HEARING TO RECEIVE TESTIMONY ON MILITARY SPACE PROGRAMS AND VIEWS ON DEPARTMENT OF DEFENSE USAGE OF THE ELECTROMAGNETIC SPECTRUM IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST FOR FISCAL YEAR 2014 AND THE FUTURE YEARS DEFENSE PROGRAM

WEDNESDAY, APRIL 24, 2013

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

The subcommittee met, pursuant to notice, at 2:30 p.m. in room SR–222, Russell Senate Office Building, Senator Mark Udall (chairman of the subcommittee) presiding.

Committee members present: Senators Udall, Sessions, and Fischer.

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

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

Staff assistant present: Lauren M. Gillis.

Committee members' assistants present: Jason Rauch, assistant to Senator McCaskill; Casey Howard, assistant to Senator Udall; T. Finch Fulton, assistant to Senator Sessions; Lenwood Landrum, assistant to Senator Sessions; and Peter Schirtzinger, assistant to Senator Fischer.

OPENING STATEMENT OF SENATOR MARK UDALL, CHAIRMAN

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

This afternoon, we will receive testimony from the Department of Defense regarding military space programs for fiscal year 2014. We will also examine the Department's use of electromagnetic spectrum in a second panel.

For planning purposes, the first panel on the Department's space programs will end at 3:30 so that we can hear from the second panel on electromagnetic spectrum, and that second panel will end around 4:00 p.m.

We will take very short opening statements from our witnesses, no more than a minute or 2 to highlight anything they think is important for us to hear.

As always, I am honored to work with our distinguished ranking member, Senator Sessions. Colorado and Alabama have important roles in space. Colorado is home to the Air Force's Space Command and Alabama is home to the Army's Space and Missile Defense Command. We have the commanding generals from both commands here today, and I thank them and all the witnesses for taking the time to testify before the subcommittee.

With that, let me make some short comments regarding the fiscal year 2014 space budget.

The Air Force is finally making strides in bringing their satellite programs on track after years of cost overruns. That is a good news story. There are still open questions regarding launch services as the Department works to lower costs and balance the incumbent launch provider with new entrants. I would like to hear from General Shelton how we assure that we have reliable access to space while continuing to lower costs.

I look forward to hearing from the Army on how they are approaching access to space. My understanding is that they are developing low-cost, innovative space programs.

The Navy is now launching their mobile user satellite system which provides line-of-sight access to users around the world. And I would like to hear how they are bringing the terminals online to receive the signals from the satellites.

In the policy area, I would like to hear about how we are implementing plans to protect our satellites from impacting with debris and other nations' satellites. And I hope that we will be able to hear about policies to deter hostile actions that other nations might take against us in space.

And finally, I would like to hear from the GAO on what long-term problems they see in the area of disaggregation of large satellite systems. There has been a lot of talk here, but we do not know the long-term consequences.

And then finally for the second panel on EM spectrum, there has been much debate about the Department's use of a frequency band that has commercial potential. We must balance our national security while promoting cooperation and competition and economic growth that would come from commercial use of this band. I believe we can get there, and I think we all agree that it must be done in a careful and thoughtful way. I look forward to the second panel's views on this subject.

With that, let me turn to my ranking member and my friend, Senator Sessions, for his opening statement, and then we will move on to questions.

STATEMENT OF SENATOR JEFF SESSIONS

Senator SESSIONS. Thank you, Senator Udall. It is great to work with you and I appreciate your expertise and cooperativeness as we work together.

I will just be brief and maybe offer my full statement for the record.

We are keenly aware of the unprecedented budget situation facing the Department of Defense and we know that frugality is the order of the day. Managing capability development and acquisitions over the next 5 years will define for decades perhaps how space

will either enable our warfighting capability or limit our warfighting capability.

I am pleased to see the Evolved Expendable Launch Vehicle, known as EELV, recorded a $1.1 billion reduction in costs over the next 5-year budget, and I applaud the Air Force in reducing cost. That was a competitive bid process you worked out. So we made some progress. I think that is something that people should know. That was quite a good thing.

