government reference PTW over operational constellations proves the feasibility of a low-cost future Protected SATCOM architecture.

Lastly, SMC has several ongoing efforts that will further develop our understanding of the benefits and limitations of disaggregation. In the OPIR mission area, the Space Based Infrared System (SBIRS) Follow-on Analysis of Alternatives (AoA) will assess a disaggregated system as one of alternatives to the current program of record. For MILSATCOM, the Protected SATCOM Services (PSCS) AoA is comparing the current program of record to a disaggregated satellite system or a new aggregated satellite system. And the Hosted Payload Office, established in 2011, is working to complete source selection for the Hosted Payload Solutions contract in

June 2014. This contract will enable demonstrations and pilots for commercial hosting opportunities.

Mr. COOPER. How will the Department decide whether to apply disaggregated architecture principles to future space system acquisitions? What role is there for using additional hosted payload opportunities? What, if any, additional knowledge is needed to make an informed decision on whether to disaggregate DOD space systems?

Mr. KLINGER. The Department is considering disaggregated solutions in several analyses of alternatives (AoA) studies, as we endeavor to create more resilient architectures. Disaggregation is only one solution; however, in the spectrum of solutions that can be implemented to address space architecture vulnerabilities in an effort to gain more resilience and more affordable capabilities. Similar effects may be achievable by diversification, proliferation, and distribution of the mission across commercial, USG or Allied satellites.

Hosted payloads (assuming they are not hosted on USG satellites), have significant implications that must be assessed prior to an implementation decision. Alignment of commercial and USG development timelines, inability to command and control the vehicle, infrastructure requirements (user terminals, etc.), and counterspace and protection responsibilities of the USG are just a few of the concerns associated with the use of hosted payloads.

Mr. COOPER. To what extent have these potential benefits and limitations of disaggregation been proven out in pilots, demonstrations, or other tests, such as the Commercially Hosted Infrared Payload (CHIRP)? What knowledge or lessons have these provided?

Mr. KLINGER. CHIRP was an acknowledged technical success as it did provide some valuable lessons on the viability of utilizing commercial services for hosted payloads and demonstrated the utility of Wide Field of View (WFOV) sensors. However, the Department is still in the very early stages of analyzing the concept of disaggregation. The benefits and limitations of disaggregation are currently being studied through the on-going Analysis of Alternatives (AoA) processes for Protected Satellite Communications Services and Overhead Persistent Infrared (OPIR). The results of these efforts are not available for report at this time. We are also leveraging information across all of the AoAs to explicitly address findings related to new concepts of operation. Finally, disaggregation is but one tool in the resiliency taxonomy which the Department is exploring and we are focused on the resiliency of our capabilities, not just individual systems.

Mr. COOPER. Has STRATCOM evaluated disaggregation, or provided any position on the issue? How does disaggregation contribute to deterrence?

General RAYMOND. U.S. Air Force Space Command (AFSPC) and U.S. Air Force Space and Missile Systems Center (SMC) are leading the study of disaggregated space system planning. They're studying SATCOM as their initial effort to better understand the concept.

Disaggregation may contribute to deterrence by influencing adversary calculations on the cost and benefits of attacking our space assets. Making our architectures more resilient—disaggregation is one means by which we may do so—enables our ability to deny an adversary the benefits of an attack. Other means to enhance the resilience of our architectures include adequate protection, increased numbers of satellites, service diversity through the use of commercial, allied, and wholly-owned elements, distribution of service nodes, and operational ambiguity.

QUESTIONS SUBMITTED BY MS. SANCHEZ

Ms. SANCHEZ. How does the Air Force plan to manage this competition to ensure a level playing field? How should ULA's launch prices best be compared to those of SpaceX?

General SHELTON. The Air Force is committed to pursuing the benefits of competition in the EELV program as soon as possible. We will compete portions of the launch manifest each year in 2015, 2016, and 2017 allowing all certified New Entrants to compete (the certification process includes successful completion of launches and reviews of manufacturing and launch processing methodologies, as spelled out in the New Entrant Certification Guide).

All offerors will be required to submit proposals in accordance with the instructions in the Request for Proposal (RFP), and the Air Force will evaluate them in accordance with the criteria stated in the RFP. We will seek Industry's inputs to the final instructions and criteria by providing a draft RFP for their review. The Defense Acquisition Executive will approve the final RFP.

