DEPARTMENT OF DEFENSE AUTHORIZATION OF APPROPRIATIONS FOR FISCAL YEAR 2015 AND THE FUTURE YEARS DEFENSE PROGRAM

WEDNESDAY, MARCH 12, 2014

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

MILITARY SPACE PROGRAMS

The subcommittee met, pursuant to notice, at 3:07 p.m. in room SR–222, Russell Senate Office Building, Senator Mark Udall (chairman of the subcommittee) presiding.

Committee members present: Senators Udall, Donnelly, King, and Sessions.

Majority staff member present: Jonathan S. Epstein, counsel.

Minority staff member present: Daniel A. Lerner, professional staff member.

Staff assistants present: Lauren M. Gillis and Brendan J. Sawyer.

Committee members' assistants present: Christopher R. Howard, assistant to Senator Udall; and Stephen M. Smith, assistant to Senator King.

OPENING STATEMENT OF SENATOR MARK UDALL, CHAIRMAN

Senator UDALL. Let me bring today's hearing of the Strategic Forces Subcommittee to order.

I want to thank our witnesses for your patience. I know Senator Sessions will be here shortly. I would like to deliver my opening statement, and then when Senator Sessions arrives, I know he will have some remarks as well.

This afternoon, we will receive testimony regarding the Department of Defense military space programs for the fiscal year 2015.

As I said, I want to thank all of you for taking your valuable time to be here today.

On February 11th, Director of National Intelligence James Clapper testified to the full committee that "threats to U.S. space services will increase during 2014 and beyond, as potential adversaries pursue disruptive and destructive counter-space capabilities. Chinese and Russian military leaders understand the unique information advantages afforded by space systems and are developing capabilities to disrupt the United States' use of space in a conflict."

I do not have to tell the witnesses that Director Clapper's statement illustrates how our policy is just now beginning to catch up with the threat and that our operational plans are just now starting to synchronize with the policy and material requirements flowing from the operational plans. Given these rapidly changing threats to our space-based assets and the need to examine these issues at the ground floor, this hearing is timely.

General Shelton, good to see you again, and I want to just say your command, as I know you know, is squarely in the middle of this vortex of events. I hope to hear more from you in this unclassified forum regarding what we are doing to protect space assets from these threats not only now but over the next 15 years. I know that we are discussing plans to move away from larger satellites and toward smaller hosted payloads. But it is my understanding that we know little about the cost and the benefit in comparison to existing satellites where we have perfected the engineering and are now at a point where we can procure them at a fixed price, allowing for incremental improvements.

General Mann, congratulations on becoming the commanding officer of the Space and Missile Defense Command. Your operations are located both in Colorado and Alabama which, of course, makes your command all the more relevant to Senator Sessions and myself. I understand your command is in charge of Kwajalein Atoll, which is one of the most important ground assets we have not only for space tracking but for missile testing. I am interested in hearing more about your long-term plans for Kwajalein and how your command supports STRATCOM for space situational awareness. Unlike military sites in my State of Colorado, Kwajalein does not have an elected Member of Congress to advocate for them and their needs, and I hope to make this subcommittee their advocate.

Mr. Loverro, you were with us last year. Welcome back. It is your job to develop the necessary policies to support DOD's space operations. I hope to hear how these policies are changing in light of the threat we face, combined with the fiscal constraints we are under for the foreseeable future. I would also like to know how you are working with STRATCOM to turn those policies into effective operational plans.

Dr. Zangardi, you are a veteran in appearing before this subcommittee. Welcome back. The Navy is fielding the Mobile Objective User Satellite System which will allow cell phone-like satellite service worldwide to DOD personnel. It is my understanding that the Navy recently had a setback with satellite number 3 and has had to switch it with another satellite. I would like to know the status of the system and how the Navy is developing its ground system to support the MUOS constellation.

And finally, we saved the best for last, Ms. Chaplain. You are our Government Accountability Office expert on DOD space systems. Your reports are the bedrock for helping our subcommittee perform its oversight duties. I would like to hear about your recent findings on new entrants to the DOD launch market and your recent work on the family of Advanced Beyond Line of Sight Terminals, including its cost overruns, and restructuring the acquisition program to only support command post terminals.

I would also like to note I have some real concerns that the Air Force has decided to spend hundreds of millions of dollars over the fiscal yearDP on developing an all-new helicopter at the same time they are accepting higher costs and increased risks for overhead architecture. They could save a huge amount of money by purchasing existing aircraft and investing the savings in improved SSA and smarter acquisition practices that would bring down the cost per copy of essential satellite programs like GPS–3.

Now my remarks here say I am going to turn to Senator Sessions for his opening statement and then move to the witnesses, but I think we could start without Senator Sessions, and when he arrives, we will make some time for him.

I would like to end the hearing, if at all possible—I think 4:30. We will shoot for that. We have got five witnesses. I think we could make that a possibility.

Senator Sessions is arriving. So let me just finish saying I think I am going to ask my colleagues if 7-minute rounds, Senator Donnelly, are acceptable. And if Senator Sessions would like to make an opening statement, I would like to recognize him.

STATEMENT OF SENATOR JEFF SESSIONS

Senator SESSIONS. Thank you. We thank all of you for being here and look forward to working with you as part of this committee. We have a lot of important issues before us, and we depend on you and your integrity and good judgment to help us make the right decisions.

General Mann, it is good to see you. We are proud of your new command, and good luck.

General Shelton, this will be your last—maybe—I guess. Well, we appreciate your service too and all you have done.

We are looking at the budgets for the Defense Department. I believe that Secretary Hagel will be forced to make some tough decisions. I think all of the things that he has listed in his reductions will not occur. I do not think, under the Budget Control Act, they will have to be cut that much, which is good news. But we need to determine pretty soon what will end up having to be reduced and how we will handle that. As the ranking on the Budget Committee, Mr. Chairman, it is just a very tough time for us, but I believe if we are smart, we will be able to work through this without having these programs that we have invested so much in for so long be damaged.

Thank you all.

I will submit my full statement for the record.

[The prepared statement of Senator Sessions follows:]

[SUBCOMMITTEE INSERT]

Senator UDALL. Thank you, Senator Sessions.