We have got the spectrum issue, as the chairman mentioned. I will not go into detail except that it has caused quite a bit of interest. It looks like the Department of Defense has estimated that moving to a new spectrum band could take at least 10 years and cost nearly $13 billion. So this is a matter that requires examination because we have got private sector people who want to be engaged in this, and it is just a matter we will be able to talk about today.

Mr. Chairman, I look forward to hearing from this distinguished panel and appreciate the opportunity to share these remarks.

I welcome Senator Fischer for her great participation in these committees. She has weighed in already with great interest. I believe you like all these space, missile, atom bomb issues.

Senator FISCHER. I do.

Senator SESSIONS. I know you do actually. Thank you for your leadership.

[The prepared statement of Senator Sessions follows:]

[SUBCOMMITTEE INSERT]

Senator UDALL. Thank you, Senator Sessions. It is truly important that Senator Fischer is involved and we welcome her engagement in this important subcommittee.

In the spirit of my opening remarks, I mentioned I would like each one of you, if you are so inclined, to give us a 1- to 2-minute statement and then we will go right to questions. So we will start to our left and work right across the panel.

Secretary Loverro?

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

Mr. LOVERRO. Thank you, Chairman Udall and Ranking Member Sessions, Senator Fischer. Thank you for the opportunity to testify this afternoon.

A year ago, assistant Secretary Creedon testified here about the progress of implementing the national space security strategy. I am pleased to join General Shelton, Lieutenant General Formica, Dr. Zangardi, and Ms. Chaplain to continue that discussion today.

Let me start with the basic reality that space remains vital to our National security. You have both expressed that. But the evolving strategic environment increasingly challenges U.S. space advantages, advantages that both our warfighters and our adversaries have come to appreciate. As space becomes more congested, competitive, and contested, the Department must formulate programs and policies that will secure those advantages for years to come.

That reality is juxtaposed with the fact that as a Nation, we are providing these capabilities and environment that is increasingly

cost-constrained. The growing challenges of budget, in addition to increasing external threats, compel us to now think and act differently so that in the future what we choose to procure, how we choose to provision it, the policies we govern it with reflect both our changed threat and fiscal environments.

While these two realities present us with a clear challenge, I do not, by any means, view them with a sense of doom or gloom. Newer entrepreneurial suppliers, alongside our legacy suppliers, are creating an ever-burgeoning commercial space market that can provide significant advantage to DOD if we formulate the policies and strategies to encourage their growth and use.

Similarly, there has been a growth worldwide in allied space investment and capability, and those provide a significant opportunity for the DOD to help us build resilience into our space capabilities.

The policies and strategies that I will discuss here today begin to address those challenges and opportunities, but they are just the initial steps in an area that will continue to demand attention and action from all of us.

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

[The prepared statement of Mr. Loverro follows:]

Senator UDALL. Thank you.

Secretary 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 and Senator Fischer, thank you for the privilege to speak before you today. I will keep my comments very brief.

At last year's hearing, we discussed the launch of the first MUOS satellite and the great accomplishments of the program. I am happy to report that the program has continued to progress towards full capability. MUOS–1 became operational to the warfighter, supporting legacy UHF operations on 2 November. Additionally, MUOS–2 is on schedule to launch from Cape Canaveral on July 19, which will bring us one step closer to providing global communications access to the warfighter.

Terminal development continues to progress as the MUOS waveform was completed in November 2012 and made available on the Joint Tactical Network Center information repository for use by commercial vendors in December 2012. Multiple vendors have downloaded the waveform and are working to develop radios which will be used by all services. Once MUOS–2 completes its 90-day on-orbit checkout, the Navy will continue its risk reduction events to thoroughly test all portions of the wideband code division, multiple access, otherwise known as WCDMA, capability to include the satellites, ground stations, DISA teleports, and the radios. Although we expect to have challenges in each of the scheduled risk reduction events, we are confident that this early testing will enable a successful operational evaluation. We expect to have an operational WCDMA capability by summer of 2014.