Ms. SANCHEZ. Given the risk of future additional launch slips beyond the changes that reduced the opportunities for new competitors in FY15–17, how is the Air Force planning to ensure opportunities for competition?

General SHELTON. The current launch procurement forecast is the result of programmatic decisions during the development of the FY15 budget request affecting launch planning in general, not just competitive opportunities, and was driven both by satellite operational needs and declining budgets.

The Air Force is aggressively taking steps to support competition while ensuring our responsibility to deploy National Security Space payloads into their orbits safely and under acceptable levels of risk. We are working early with declared New Entrants to certify their systems as soon as possible. We have a Cooperative Research and Development Agreement with SpaceX and we have recently added more government team resources to accelerate review of certification products, data and other supporting information throughout the certification process. The AF awarded SpaceX early integration contracts in March and April 2014 to support timely GPS III and SBIRS–GEO integration requirements. NROL–79 is the remaining competitive mission in FY15. The AF delayed release of the RFP from January 2014 to June 2014 to provide additional time for new entrants to prepare.

Ms. SANCHEZ. What is the requirement for maintaining the ELC line? Given the growing competitive environment in launch, should the government continue to pay for ULA's annual launch infrastructure in the longer-term or should the government work toward buying launch vehicles like satellites—as fully cost burdened items?

General SHELTON. We continue to fund EELV Launch Capability (ELC) to perform launch operations, maintain launch infrastructure (systems and expertise) and to provide the operational flexibility and cost predictability required to launch National Security Space (NSS) satellites. There is still only one launch provider in the U.S. who can lift the heavier satellites in the NSS manifest, such as Wideband Global SATCOM, AEHF, MUOS, and many classified payloads. Launch capability provides us the flexibility to meet mission requirements without continual requests for equitable adjustments (REAs) or schedule penalties driven by satellite vehicle (SV) acquisition/development issues, integration delays, range delays, and SV build delays. In short, the ELC portion of the launch business ensures we are continually prepared to launch national security payloads.

Ms. SANCHEZ. EELV launch costs have steadily risen over the last decade. DOD and ULA have recently cited gains in efficiencies. How has the potential for competition affected prices?

General SHELTON. The FY15 budget request includes $1.2B in Air Force savings between FY14 PB and FY15 PB in the EELV program, and reflects the final portion of $4.4B savings for the DOD since the FY12 PB high water mark for the program. This is a direct result of economic order quantity purchasing (36 cores over a 5 year period) while leveraging the benefit of competition with the incumbent. This FY15 request demonstrates hard-fought gains in controlling launch costs.

Ms. SANCHEZ. What role do you see commercial industry having in satellite architectures of the future?

General SHELTON. The commercial industry has a critical role in helping to define future satellite architectures through the introduction of business approaches, concepts for communication services, and internally developed technologies. That role continues in response to the ongoing conversations in support of future commercial satellite communications pathfinding risk mitigation. In partnership with commercial industry, the Department recognizes there are opportunities to develop and procure more affordable, resilient future satellite architectures.

Unified S-Band (USB) and hosted payloads are two areas that the Space and Missile Systems Center is actively pursuing to take advantage of new developments in the commercial industry. Transitioning to USB will allow our satellites to take advantage of existing commercial satellite control networks and reduce the Air Force Satellite Control Network footprint. This will result in substantial cost savings, as well as development of dual band command capability, which will provide additional satellite control flexibility and resilience. And the Hosted Payload Office, established in 2011, is working to complete source selection for the Hosted Payload Solutions contract in June 2014. This contract will enable demonstrations and pilots for commercial hosting opportunities, the goal being to complement and supplement dedicated platforms while potentially providing significant cost savings and improved resilience across most mission architectures.

Ms. SANCHEZ. Are NNSA requirements for nuclear detection being met in terms of integrating this requirement on GPS III and what is the deadline for resolving what the nuclear detection payload on the next GPS III vehicles will be? What challenges remain?

General SHELTON. NNSA is coordinating closely with the Air Force to ensure successful integration of their Global Burst Detectors (GBDs) onto GPS III SVs 01–08. The GPS program office is currently working acquisition strategies for GPS III SV 9 and beyond.

Air Force Space Command is working with NNSA to firm up plans for the GPS III SV 9+ era. Interface definitions will be defined and coordinated over the next year.

Ms. SANCHEZ. Given the risk of future additional launch slips beyond the changes that reduced the opportunities for new competitors in FY15–17, how is the Air Force planning to ensure opportunities for competition?