I want to start with Mr. Loverro and work across the panel. I think if you all could keep your remarks from 3 to 5 minutes—any additional comments you have, of course, we can include in the record—that will give us time for a robust round of questions and interaction with the members of the committee. Mr. Loverro?

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

Mr. LOVERRO. Yes, sir.

Chairman Udall, Ranking Member Sessions, members of the subcommittee, I am pleased to join General Shelton, Lieutenant General Mann, Dr. Zangardi, and Ms. Chaplain to testify on Department of Defense space programs and policies. I first testified in front of Congress 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 at every level of engagement, from humanitarian assistance to the highest 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 allies.

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. Those terms, the so-called three Cs, have been used extensively, and I believe it serves us well to put them in perspective.

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 right 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 we and the Department of State are doing internationally and at the United Nations to set rules of the road for outer space, as well as the space situational awareness sharing work that U.S. Strategic Command is leading, are aimed at bringing a similar focus on this issue to the community of space-faring nations. I am somewhat confident that we are on the right course to deal 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 air, sea, and land domains, and now we must likewise respond in space. We do so against a backdrop of decreasing budget that challenges both the ability and the speed with which we can act, but in no way diminishes the impor-

tance 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 have submitted to the subcommittee, I have outlined the five key elements of this strategic approach: promoting the responsible, peaceful, and safe use of space; enhancing the resilience of DOD space architectures; partnering with likeminded international organizations and commercial firms; deterring aggression; and defeating attacks and preparing to operate in a degraded environment. My testimony also describes specific steps we are taking to implement our approach in each of these areas.

I look forward to your questions. Thank you very much.

[The prepared statement of Mr. Loverro follows:]

Senator UDALL. Thank you very much.

Dr. Zangardi?

STATEMENT OF DR. JOHN A. ZANGARDI, DEPUTY ASSISTANT SECRETARY OF THE NAVY FOR COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, INTELLIGENCE, INFORMATION OPERATIONS, AND SPACE

Dr. ZANGARDI. Good afternoon. Chairman Udall, Ranking Member Sessions, Senator Donnelly, Senator King, thank you for the privilege today to speak before you and with this distinguished panel.

I am happy to announce that the MUOS program continues to make positive strides in achieving overall program goals. On the heels of our first successful launch of Space Vehicle, or SV–1, in February 2012, SV–2 launched from Cape Canaveral, FL, on July 19, 2013. Its legacy payload—that is the UHF payload—is available now for early operational use. Our three remaining satellites are on schedule to be launched in January 2015, August 2015, and sometime in 2016.

The most significant challenge for the program over last year has been delays with satellite number 3. During last year's thermal vacuum testing, satellite 3's legacy payload experienced an uncommanded shutdown. The program office initiated a thorough investigation and identified the root cause as insufficient solder volume during the production of the output multiplexer, or OMUX. The program office initiated corrective actions and has since determined that this deficiency is isolated to satellite 3 only. 4 and 5 are not impacted. Since satellites 3 through 5 are under a fixed price incentive fee contract, the Government will not incur any additional expenses due to the delay.

In order to minimize the schedule delay of approximately 6 months, the Navy has decided to move satellite 4 up into the third launch slot in January 2015.

The MUOS program continues to meet objectives for ground sites in Geraldton, Australia, Wahaiawa, Hawaii, and Northwest, Virginia. These sites have completed hardware installation and final acceptance testing and have been officially handed over to Fleet Cyber Command. The fourth site at Niscemi, Sicily recently cleared a major hurdle. I would like to thank the State Department for

their efforts in working with the Italian Government to bring resolution to the installation of the three large antenna dishes.

Terminal development continues as the Army lead on the Manpack Radio is in the final phases of development to support the upcoming MUOS multiservice operational test and evaluation, or MOT&E. Army fielding of the MUOS-capable Manpack Radios is scheduled to begin in fiscal year 2015 and continue through fiscal year 2027.

Additionally, the Navy is developing the MUOS capability for the Digital Modular Radio, or DMR, to support shipboard operations.

While these two radios are our primary focus, several U.S. terminal vendors have contacted us to gain access to the MUOS testing labs. Three vendors have been scheduled to utilize the labs beginning in March and others will be scheduled in the near future as their terminals are ready for testing. These additional terminals are expected to greatly increase the number of MUOS terminals over the next several years.

Over the past 18 months, the program has conducted numerous phases of testing and is in the final risk reduction testing before conducting the MOT&E later this year. MOT&E is the final test that will certify the system operational, testing the full end-to-end capability of the terminals, ground stations, and satellites utilizing real-world scenarios in order to achieve IOC. The Navy is extremely proud of our MUOS program and we look forward to seeing the program become operational.

Senators, I am standing by for your questions.

[The prepared statement of Dr. Zangardi follows:]

Senator UDALL. Thank you, Dr. Zangardi.

General Shelton?

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

General SHELTON. Mr. Chairman, Senator Sessions, Senator Donnelly, Senator King, it is an honor to appear before you once again as the Commander of Air Force Space Command. It is also a privilege to appear with these distinguished witnesses on the panel here.

As you noted in your opening statement, 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 both 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 for space, I believe we are at a strategic crossroads. It is a reality that requires us to address how we protect our space systems, challenge traditional acquisition practices, and consider alternative architectures that are more resilient and more affordable.

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

[The prepared statement of General Shelton follows:]

Senator UDALL. Thank you, General Shelton.

General Mann?

STATEMENT OF LTG DAVID L. MANN, USA, COMMANDER, U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/ARMY FORCES STRATEGIC COMMAND AND JOINT FUNCTIONAL COMPONENT COMMAND FOR INTEGRATED MISSILE DEFENSE

General MANN. Mr. Chairman, Ranking Member Sessions, Senator Donnelly, Senator King, thank you for your ongoing support of our soldiers and our civilians and our families.

This is my first appearance before the subcommittee, and it is an honor for me to be here to talk about the values of space to the Army, especially in light of declining budgets.

Space is essential to the Army and it is truly the ultimate high ground. As you know, the Army is the largest user of space capabilities for the Department of Defense. In order for the Army see, shoot, move, and communicate, we need space. The advantages that space provides are critical to our success and that of our joint partners.