Significant accomplishments have been made at three of the four ground stations. Sites at Geraldton, Australia, Wahiawa, Hawaii, and northwest Virginia have completed final hardware installation and will complete final acceptance testing this summer. The final site in Niscemi, Italy, is expected to be complete by December 2014.

The Navy will continue to focus on the successful deployment and development of the MUOS constellation and the replacement of legacy UHF capability. I want to point out that there has been tremendous teamwork in this program between the Navy, Army, DISA, and OSD to deliver this capability. Industry has delivered in this case on cost.

Senator, I am standing by for your questions.

[The prepared statement of Dr. Zangardi follows:]

Senator UDALL. Thank you. Forgive me for an oversight. I should have properly introduced Secretary Loverro, who is the Deputy assistant Secretary of Defense for Space Policy, and Dr. Zangardi who is the Deputy assistant Secretary of the Navy for Command, Control, Communications, Computers, Intelligence, Information Operations, and Space. Quite a portfolio.

I now want to recognize a good friend of mine, General William Shelton, who is the Commander of the Air Force Space Command, based in Colorado, my home State. General Shelton, the floor is yours.

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

General SHELTON. Mr. Chairman, Senator Sessions, Senator Fischer, it is an honor to appear before you today as the Commander of Air Force Space Command. It is also my privilege to appear with these colleagues in the National security space business.

Since its inception a little over 30 years ago, Air Force Space Command has made significant progress in evolving and sustaining space capabilities to underpin operations across the spectrum of conflict.

We have established three major goals to ensure these foundational capabilities are available to the warfighter and to the Nation: to provide assured full-spectrum space capabilities, to develop highly skilled and innovative space professionals, and to provide resilient, integrated systems that preserve operational advantage for the Nation.

Accomplishing this in an era of declining budgets, growing threats, and increasing requirements is no small challenge. And we face a daunting new challenge, providing these foundational capabilities in an era of sequestration. In my command alone, I had to find $508 million in reductions for the remainder of fiscal year 2013. The chaos created by operations and maintenance account reductions this large in this short time period cannot be overstated. At the top of the list is the significant and justifiable angst of my civilian workforce facing the prospect of a 20 percent pay cut for the last 14 weeks of this fiscal year.

Despite our fiscal challenges, we will work together with our mission partners and with industry to find innovative approaches to providing vital space capability to the Nation.

I thank the committee for your steadfast support of Air Force Space Command and its people, and thank you, Mr. Chairman.

[The prepared statement of General Shelton follows:]

Senator UDALL. Thank you, General Shelton.

We will next hear from Lieutenant General Richard P. Formica, Commander of U.S. Army Space and Missile Defense Command. General, thank you for being here today.

Senator SESSIONS. Mr. Chairman, could I just add my welcome to General Formica? He does a great job in Huntsville at the Space and Missile Defense Command, and we are proud of his work. We look forward to hearing from you, General Formica.

STATEMENT OF LTG RICHARD P. FORMICA, USA, COMMANDER, U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/ARMY FORCES STRATEGIC COMMAND

General FORMICA. Thank you, Senator.

Chairman Udall, Ranking Member Sessions, Senator Fischer, it is an honor and a privilege for me to appear here as the CG of Space and Missile Defense Command and as a soldier in the United States Army. And I want to thank you for your ongoing support of our soldiers, civilians, and families.

Today, I will reinforce the Army's enduring need of space capabilities, recognizing that they come during the present environment of declining resources. Space capabilities are and will remain critical to the Army as it conducts unified land operations, and they have been appropriately prioritized by headquarters Department of the Army. Nonetheless, fiscal uncertainties resulting from sequestration will impact our ability to provide space-based capabilities to the warfighter. It has also impacted our professional civilian workforce.

Space is essential to the Army. It is the ultimate high ground. Within the Department of Defense, the Army is the biggest user of space capabilities and is also a provider of space-based capabilities.