Mr. KLINGER. All launches over and above the 36 cores being sole-sourced from ULA will be available for competition to all certified providers.

The Department will continue to work to ensure the maximum number of competitive opportunities are available to all certified providers. The Air Force is working with prospective new entrants to gain certification, without imposing potential design or cost impacts on existing new entrant launch vehicles, and by providing the launch infrastructure necessary to meet National Security Space (NSS) launch requirements. The Air Force is partnering with our civil space agencies, NASA and NOAA, to identify launch opportunities which will demonstrate capabilities equal to those needed for NSS. The funding for these opportunities has been provided by our civil space partners.

The Air Force has also recognized that new entrants will have different approaches to meeting some requirements. The Air Force is updating these requirements to specify vertical integration, and maintaining the requirement for minimum 20,000lb lift to Low Earth Orbit for new entrant providers, in order to maintain predictable requirements for new entrants.

Ms. SANCHEZ. How does the Air Force plan to manage this competition to ensure a level playing field? How should ULA's launch prices best be compared to those of SpaceX?

Mr. KLINGER. The Department is working aggressively to ensure all future competitions will allow certified offerors the opportunity to compete on a full and open basis. For the Phase 1a competition the offers will be evaluated based on specific criteria developed for each mission. The Air Force will ensure a level playing field by having a readiness meeting with each contractor prior to RFP release.

The new acquisition strategy, designed to introduce competition as soon as a new competitor is certified and in a manner to maintain mission assurance requirements, requires any competitor: to fly our most critical payloads to all required orbits; provide those capabilities from launch locations on both coasts; provide heavy lift launches; and meet the security and mission unique requirements of the National Security Space launch process for the EELV Phase II follow-on competition. Any price comparison between competitors must account for all of these requirements, as stipulated in the Acquisition Strategy.

Ms. SANCHEZ. What is the requirement for maintaining the ELC line? Given the growing competitive environment in launch, should the government continue to pay for ULA's annual launch infrastructure in the longer-term or should the government work toward buying launch vehicles like satellites—as fully cost burdened items?

Mr. KLINGER. ELC provides the government with the flexibility to meet all current national security space launch needs. The EELV Phase 1 Contract awarded to ULA on 18 December 2013 includes both a firm fixed price line item for the actual Atlas V and Delta IV launch vehicle, and a Cost Plus Incentive Fee line item for the majority of the Launch Capability support, i.e., the associated launch infrastructure readiness. This includes Systems Engineering and Program Management, Mission Integration, Base and Range Support, Maintenance Commodities and launch pad depreciation (the only Firm Fixed Price portion). This contract arrangement ensures that the government, in good faith, will make every reasonable attempt to lock in prices for the launch cores over the 5 year ordering period.

The future acquisition strategy and contract structure that fully incorporates new entrants for future EELV procurements is still in development. The government will evaluate the competitive environment that exists when the future procurement occurs and determine the appropriate contracting approach. At this point the Department is evaluating plans that will take the costs currently funded in the ELC line and directly allocate them with individual launch service thus allowing the Department to phase out the ELC line on future EELV procurements.

Ms. SANCHEZ. EELV launch costs have steadily risen over the last decade. DOD and ULA have recently cited gains in efficiencies. How has the potential for competition affected prices?

Mr. KLINGER. The Department recognized the rising EELV launch costs and directed the AF to develop a new acquisition strategy that reintroduced competition

into the program with the hopes of realizing the benefits of competition in the form of reduced costs. The AF developed a dual track acquisition approach that encourages competition and also provides cost reduction by providing the incumbent contractor, United Launch Alliance (ULA), with a 5 year requirements contract that allows ULA to strike long term deals with their vendor base. This longer term contract has the added benefit of helping to stabilize an atrophying space industrial base.

The combination of those two approaches has significantly reduced the cost of launch to the U.S. government, with program improvements that result in a $3Billion decrease in the new Acquisition Program Baseline, which includes extending the EELV program by 10 years (from 2020 to 2030) and increasing the launch service quantity by 60 from 92 to 152. It also takes advantage of a steady production rate to minimize costs adding stability and predictability for both Solid Rocket Motors and Liquid Rocket Engines.

Ms. SANCHEZ. What role do you see commercial industry having in satellite architectures of the future?