As the Army's proponent for space, my organization coordinates with all the members of the space enterprise in order to provide the capabilities through our three main tasks: number one, to provide trained and ready space missile defense soldiers out there, to build the future force and future capabilities for tomorrow, and also to look at emerging technologies for the day after tomorrow.

That said, it is important to make the point that our soldiers, our sailors, Air Force, marine, civilians out there—that is truly our asset. That is our greatest asset to getting after this capability.

This subcommittee's continued support is essential to providing the capabilities that have proven so vital to maintaining our edge on the battlefield.

I appreciate the opportunity to speak about the value of space to the Army and look forward to your questions. Thank you.

[The prepared statement of General Mann follows:]

Senator UDALL. Thank you, General Mann.

Ms. Chaplain?

STATEMENT OF CRISTINA T. CHAPLAIN, DIRECTOR, ACQUISITION AND SOURCING MANAGEMENT, GOVERNMENT ACCOUNTABILITY OFFICE

Ms. CHAPLAIN. Chairman Udall, Ranking Member Sessions, Senators Donnelly and King, thank you for inviting me to participate in today's hearing on DOD's space programs.

As you know, the GAO has been tracking space acquisitions, past problems, and reforms. Most of DOD's space programs have overcome significant problems and are now in the production phase. DOD has continued its focus on implementing acquisition management and oversight improvements. There are still technical and manufacturing programs affecting key programs such as MUOS and GPS–3, but the portfolio as a whole has not seen problems on the scale it saw last decade.

The challenges that face the Department now, in fact, are different than the ones faced just 5 or 6 years ago when most programs were in the development phase.

For one, faced with budget constraints, DOD has been seeking ways to reduce costs and achieve savings as it negotiates contracts for more satellites and launch vehicles. For launch vehicles, it is also working to introduce competition and lower costs.

Second, faced with growing security threats and the need to increase resilience, DOD has been reconsidering its approach to acquisition. For instance, instead of building a satellite that meets many mission needs and serves a multitude of users, DOD is considering whether it should disperse missions, functions, and sensors across multiple systems, platforms, or domain. And this approach is known as disaggregation.

We recently reported on DOD's efforts to introduce competition into the EELV program, and today we are reporting our preliminary findings related to disaggregation. On the EELV program, we reported that DOD has taken significant steps to gain insight into contract costs with its current provider ULA. This effort has resulted in significant savings. We also reported that DOD could take a range of approaches to introduce competition with the 14 cores coming up, and we specifically laid out the benefits and challenges with 2 approaches, having the EELV competitors compete for launches under a commercial approach or having them compete in the way similar to the way DOD now contracts with ULA.

In short, both approaches can foster competition. The first could further reduce prices, but it could also result in less insight into costs and reduce DOD's flexibility in scheduling launches. The second would maintain the flexibility and insight but could add costs. For new entrants, for instance, it could require them to develop and install new business systems to fulfill Government data requirements. We do not recommend an approach that should be taken. It is really DOD's decision and it is not GAO's role to make such a recommendation.

On the second question of disaggregation, we are reporting today that while our prior work shows these concepts can potentially reduce costs and development time, DOD does not yet have the knowledge it needs to make a transition to disaggregation on a wide scale. While DOD has conducted some studies that have assessed alternative approaches to the current programs of record, some within the Department do not consider these studies to be conclusive because they were either not conducted with sufficient analytical rigor or did not consider the capabilities, risks, and trades in a holistic manner.

More analysis about disaggregation is important because this approach can have far-reaching effects and because there are challenges to its implementation. For several missions, this analysis is in progress and we will be continuing to evaluate DOD's progress this summer for this committee.

This concludes my opening and I am happy to answer any questions you have.

[The prepared statement of Ms. Chaplain follows:]

Senator UDALL. Thank you, Ms. Chaplain.

We will do 7-minute rounds. I will start.

I want to, General Shelton, turn to you. Much has been said about the disaggregation of satellite sensors to smaller satellites or hosted payloads, but no studies have been done to prove that it in-

creases survivability and lowers cost. What is your point of view on that set of questions?

General SHELTON. Senator, we are in the middle, as Cristina just said. We are in the middle of these studies right now. In fact, she mentioned this as well. The way we have gone about procuring satellites, particularly advanced EHF and SBIRS and GPS, we have bought blocks of satellites, in some cases two, in some cases more, but we have bought in blocks, saved considerable money by doing that. And some of that money we have plowed back into what we call strategic modernization initiative funds, and those funds support both technology improvement, as well as studying these disaggregation concepts, alternative architectures for the future.

What we are trying to do here is get ahead of the threat or at least stay up with the threat so that we are much more resilient, much more survivable in our architectures in critically important space capability for the future.

So I would agree that we are not quite there yet. We have not gotten to definitive answers, but we are certainly in the middle of some very important studies on what those answers would be.

Senator UDALL. If there is one thing that you are known for, it is advocacy of space situational awareness, and I want to thank you, I think, on behalf of the committee for the great service you have done the Nation in that regard.

Do you believe we need an overall coordinated architecture for this effort rather than this accumulation of sensors that we now have?

General SHELTON. Yes, sir. We do have an overall architecture, and it is orbital regime by orbital regime. So what we need in low earth orbit, what gaps we have in capabilities, what we need in geosynchronous orbit, what gaps we have in those capabilities—we are filling those gaps. We are in the process of providing new sensors that would, indeed, fill those gaps with things like the Space Fence which will go out on Kwajalein, with things like the space-based space surveillance satellite, which will come probably in the 2018–2019 timeframe. We are looking at moving the space surveillance telescope that is now in New Mexico down to Australia to provide us better coverage of deep space in the southern hemisphere.

So there is a range of things that we are doing in terms of sensor technology, but in addition to that, we are putting a new system out at the Joint Space Operations Center called JMS, Joint Space Operations Center Mission System. That will fuse all this data and provide us much better capability to be predictive in our space situational awareness, much less reactive because right now we kind of do forensic analysis, frankly, of what happened. We want to get to the place where we are predicting what is going to happen and then we can take steps to avoid the consequences of those actions.

Senator UDALL. Let me ask a final question of you that gets a the heart of this important discussion we are having. Do you believe deterrence concepts work with space assets?