Our command at SMDC contributes space capabilities to the joint force through three core tasks: to provide trained and ready space and missile defense forces and capabilities today, to build future space and missile defense forces and capabilities for tomorrow, and to provide space missile defense and other related technologies like the nanosat technology that you referred to in your opening statement, Mr. Chairman, for the day after tomorrow.

Your committee's continued support of our Army and its space program is essential in maintaining and improving our space capabilities and the development of our cadre of space professionals.

I look forward to addressing any of your questions. Army strong.

[The prepared statement of General Formica follows:]

Senator UDALL. Thank you, General.

We now turn to Ms. Cristina Chaplain, who is the Director, Acquisition and Sourcing Management at the GAO.

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

Ms. CHAPLAIN. Thank you, Chairman Udall, Ranking Member Sessions, and Senator Fischer. I am pleased to be here today to talk about our work regarding space acquisitions.

The noteworthy thing is, as our work continues to affirm that DOD is reducing acquisition risk on its satellite acquisitions. Cost growth is definitely less widespread. This is a very critical achievement in this time of constrained budgets to be reducing unnecessary cost growth in my view.

We still have concerns about the systems and programs that support satellites. I wanted to highlight three of them today. They are also highlighted in my testimony in more detail.

First, we are still reporting gaps, adding up to years in some cases, between the time satellites are launched and the time ground systems and user equipment are delivered. And that is really an issue because it could lead to waste of expensive space-based capability.

Second, we reported just last week that the networks that control and maintain satellites need to be streamlined and brought up to today's modern technology and practices. And DOD concurred with these findings and recommendations.

Third, the rising cost of launching satellites is still an issue. We performed an analysis this year that showed about $46 billion is predicted to be spent over the next 5 years by the whole Federal Government on launching satellites. Competition is key to reducing costs, but we will not know for several years whether there will actually be viable competitors. There is a long process they need to go through, and there are still unknowns about the outcome of that process. So it is something we will be watching.

And those are just the three concerns I just wanted to point out today. Again, they are highlighted more in our statement. And I am happy to answer questions about them and anything else today.

[The prepared statement of Ms. Chaplain follows:]

Senator UDALL. Thank you for that summary.

Let us go right to questions. We will do 5-minute rounds and I will recognize myself for the first 5 minutes.

General Shelton, let us start with sequestration. You have had to cut back on a number of missions, including some missile warning and space surveillance operations. Can you describe which of your systems are affected by sequestration, and do you anticipate additional sequestration cutbacks toward the end of this fiscal year?

General SHELTON. Mr. Chairman, specifically there are two radars, missile warning radars, one of which is key to missile defense which we reduced the operating tempo on. In one case, we are operating at a lower power. In another case, we are operating for a reduced number of hours per day.

In the case of the one that is necessary for missile defense, we have continued to operate that one at full power because of the threat from North Korea. If that posture is sustained through the rest of the fiscal year, that is another $5 million I need to find in my budget somewhere.

We have taken down one-third of Space Fence receiver sites. So we have a reduced length of the Space Fence that goes across the southern United States.

We have reduced the sustainment dollars that are being spent on the legacy DSCS constellation, wideband communications satellites, which means we will be slower to respond to problems. We will not do as much trending analysis, that sort of thing.

There are a host of other things across the command, but those are the big operational impacts, and then of course, the civilian furloughs that are upcoming.

Senator UDALL. And would you anticipate additional cutbacks if we do not, obviously, get our act together in the next fiscal year? But what I hear you saying is, yes, you see additional cutbacks.

General SHELTON. In the remainder of fiscal year 2013, I think we are on target with the exception of the $5 million I mentioned.

Senator UDALL. Okay.

General SHELTON. For fiscal year 2014, it all depends on the President's budget, of course, how that is enacted, whether or not we go into a continuing resolution, whether the Budget Control Act targets remain in place. All of that is yet to be determined.