Mr. KLINGER. The Department sees the commercial industry's role becoming more prominent in the years to come. We are currently at a point in time where all of our major space capabilities are on the cusp of re-capitalization decisions and we have the opportunity to pursue a more significant role for commercial capabilities. The options to implement this include partnerships that add real value e.g. improved resilience, to our National Security Space architectures. A renewed focus on resilience offers an opportunity and a virtual requirement that considers these systems as a fundamental feature of our space architectures. Their consideration as elemental to our architecture should address not only their capacity contribution, but also their ability to bolster deterrence and complicate the decision calculus of our adversaries. Over the years we have demonstrated the value of commercial contributions in areas such as remote sensing for our warfighters, Coalition partners, disaster relief and many other civil applications. We now have the opportunity to expand use of commercial capability, as called for in the National Space Policy.

Ms. SANCHEZ. EELV launch costs have steadily risen over the last decade. DOD and ULA have recently cited gains in efficiencies. How has the potential for competition affected prices?

Mr. LOVERRO. It is my opinion that competitive forces have been an important element of DOD's overall strategy to curb cost growth and, hopefully, eventually lower launch costs.

More importantly, a well-managed, commercially competitive U.S. launch industry brings secondary benefits for DOD through competitively-inspired improvements in launch technology, range scheduling process, and a host of other areas, not to mention the overall national benefit of bringing commercial launch back to the United States. These are some of the primary reasons DOD is interested in facilitating new entrants into the space launch business and certifying those new entrants as quickly as possible.

Ms. SANCHEZ. Are NNSA requirements for nuclear detection being met in terms of integrating this requirement on GPS III and what is the deadline for resolving what the nuclear detection payload on the next GPS III vehicles will be? What challenges remain?

Mr. LOVERRO. Yes, the National Nuclear Security Administration (NNSA) is coordinating closely with the Nuclear Detection (NUDET) Detection System (NDS) and Global Positioning System (GPS) III Air Force teams to ensure successful integration of the Global Burst Detectors (GBDs) onto next-generation GPS III Satellite Vehicles (SV). There is no issue with SV 1–8, as NNSA will provide the payload on time to meet the integration schedule for these SVs as originally planned. If, as expected, the Air Force extends the contract and buys additional satellites, SV 9 & 10 will not have GBDs, but these are not needed to have a healthy system. NNSA has begun research and development to develop a new/modified GBD to use on SV11 and thereafter.

According to the approved GPS Enterprise Schedule, the SV–11 Available For Launch date is in the second quarter of Fiscal Year 2022; therefore, the NDS payload would be required in the second quarter of Fiscal Year 2020. NNSA development is on schedule to meet these deadlines. NNSA, Department of Energy laboratories, and Air Force NDS and GPS Space Vehicle teams are working successfully together with the SV contractor to determine NDS payload space allocation on the next-generation GPS III SV. No other known challenges remain.

QUESTIONS SUBMITTED BY MR. PETERS

Mr. PETERS. What progress has the Department made to establish its Space Acquisition Strategy for commercial satellite services as required in the final conference report of the fiscal year 2014 National Defense Authorization Act (NDAA)? A recent DISA report shows that military satellite communications bandwidth demand is increasing at a rate of 35% per year. It was surprising to learn that to meet 2012 military bandwidth needs it takes 21 legacy satellites versus one modern commercial high capacity satellite. As the Department continues to develop its Space Acquisition Strategy, is the Department aware of the new technology that is available for high capacity satellites? How does the Department plan to incorporate the procurement of the best available commercial satellite services into the overall acquisition strategy that is being developed?

General SHELTON. A Space Acquisition Strategy for commercial satellite services is currently in work to answer the requirement of the FY14 NDAA.

The Department is actively engaged with commercial partners regarding new technology available for high capacity satellites. Beginning in FY11, the Space and Missile Systems Center (SMC) has conducted several Broad Agency Announcements (BAAs) with the goal of better understanding these technologies and integrating them into our plans for more affordable and resilient future satellite architectures. SMC is executing a pathfinder beginning later this year to procure transponders on a highly inclined commercial satellite to meet a validated warfighter need over USAFRICOM. This cost-efficient pathfinder will satisfy specific mission requirements and inform future commercial satellite communications procurement approaches.

The pathfinder planned for later this year is the first of several additional pathfinders intended to incrementally build via a "crawl, walk, run" approach toward a more efficient commercial acquisition process and optimized balance between Military and Commercial SATCOM procurement. The ultimate goal of these efforts is to increase affordability, efficiency and resiliency.