General SHELTON. Senator, that is a very difficult question because traditional deterrence theory involves two things. It is either denying benefits to an adversary or imposing costs on an adversary. But much of that deterrence is based on being able to see

what capabilities the adversary has. Well, we do not make public in most cases some of the capabilities that we have. So there is no transparency there, so there is no deterrence. And there is very little capability to really verify what we might consider as deterrence or treaty obligations or anything of that nature. So typically what we have looked at for strategic deterrence in many cases does not apply because you just do not have the same situation, and as you reach into the cyber domain, it gets even worse.

Senator UDALL. That is a whole other conversation. Is it not?

General SHELTON. Yes, sir.

Senator UDALL. Thank you for those insights.

Lieutenant General Mann, maybe I could turn to you. As I mentioned, one of the primary assets you maintain is the one on Kwajalein. Its location makes it very important for space situational awareness.

Could you explain to the subcommittee how the Army budgets for space situational awareness and what improvements might be made in the budget process?

General MANN. Thank you, Senator, for that question.

Currently the way we work the budgeting process is we receive from STRATCOM, Strategic Command, the needs, the requirements each year in terms of products, whether it is imagery, and we use that to help form the POM that the Army puts forth. And so we kind of have an arrangement where we work very, very closely with STRATCOM, with the Air Force to make sure that we fully understand what the requirement is and then we POM accordingly.

Now, something that might come in out of cycle or an additional request is something that we would have to take back to the Army and it would have to be prioritized and funded if it met that threshold.

So currently that is the process, working very, very closely with STRATCOM based upon what their requirements are every year.

Second, your second question, Senator. I think not so much from the budgeting process—I think really what I have to do is I have to make sure that I truly articulate the importance of SSA, space situational awareness, to the leaders that make the decisions. Obviously, there are multiple claimants for limited resources. So really from a budgeting standpoint, my challenge, my objective is to make sure that I clearly articulate the importance and the priority that these requests should receive. And quite frankly, I think it is reflective in how the Army's senior leadership—how they view space, missile defense, and cyber. I mean, it is at the top of the priority list. So I am pretty confident we are going to get the support we need.

Senator UDALL. Dr. Zangardi, let me try and fit in one last question. I know you will give a succinct answer.

You talked about MUOS. It is designed to replace an aging UHF system the Navy operates which, as I have implied, is near its end of life. Do you expect the event with satellite number 3 to affect our capacity to replace the aging system? And if so, how?

Dr. ZANGARDI. No, sir, I do not. We experienced a 6-month delay moving to number 4 and pushing it back to a January launch of 2015. With the capacity we currently have up on orbit, between

UHF, UFO, MUOS, SV–1 and SV–2—we have two UHF packages there—hosted payloads and leased satellite capability, we exceed the Joint Staff requirement by 41 percent for channels where access is provided to the warfighter. So we are pretty confident that that will have no impact on the operational warfighter.

Senator UDALL. Thank you for that.

Senator Sessions?

Senator SESSIONS. Thank you.

General Shelton, the November 2013 U.S.-China Economic and Security Review Commission raises concerns about China's efforts to militarize space and develop an anti-satellite weapon capability. They say this in the unclassified report. Quote: Although Beijing claims the launch was part of a high-altitude scientific experiment, available data suggests it was intended to test at least the launch vehicle component of a new high-altitude anti-satellite capability. If the launch is part of China's ASAT program, Beijing's attempt to disguise it as a scientific experiment would demonstrate a lack of transparency about its objectives and activities in space. Furthermore, such a test would signal China's intent to develop an anti-satellite capability to target satellites in an altitude range that includes U.S. global positioning systems, GPS systems, and many U.S. military intelligence satellites.

Is that accurate, to your knowledge? Do you agree with that assessment? And is it a concern to us?

General SHELTON. Senator, at this level, all I can say is we are concerned about all orbits now. We are concerned about low earth orbit because we saw the 2007 Chinese ASAT test, which was a success. We are concerned about work that we have seen since then that includes all the way up to geosynchronous orbit. Some of our most precious assets fly in geosynchronous orbit.

Senator SESSIONS. Well, are there actions we could take to deter our potential adversaries from taking such action? I mean, what do we consider it to be? Is it the equivalent of shooting down a military plane or attacking a ship? How do we respond to any potential attack on our satellite capability? And should we not make that clear now?

General SHELTON. Yes, sir. Those are policy questions that we are addressing right now. Maybe Mr. Loverro wants to say more about that. But I will tell you from the technology point of view, we are addressing that very issue.

Senator SESSIONS. Well, Mr. Loverro, what do you think about that? Sometimes ambiguity encourages aggression, as many people stress. So should we have a clear position with regard to the consequences of aggression against a satellite of the United States?

Mr. LOVERRO. Yes, Senator. Actually our national policy makes it clear that we view U.S. space assets as our sovereign assets and that attack on them is equivalent to attack on any sovereign assets. So we have stated in our national space policy that we intend to go ahead and defend those assets in times and place of our choosing because we do view those as critical to U.S. national security.

Senator SESSIONS. Well, I think it is important to make sure we understand. And I am not sure you have stated absolutely clearly what would happen. But to the extent to which we make it very

clear that you do not get to knock our satellites out and nothing will happen, I think it is very important. Thank you for sharing that, and I am glad you are working on it. We will probably inquire about it further as we go along.

General Mann, in November 2011, your team tested the advanced hypersonic weapon. It demonstrated the best results to date for the development of a future prompt global strike capability. I understand there will be another test in August of this year. Can you provide the committee a quick update on the progress that is managed by your command?

General MANN. Yes. Thank you, Senator. And again, I am pretty proud of our team, as you know, those men and women at Huntsville with Sandia Labs, working with those folks. It is the only successful test to date of the advanced hypersonic weapons system.

Right now we are on track. As you mentioned, we have a test scheduled for August of this year. And then based upon the results that come from that test, then we will go ahead and again work closely with OSD as to what they would like us to do, what the next steps are. I know that they are working with the Navy also on possible utilization of this capability.

Senator SESSIONS. Well, I think there is a competitive environment for production of this, as I understand it. But tell us how you feel like your team is doing, to what extent it is an in-house operation, and how the costs are shaping up.