Senator UDALL. Thanks for that further information.

Let me turn to the EELV. Senator Sessions mentioned it in his remarks.

As I understand it, you are working to bring new entrants into the medium and heavy lift launch market while assuring reliable access to space. Those two go hand in hand. I am interested in how you will structure the contracts to account for launch services, including mission assurance and vehicle integration, in addition to the acquisition of the rocket itself.

And as a follow-on, can you explain the difference in contracts between the launch providers in the current 50 core block buy and your plans for contracting in the next block buy past the current 50 cores?

General SHELTON. Yes, sir. Let me start with how we will work the leveling of the playing field, if you will.

We have not fully determined how we will do that because there was a very efficient mechanism of providing launch capability. With a single provider, you can look at providing launch capability from both coasts. We even fly crews back and forth between the coasts because that is the more efficient way to do business. So we provide the launch pads. We provide the crews. We provide all that under a launch contract that just sustains that capability. It is a level of effort sort of capability. And then we buy individual boosters.

Trying to introduce new entrants with some sort of construct that is parallel so that there is not a competitive disadvantage, so to speak, for those new entrants is still a work in progress. We have not solved that yet, but we will. We will get to the place where we define what ULA's costs are versus a new entrant's costs so that they can compete head to head here in the future.

So we will soon contract for the 36 cores, another 14 cores to be competed. So ULA will be able to compete against any new entrants that are certified by that time, and then we will be in good

shape for determining the most efficient, most reliable access to space.

Senator UDALL. Let me slip a final question in to you, General, and this is in reference to Buckley Airfield and the space-based infrared satellites, SBIRS. My understanding is we are now fielding that next generation, but the ground system has been lagging behind the satellites. What are your timelines in regards to bringing the ground system online at Buckley?

General SHELTON. Senator, as you know, that has had a very checkered history. And when we had a Nunn-McCurdy breach in 2005, we went after the satellite, spent more money on the satellite system than we did on the ground system. So we knew this problem would exist, that the ground system would lag behind. But by 2016, we will have all this put back together.

We have full capability now to do what we need to do. It is in various locations, but it will all be combined in 2016.

Senator UDALL. Thank you.

Senator Sessions.

Senator SESSIONS. Thank you.

General Shelton, your comments there related to what Ms. Chaplain was saying about the delay between the launch of a satellite and the ground system capability. Can Congress fund your programs that have complicated your ability to have that come out in an effective timing sequence?

General SHELTON. Yes, sir. I would say that there are two factors. One is ground systems and satellites are typically contracted for independently, and trying to manage the technical risk and the tempo of those programs independently is a challenge, trying to keep them on track going down the same schedule.

There are also funding challenges. As we run into difficulties, as we run into just normal fiscal challenges and there are reductions in the budget, that can slip one program out of sync with the other. So the only way that I know of to pull this all back together is manage it in one big contract, and that has got its own challenges. So I do not think what we have done is necessarily wrong. Keeping them together in a funding and schedule perspective has been a challenge.

Senator SESSIONS. Well, I can see that. Sometimes the Defense Department gets blamed for funding irregularities in Congress, and we should work really hard and you should keep us advised of extraordinary cost that might occur, particularly as we go through this sequestration dangerous period.

General Formica, a question involving prompt global strike which is, as you know, dependent on space-related technologies. During the past missile defense testimony, you have highlighted the need for defensive and offensive capabilities to address the ballistic missile threat. And I remain hopeful that a prompt global strike capability will provide this necessary offensive capability.

Can you provide the committee a quick update on the progress of the advanced hypersonic weapon technology demonstration that is managed by your command? And what are some of the strategic implications?

I felt like we have made this much more difficult. I felt like we could have used the original plan that was to use existing sub-

marine-launched missiles, but that turned into a complication. So now we are on a more expensive track. And so how do you see it coming out and the value of it?

General FORMICA. Senator Sessions, thank you for the question.

As I have testified in the past to the subcommittee, we were successful in our first test of the advanced hypersonic weapon in November 2011. We attributed that success to the great work of Sandia Lab and our partnership with the Aviation Missile Research Development and Engineer Center at that technology campus at Redstone Arsenal in Huntsville with our engineers from our technical center. We provided that test under the leadership of OSD's prompt global strike program.

It was successful. We believe that it has got strategic and operational application. Just from my narrow vantage point, I see it as a potential left-of-launch capability in the missile defense business. I spent yesterday at a missile defense symposium hosted by the Director the Missile Defense Agency, and every one of the speakers talked about the need for offense-defense integration and attack ops to complement our missile defense capability. I see AHW has clearly a capability that has potential for application there.

We continue to work closely with OSD as we move towards a second flight test in fiscal year 2014. In fact, the Director of the Tech Center and my civilian deputy are meeting with OSD by Mr. Holter just today, and that is one of the subjects. The technology continues to advance, and we think we are on track to get ready for that test next year, sir.

Senator SESSIONS. Well, thank you very much.

To all of you, I am concerned that the President's budget does not identify the impacts of the sequester in the fiscal year 2014 budget. If the sequester is not averted, how will it impact the budget? So we have got a $52 billion assumption more in the President's 526 DOD budget. I believe it is $526 billion. But the current law is that the sequester takes effect, and if that takes effect, then the real budget you have got to live with is $52 billion less. So I am really concerned about that.

Senator McCain and I and others asked a lot of questions about why we were not planning for this in advance on the assumption that it might happen. And as a result, no serious planning was done, and you have had to make cuts in a very rapid situation.

So the sequester is in law, signed by the President, voted for by Congress. And we are not seeing the kind of movement I would like to see to see if we can avoid it. So I am worried about that.

That is past my time. I will just leave it at that right now and just say that it is a matter of all of our concern. I know Senator Udall and we all care about it, but we are not making a lot of progress. I am afraid you definitely need to be seriously figuring how you are going to operate with less money than the President's budget assumes.

Senator UDALL. Thank you, Senator Sessions.

Senator Fischer.

Senator FISCHER. Thank you, Chairman Udall and Ranking Member Sessions. It is good to be with you again today.

And thank you for being here and being willing to answer some questions that we have for you.

General Shelton, I understand that the Air Force is exploring sensor disaggregation and hosting sensors on less expensive commercial satellites. Are you confident that that approach is going to work?

General SHELTON. Senator, we are actively studying that. It is not something where we have wholesale decided, but part of the savings that we have garnered from new acquisition approaches is being plowed into what we call space modernization initiative programs for advanced EHF, for SBIRS, and for GPS. That money goes to architectural studies to look at exactly what you are talking about. We will be a lot smarter by the summer. Right now, it is a bit in the study phase, but I would tell you from everything that I have seen so far, there is no reason not to be confident.

Senator FISCHER. And how long have you been studying it?

General SHELTON. About 6 months now. So we are just starting to scratch the surface of this.

We do have a hosted payload on orbit right now that is doing extremely well and is kind of a trail-blazing effort. So that is part of the confidence, but also as we look at trying to establish resilience in our most important constellations, we know that we have got to do something different. Whether that is disaggregation in terms of more numbers of satellites on orbit to make the targeting problem more difficult for an adversary, survivability concerns just from a premature failure point of view, all those sorts of things we are bringing into this equation to try to understand what is the best thing for the future.

Senator FISCHER. I would assume that if you do head in that direction, that the satellites that you would be putting up—more satellites that you would be putting up would be less expensive and maybe less capable than the ones that you currently have up?

General SHELTON. In aggregate, we are not looking to reduce capability. As you look at each individual satellite, it would be less complex. It would be based on very mature technology and it would be smaller. So in theory—and again, part of the study effort—we think it would be less expensive to launch, less expensive to build, and less expensive to operate.

Senator FISCHER. Thank you.

Secretary Loverro, do you have anything to add on that?

Mr. LOVERRO. Senator Fischer, I think General Shelton has summed it up very well.