General MANN. Senator, right now we are on target with the costs. I do not see any kind of an overrun at this moment. Everything is kind of predicated on what happens after the test. We have the monies allocated to support the test. We do not envision any kind of overruns. But really, I think once we see the results of the test and whether or not it met all the parameters and all the objectives, that I think will be illuminating for the OSD folks to really take a look at where they want to go with this, how much further they want to go. Do they want to look at a naval application for that? But in terms of the budget, we are on budget. We are not over budget and we are on target right now to execute. No showstoppers at this point.

Senator SESSIONS. So you feel like there is nothing scientifically blocking you from success and reaching the goal at this point.

General MANN. Not at this point, Senator.

Senator SESSIONS. General Shelton, briefly. This committee, full committee, has delved into the concerns about cyber warfare and any vulnerabilities our systems might have, particularly our space and missile systems, to cyber attacks that could neutralize their capabilities even for a period of time. It might be a critical period of time.

Do you have any thoughts about that? I know you are concerned. Maybe some of the other panelists would offer an opinion.

General SHELTON. Yes, sir. We are going system by system looking at our cyber vulnerabilities, and we have a large information assurance program that gets into those vulnerabilities and patches them and tries to prevent access. In many cases, these are closed systems. That does not mean there are not vulnerabilities, but they are closed systems not accessible through the Internet. So it would take insider, special access, those kinds of things to get to these

closed networks. But nevertheless, we are addressing all those touch points, if you will, and closing off those vulnerabilities as best we can.

Senator SESSIONS. Any other members want to comment on that?

We had legislation that required that to be done, a review to be done and a report to be done on this. And what we found was the full committee staff recommended and the committee has fundamentally adopted it that all our vulnerable systems—not just space and missile—be examined for these weaknesses, possible weaknesses. And I think it is very important. Thank you for your work.

Senator UDALL. Thank you, Senator Sessions.

Senator Donnelly?

Senator DONNELLY. Thank you, Mr. Chairman.

Mr. Loverro, I do not know if you would be the guy to answer this one, but we currently rely on NOAA weather satellites. And they are getting older, and I am concerned about their impact on military operations as they get older, if they are becoming less capable. And I was wondering if there is a master plan to upgrade the weather satellite program and whether, as you look at it, you have the funding streams to get it done.

Mr. LOVERRO. Yes, Senator. Again, this is probably one of those questions that can be shared between myself and General Shelton. So let me start and perhaps let him finish.

Within the Pentagon, we conducted—I was a party to an extensive review of the U.S. DOD weather needs, analyzing not just the NOAA systems but commercial and international systems as well, and what kind of specific needs did the DOD need to bring to bear to assure that its capabilities were protected. Air Force Space Command took a very aggressive approach on that, brought forward a program and issues budget that I probably should turn to General Shelton to go ahead and talk about.

General SHELTON. Yes, sir. Following that analysis of alternatives that Mr. Loverro is talking about, we have gone forward with a weather system follow-on program we call it, which will end up being a small satellite which has unique DOD requirements satisfied. And like he said, we will count on NOAA, international partners, commercial to provide the rest of the data that is needed to round out the weather picture.

We are in the process right now of launching defense meteorological satellite program. Satellite number 19 will launch within the next couple of months from Vandenberg Air Force Base. So we will put up a new satellite. What happens after that is under review, but we are confident we are in a good place, sir.

Senator DONNELLY. And, General Mann, the hypersonic missile program is really quite a task. You are doing amazing work on it. What I was also wondering is, as other nations are working on this, as we know they are, do we have groups working on how to counter their efforts in this area or how to protect our Nation from their efforts I guess would be a better way to put it?

General MANN. Let me say that we are aware of the technologies that are being looked at. I would like to take that for the record. I really do not know of specific programs that we are putting into place to combat that threat, but we are aware. In the case of Rus-

sia, I know that Russia is heavily involved in looking at this kind of capability. But really, let me take that for the record to get you the exact programs, if they are out there.

[The information referred to follows:]

[SUBCOMMITTEE INSERT]

Senator DONNELLY. General Shelton, as we look at the ground-based interceptor systems and such, we are looking at some sites for further development to protect us from North Korea and Iran. Do you see that as a necessary step as we move forward?

General SHELTON. Senator, I really do not work missile defense, to tell you the truth, other than provide radar support to missile defense interceptors. That may be something General Mann could answer better than me.

General MANN. Yes, Senator. Thank you.

Obviously, putting a third site out there on the east coast will provide increased capacity, not so much capability, but increased capacity. You will take your assets and spread them out so that you do not have them just at Greeley or at Vandenberg Air Force Base. It also will give you a little bit more decision space or battle space, as it is known, in order to make a decision regarding a threat emanating from Iran.

But I will have to tell you that I think that the greatest priority, the most important thing that we need to really focus on is long-range discrimination because I think it is fair to say that we will never have enough interceptors to really address all the threat vehicles that are out there. And so I think it is more important that we are as efficient and as effective with the interceptors that we currently have. That is the reason why making sure that we are providing the interceptor with the best track data, the discrimination to be able to really identify the target within a complex, that is really what I would really highly recommend.

Senator DONNELLY. And this would be to whoever would like to take it. If China is conducting test targeting objects like up to 12,000 miles away from the Earth's surface, could this affect our GPS capabilities, our GPS satellites?

General SHELTON. Yes, sir.

Senator DONNELLY. In a significant way.

General SHELTON. Yes, sir.

Senator DONNELLY. Would their efforts, if they do this, indicate a significant improvement in China's space weapon capabilities as well?

General SHELTON. No question. Yes, sir.

Senator DONNELLY. This would be for Dr. Zangardi, and that is, in relation to relying more heavily on networks and computer components to utilize our military and space systems than we ever have before, what confidence do you have in our ability to detect counterfeit parts, similar parts that create a danger of their own, obviously? Number one, it is important to protect our Nation. Number two, Naval Warfare Crane out of Indiana does a lot of this work. And it is something that is very concerning to me to make sure that we get this right.

Dr. ZANGARDI. Yes, sir. It is very concerning to us also. And we spend time with the Naval Warfare Center at Crane. That does not

fall within my portfolio. I mainly work with SPAWAR out of San Diego and their technical acquisition expertise in this area.

We take it very seriously. And specifically as related to MUOS, we have put in place actions in the program to review what we are taking in, what we are procuring. In a broader IT sense, the IT portfolio within the acquisition of the Navy falls under me. We take very seriously this threat and we are putting in place actions to begin to ensure that we are not buying parts that would not be good for us to have.

Senator DONNELLY. What is your determination—I will ask this very quickly. I am out of time—as to rate of counterfeit parts, what you are seeing? Do you see an increase, decrease, or what is your best estimate at the present time?

Dr. ZANGARDI. Sir, I am hesitant to give an estimate. I would like to take that question for the record and provide you an answer at a later time.

Senator DONNELLY. That would be fine.

[The information referred to follows:]

[SUBCOMMITTEE INSERT]

Senator DONNELLY. Thank you, Mr. Chairman.

Senator UDALL. Thank you, Senator Donnelly.

Senator King?

Senator KING. Thank you, Mr. Chairman.

General Mann, I just want to emphasize—I think you said something very important that what we really need to be talking about on this missile defense is long-range discrimination and sensors. Does the President's budget take that into account? Are there initiatives, programs?

General MANN. Thank you, Senator.

Yes, there are programs, and in fact, as a result of the bipartisan budget agreement that took place, I am pretty sure that the MDA received some additional funding. And that is one of the things in their portfolio that they are looking at. How robustly it is funded I really cannot say, but I do know that MDA is looking at that as a technology that they are going to pursue.

Senator KING. Thank you.

General Shelton, I want to engage in a hypothetical. This hearing is about the importance of the military aspects of space. Tell us what would happen if all of our space assets were wiped out in a 5-minute period. What would that mean to our ground and naval forces if we were in a conflict situation?

General SHELTON. I would tell you, Senator, that we are so dependent on space these days. We plug into it like a utility. It is always there. Nobody worries about it. You do not even know sometimes that you are touching space. So it would be almost a reversion back to almost industrial-based warfare, industrial age warfare. We would not be able to communicate as well. We could not navigate as well. We would not operate with the precision. We would not have the coordination. It would be a while recovering our coordinated, integrated aspects of warfare. We operate as an integrated joint team now. Much of that is provided by space capability. So recovering that without space would be very, very difficult if not impossible.

Senator KING. Given the importance and given that vulnerability, does it not make strategic sense—I know there is a discussion. I think the term is "disaggregation"—to spread these capabilities over smaller satellites, different satellites, commercial satellites so that we do not have a kind of Pearl Harbor of space where a few major facilities are knocked out and then we are in trouble? Just strategically is it not better to have a diverse structure?

General SHELTON. This is exactly, Senator, what started taking us down this path. As we started thinking through—I will call it the cheap shot. Let us postulate an advanced EHF satellite on orbit. Four of them represent the entire constellation. Take one of those out, and you have opened up a big gap in our ability to communicate over protected resources. That would be very difficult for the National Command Authority. It would be very difficult for our deployed troops. So, yes, dispersing our capability, having a much more failure resilient and attack resilient architecture, that is exactly what our study efforts are aimed at and trying to provide that capability for the future.

Senator KING. Do we have options, including military capabilities, on civilian satellites and vice versa, for that matter?

General SHELTON. We are exploring those concepts right now. We have had a very successful test of a commercially hosted infrared payload, CHIRP. It was an infrared sensor hosted on a commercial satellite, a very successful program. It showed us a lot about what was possible of hosting payloads on commercial satellites, lots of lessons learned, and we are continuing to pursue those concepts for the future.

Senator KING. In Maine, we are having a lot of success putting cellular towers in church steeples. If that is not dual use, I do not know what is.

General SHELTON. Yes, sir.

Senator KING. Ms. Chaplain, what about the possibilities of greater competition in terms of launch capability? We have got the unified launch system—is it Lockheed and Boeing. But are there other companies? Is this an area where there can be some competition and therefore greater economies for the Government?

Ms. CHAPLAIN. I think we finally arrived at the point where there are other companies that can begin to contend for space launches. They have not been certified yet and it might take a little while before they are certified. But SpaceX is going through that process, for example, and it hopes to be certified by the end of the year. And there is at least one more company that might be in the mix there.

The DOD has set aside a number of launches, 14, that they could compete for, but they will compete with ULA competing too. So competition is on the horizon and it is a matter of just figuring out how best to do it in a way that you can measure the competitors in a similar way.

Senator KING. Let me ask a sort of basic question. Who owns the rockets and how do we pay for it? Does the Government or does the military contract with ULA, for example, and say we will pay you $10 million to get this satellite into orbit, or do we buy a rocket from them and then we launch it? Who has title to this?

Ms. CHAPLAIN. It is a combination of things, but we buy it as a service. So the rocket itself and the launch is bought as a service, and then separately we have a contract with ULA that is not a fixed price contract. It is a cost-plus contract, and it pays for all the things that go behind launching those rockets. There is a lot of capability and skill sets behind those launches that need to be maintained.

Senator KING. If this is something that is done on a fairly regular basis and has been for some years, why are we doing cost-plus and not fixed price?

Ms. CHAPLAIN. It has been the Government's choice to follow the cost-plus approach mainly to have maximum flexibility, maximum convenience. They want ULA to be ready to launch these rockets whenever the Government wants them to launch. If you move to an approach where you are more dependent on the supplier and you are not paying for this extra premium of capability, you could have delays. You might be in a situation where the supplier cannot readily accommodate you. If you have several suppliers, that might be okay. You could go back and forth and see who could meet that, but when you have one supplier, the Government, in the situation it was in, chose to have this kind of convenience and flexibility and it chose the approach it did to accommodate that.

Senator KING. I would appreciate your keeping the subcommittee updated on the progress of competition in this area of launch just so we can be aware of what is available when and what the timetable is.

Ms. CHAPLAIN. We are happy to do that.

Senator KING. I appreciate it.

One more quick, Mr. Chairman, if I can take another minute.

General Shelton, there is a recent CRS report that says we have an orbital debris problem. How serious is that and is there any way to deal with it?