You know, disaggregation we view as one piece of the larger resiliency equation. There is no question that putting all of your eggs in a single basket, as we have in some of our satellite systems to date, does not present a resilient front to threats or even unintended consequences that we might see in the future.

There is certainly a large body of evidence that disaggregation can help us in this way, but it is not going to be the only thing that we use. Sometimes disaggregation is thought of as simply hosting a sensor on a commercial satellite. Disaggregation means allowing other nations to provide capability.

In a meeting a couple of days ago, we were talking about weather, which General Shelton and his team are running an analysis of alternatives on right now. It is interesting to note that our weather capabilities are comprised of contributions from well over

100 different sensors, and when you go ask the scientists who sit in the weather system which satellite contributes what piece of the weather, they cannot tell you. And if the scientists who sit there cannot tell you, imagine the complexity an adversary would have in trying to eliminate our weather capability because they cannot tell either. They would have to either target 100 different sensors which would be cost-prohibitive, or they stop trying and look at other ways to deny that. Now, not that we are interested in having them look at other ways. But complicating that calculus, complicating the enemy's calculus, is an absolute hallmark of the resiliency discussion that we have been having.

Senator FISCHER. Thank you.

Ms. Chaplain, have you looked at that at all through GAO? Do you know will it be less expensive? Have you looked at costs? Are you working on this? Are you in on the study?

Ms. CHAPLAIN. Yes. We have several studies that will be covering this issue. You will see them later this year. But these issues have kind of been talked about in previous work, and I would say our work confirms these theoretical benefits. If you build satellites that are more executable, they are smaller, the time frames are going to be shorter, the launch costs could go down.

But there are a couple cautions here. Like even transitioning to a disaggregated scenario, costs could go up in the short term because you will need an overlap between the current structure and where you are going, and there could be startup costs to put a new infrastructure in place to support this different kind of architecture.

And then there are some other issues that just are risks, I think, that are associated with this kind of architecture. Interoperability. You have more satellites out there that have to work together. It is not just all on one package. Data fusion. That is where you are going to get your capability by bringing all these thing together. Both those things alone are not easy to achieve and have been difficult to achieve in the past. Modernizing control systems is another issue. Developing common interfaces and common standards. There has been kind of slow progress on that front. And just the general broader issue of leadership fragmentation. Right now, it is difficult. You can see just coordinating user assets and ground systems and the satellite to deliver at one time—that is pretty difficult. If you get into a scenario where you have a lot of—

Senator FISCHER. I think you said it takes years sometimes before it is coordinated?

Ms. CHAPLAIN. Yes. So I think the fragmentation of leadership needs to kind of be addressed to make this scenario work.

Senator FISCHER. Thank you very much.

Thank you, Mr. Chairman.

Senator UDALL. Thank you, Senator Fischer.

General Formica, let me turn to you. In the spirit of Senator Sessions? comment and also the question I asked to General Shelton, tell us, if you can, briefly how sequestration is affecting your operational capability.

General FORMICA. Thank you, Mr. Chairman, for that question.

Of course, sequestration and the fiscal realities impact all of our operations. We were somewhat relieved in our fiscal situation in

fiscal year 2013 with the enactment of an fiscal year 2013 appropriation. So that has taken some pressure off this year. And I would add that the Army prioritized space and missile defense programs very high in its prioritization list. And so as we were working our way through the impacts of the fiscal year 2013 budget, I think space and missile defense was accorded appropriate consideration by the Army.

That said, as Senator Sessions indicated, our fiscal year 2014 budget request does not yet reflect sequestration. We know that there will be some degradation from that budget request.

I anticipate two primary challenges to our program based on sequestration.

First, we are already delaying some of our training courses. So I expect training readiness to be challenged in fiscal year 2014.

And then the second, as General Shelton mentioned in his opening statement, the impact on the civilian workforce. I am concerned about that, frankly, in four different areas.