General SHELTON. Senator, just some numbers. We routinely track about 23,000 objects on orbit right now. About 1,000 of those are active payloads. The rest of those are defunct satellites, pieces of debris, defunct spent stages, those sorts of things.

Our models tell us that between 1 centimeter in size and 10 centimeters in size, which is kind of the practical limit of what we can track—so those 23,000, by the way, is just what we can track, but between 1 and 10 centimeters, we think there are 500,000 objects on orbit. So, yes, this is a very serious problem, and I have seen nothing yet that will be technically viable for active debris removal.

Senator KING. So it is just something we have to cope with, but it seems to me you could lose a very valuable satellite to a very cheap piece of space junk.

General SHELTON. We actually already have. There is a commercial satellite that was hit by an old Russian satellite and caused catastrophic loss for the company, Iridium.

We need better capability to track, which is what the Space Fence is all about. We need all space-faring nations to not generate more debris because our biggest fear is that if you get more and more debris on orbit, eventually you get to the place where debris begets debris. You have a cascading effect and you have polluted entire——

Senator KING. Might this not be an area rife for international cooperation? It is in everyone's interest who is in space to deal with this problem, and maybe we could have a joint venture on this cleanup problem.

General SHELTON. Yes, sir. And I know Mr. Loverro has been actively involved in that internationally certainly to address the debris creation problem but also to generate norms of behavior internationally that would keep people on the straight and narrow.

Senator KING. We need returnables. We need a returnable law.

General SHELTON. Yes, sir.

Senator KING. Thank you.

Thank you, Mr. Chairman.

Senator UDALL. Thank you, Mr. King.

Mr. Loverro, let me ask you a similar question I have asked some of the other panelists and that is the question that attaches to the disaggregation of space sensors and hosted payloads. The studies are underway. Which satellite systems do you think are best suited for this approach?

Mr. LOVERRO. Thank you, Mr. Chairman.

You know, it is interesting. We have already created several disaggregated systems without realizing it. One of those would be the weather systems we talked about with Senator Donnelly earlier. Probably about 50 to 100 different satellites with a variety of sensors all contribute to that weather picture. I spoke—I do not know if it was in this committee last year or whether it was on the House side—that if I were an adversary trying to target the weather capability, I would not know what to shoot at because there are just too many targets.

GPS is somewhat of a disaggregated system. We call it "distributed," many, many satellites that if you lose one, you do not lose the capability. In fact, you could lose several and not lose it. That is not an invitation to lose any, but it certainly makes it more resilient than the example that General Shelton gave, for example, on the advanced extremely high frequency system where if you lose one satellite, you lose coverage for an entire hemisphere. And those kinds of systems, advanced EHF and SBIRS, where one system tends to cover an entire side of the earth are the ones really where we see the most danger.

That does not mean that we are secure in any of our space capabilities. All of our space capabilities need to respond to the threats we have seen. They were not built to go ahead and sustain themselves in an environment in which they are threatened. They were not built in an environment where they would be used in conventional warfighting and threatened by conventional means. They were built for nuclear warfighting. So all of the architectures need to be refreshed with that view in mind. Disaggregation is an important concept especially for AEHF and SBIRS. But that concept, what we call resiliency in space, applies to all of our space systems.

Senator UDALL. Assess the new entrant policy in space and then, if you will, think 10 years out for us, what concerns you would have, what might be some of the up sides.

Mr. LOVERRO. Absolutely. I think we have talked a lot about the up sides. I think Ms. Chaplain has already talked about some of the cost reductions that we have seen in the EELV ULA program.

Some of those we get because we have decided to buy more launchers, but there is no question that some of those came about because of the—in the face of competition. I already spoke in my opening statement about competition being good.

I think that there is clear evidence that the competitive aspects of launch will benefit the Department of Defense. We kind of were on that path in the early 1990s and we moved away from it because at the time we did not think there was enough launch rate to sustain competitive actions in space. The indication for the future is that is not the case. The indication is that there is enough launch need to sustain a competitive environment. The indications are that in that competitive environment, we can bring commercial launch back to the U.S. SpaceX has been one of the most successful companies in attracting competitive international launch back into the United States, which is good for us all.

So I think this is a very key aspect. I think what we will have to avoid and what the President's National Space Transportation Policy clearly suggests is that we want to maintain that competition for the future. We do not want to be 10 years down the road, as you hypothesized, and decide, well, maybe we should go down to one supplier. We think that is the wrong way to do it. We think that to keep the environment competitive keeps it inexpensive or lower expensive. It is never going to be inexpensive, but at a lower expense. It keeps folks trying to go ahead and prove the technology on their own rather than relying on the Government to do so. So we think that is a critical aspect of the future.

Senator UDALL. I think, as you were saying, we have got to thread the needle here. We have under-capacity that presents one set of threats; over-capacity presents another set of threats. And the U.S. Government, therefore our people, are on the hook either way, and we have got to try and find that balance.

Mr. LOVERRO. Yes, sir, absolutely.

Senator UDALL. Ms. Chaplain, let me turn to you. We always look forward to having you here because you have got such a great understanding of the challenges and what we need to do to keep faith with the taxpayers.

Talk about the EELV a bit. I know you mentioned the lack of transparency in the launch services contract schedule. Could you speak to that?

Ms. CHAPLAIN. So until recently, there has been a great deal of lack of transparency into costs, particularly on what is known as the EELC contract. That is the one that is the cost-plus side. But in the course of negotiating contracts recently, the Government made a tremendous effort to get insight into cost, and they did so to a great extent. What did not happen was not all the costs could be tied to a launch vehicle by the Government. So there is probably 70 percent or so where you cannot exactly tie those activities and parse them out amongst launch vehicles. But the Government does have a lot more transparency into those costs. They know what they are. They know what they are paying for a year. They know how to break it down amongst all the activities. And that is great progress from where we were before. So it just a matter of you just do not have that visibility tied by launch vehicle, and there are reasons that are good to have that. Hopefully we will get that in time.

Dr. ZANGARDI. Sir, may I add from the Navy's perspective?

Senator UDALL. Please, yes. Please, Doctor.

Dr. ZANGARDI. From MUOS' perspective, we have seen an increase in transparency. We are happy with what we are seeing. We have also seen a decrease in cost. So we have seen an improvement. Now, granted, the data points we have are quite limited, but then again, we have seen improvement over the last couple years.

Senator UDALL. Thank you for that elaboration.

Ms. Chaplain, I have been asking many of the panelists about disaggregation of existing satellite systems, which after 10 years I think have stabilized costs and requirements. Do you believe the assessments involved purely from a schedule standpoint will timely inform the decision for using existing systems or follow-on systems?

Ms. CHAPLAIN. I do have questions about whether the assessments will be done in time to have enough input into the next set of buys that come up for programs like SBIRS. In other cases on the communication side, they probably will be able to have maximum information provided and ability to do things about that information. But I am concerned that if they take too long, DOD—time will make its decision for it. If you do not have enough time to act on the information that you get, you are just going to have to go along and buy what you keep buying.

Senator UDALL. It is an important point.

Senator Sessions?

Senator SESSIONS. Well, thank you. We have seen some progress in competition, and it has saved the taxpayers some money. Mr. Loverro, you mentioned that the EELV buy was 36 over a period of years, and my understanding is that you believe it saved $4.4 billion. Competition and a longer buy were the main factors in that in your opinion?

Mr. LOVERRO. Yes, Senator. I do not want to quote a number. It is not my business to be in the budget game specifically, but savings were significant and I believe both factors led to those savings.

Senator SESSIONS. We have seen some other savings too when we rebid the maintenance program for one of our systems. It was a billion dollar savings. Do you know what I am referring to there?

Mr. LOVERRO. You may be referring to what is called the launch infrastructure program, so-called, LISC program, launch range infrastructure program, a competitive bid that one of General Shelton's organizations, the Space and Missile Systems Center, is responsible for. Again, I think competition is looked for to drive those savings down. I would again turn to General Shelton for more details on that program.

Senator SESSIONS. General Shelton?

General SHELTON. Senator, the $4.4 billion figure that you quoted is accurate. If you look at the fiscal year 2012 President's budget as your baseline and then look at what we actually contracted for, there is $4.4 billion of difference. Now, a lot of people want to dispute that. A lot of people want to reaccount for that money. But in fact, from an Air Force budget perspective, it is $4.4 billion of difference.

As Mr. Loverro just talked about, this combined contract that will service both the eastern range and the western range for launch services is going to save us a bundle of money. We are in

the source selection process for that right now and contract start should be the 1st of October this year.

Senator SESSIONS. I think I am correct—and I will just wrap up here—to say that we were I think at $554 billion for function 50 defense, which includes homeland security monies. That dropped down to $518 billion. Then it was projected to go to $498 billion this year. The Ryan-Murray put back money that moved it back up to $521 billion this year. It is projected to be at $521 billion next year and $523 billion the next year. That is billions of dollars each. So basically under the Budget Control Act we have today, it will be at flat level spending considerably below what we were a few years ago.

But it does start increasing then at the rate of $13 billion a year for the next 6 years I believe it is. And so we end up over $590 billion, so at the end of the 10-year budget window.

I say that to say I am not sure we can replicate these kind of cost savings in the future, but a few more of those cost savings plus the fact where we are now—I am not sure we have to devastate our procurement system to stay on track even with a very, very constricted budget the Defense Department has dealt with. In fact, my analysis of the budget is the Defense Department has the most significant reductions than any other Department of our Government. And if you were given more time to achieve the savings, it would be easier even then. The biggest danger was we had these cuts so fast. So that is what the Ryan-Murray—I did not like the way they did it, but the result of getting more money this year so we do not have another big cut on top of the last one because there are efficiencies in productivity.

This $4 billion savings, General Shelton—you could not account for it in the first year. Could you? I mean, you had to account for it each year over a period of years. So savings effected today may not actually accrue until the out-years. And that is one my particular concerns about the danger of the difficulties in the defense budget.

So we will have to see where we are, and thank you for your work to bring down cost. And as technology gets more common, things that 10 years ago were out of this world are more routine today and should cost a lot less. You certainly see computers and everything else drop in their cost. So maybe we can not be too pessimistic about our budget. I hope so.

Senator UDALL. Thank you for that, Senator Sessions.

I have got one more question. I did not have a chance to check with Senator Sessions, but if he does not have any other questions, I will ask my question and we will end the hearing.

But I would add to what Senator Sessions said. The Murray-Ryan budget possibilities and opportunities are there as long as we do not fall back into sequestration 2 years hence.

Senator SESSIONS. Well, let us talk about that. Everybody needs to get this straight. With sequestration and the way current law expects spending to be, the Defense Department will spend 521 this year, 521 next year, 523 the next year and then go to 536, 549, and it goes up $13 billion each year thereafter. So there is really no more cuts. It is just flat spending for 3 years, which is not easy to deal with. So there is a feeling that I keep picking up among

my colleagues that we are facing additional cuts as a result of the sequester. The sequester was what hit us this year. That is what got us, and it was dangerous.

So I do not know whether you have sufficient money to meet the defense needs of the country or not. But if we keep finding these kind of savings, we might surprise ourselves and we can maintain a sufficient defense of America at a more reasonable cost. I hope so.

Senator UDALL. Me as well. Thank you for that, Senator Sessions.

General Mann, the last question is yours for the day. The Air Force may fire communication satellites, but SMDC is the primary scheduler of bandwidth for DOD communications via the wide band global satellite and the defense satellite communications systems. Over the next 5 years, what do you see as the Army's biggest issue and what do you recommend to help alleviate it?

General MANN. Senator, thank you for that question.

I think we talked a little bit about this in terms of maintaining persistent and protected communications I think is going to be our biggest challenge over the next couple years. So whether that is hardening the things that we have in space on orbit or our ground stations and also looking at our tactics, techniques, and procedures, how we operate those things, those are the areas I think that we really need to focus on to make sure that we address a threat that is only going to evolve and increase in intensity over the next couple years.

Senator UDALL. We on the committee look forward to working with you on that important mission.

I want to thank the panelists again for spending time with us, for being succinct, for being to the point.

We will leave the record open for another 3 or 4 days. We may extend some additional questions to all of you. Thanks again for your time.

This hearing is adjourned.

[Whereupon, at 4:18 p.m., the subcommittee adjourned.]