One, you have the threat of a furlough beginning in June, which has caused angst in the force, and if it actually is executed will cause hardships to our civilians and will challenge our ability to meet our day-to-day operations.

Second, we have already implemented a hiring freeze, and that hiring freeze means that we are creating gaps in our civilian workforce because people continue to retire, move, get sick, and those gaps are not being backfilled because of the hiring freeze.

Third, we have eliminated our temporary and term civilians, and that means, in my view, the next generation of public servants that we are trying to develop are no longer being nurtured at the entry level.

And then last, like with our military training programs, we have taken a reduction in the development of our civilian workforce and the dollars that are afforded to that. So we are going to take some impact in the ability to continue to train the civilian workforce that we have.

Senator UDALL. Thank you for that update.

Let us turn to nanosatellites. Senator Fischer talked with General Shelton about the Air Force's interest in this. Your command is credited with pioneering a number of low-cost, small nanosatellite programs such as the Kestrel Eye, which is an imaging satellite. Can you give us a perspective on where those programs are headed in the Army? Particularly I wanted your thoughts—the operational responsive space program was chartered to pioneer many of these initiatives, and I know it was popular among its customers. Do you still value the overall program?

General FORMICA. Thank you, Mr. Chairman.

We do value the operational responsive space program, and the warfighter continues to benefit from the space capabilities that they are providing.

That said, we see nanosat technology as a complementary space capability, and we are, in fact developing that technology as part of a Department of Defense joint technology capability development program, approved by DOD and funded by the Congress. That nanosat technology is principally two different satellites, one for beyond-line-of-sight communications and one for imagery, the Kestrel

Eye, as you mentioned. We are in the middle of that capability demonstration. We continue to make very good advances with the technology and are learning a lot from our engineering efforts. The JCTDs are, in fact, on track. We expect to be able to launch satellites in both categories, both from the communications satellite SNAP and Kestrel Eye next year.

Where they are going is at the end of the JCTD, there will be a joint military utility assessment, and we think that that is the time for the Department to assess the military utility of this technology and then to have a cost-benefit discussion as to where we go. My expectation is that if the technology works correctly, then we would advocate for ultimately to become a program of record. But the time is not right yet for that. We need the joint military utility assessment to have that discussion.

Senator UDALL. Thank you for that update.

Let me turn to Senator Sessions.

Senator SESSIONS. General Shelton and Formica, earlier this month President Vladimir Putin announced his intention to build a system to neutralize space weapons. According to the press reports, Deputy Prime Minister Dmitry Rogozin has said that Russia will, quote, have the technical means by 2030 to counteract threats from space by other countries.

Do we know what the Russians are referring to there? Do you believe we require similar capabilities, and do you believe Russian efforts being referred to are defensive or offensive in nature?

General SHELTON. Senator, I do not know specifically what might be talked about there. In a different forum, we could talk about some other capabilities.

Senator SESSIONS. Well, there could be some areas of classification that we should not talk about, I certainly acknowledge.

General SHELTON. But suffice it to say, there are nations—and I will just use the plural here—who are developing capabilities to counter our advantages in space, and we are doing what we need to do to address that.

Senator SESSIONS. General Formica, would you like to comment on that?

General FORMICA. I think General Shelton covered it, Senator Sessions. Thank you.

But, obviously, we would be concerned about any of those capabilities because, as you know, we are fully dependent on space as we conduct operations on the ground.

Senator SESSIONS. Would you say, General Shelton, that the need for counterspace capabilities are increasing rather than decreasing today?

General SHELTON. I think everything that we have seen from a policy perspective, from an intelligence perspective would lead us to believe that counterspace is a growing area for all of us.

Senator SESSIONS. And potential adversaries seem to be advancing their capabilities. Would you agree?

General SHELTON. I do.

Senator SESSIONS. The operationally responsible space concept—for a second year in a row, the budget request proposes a termination of the congressionally established Operationally Responsive Space Office. So the budget proposes a termination of that.

How does DOD intend to fulfill short-term capability gaps quickly and inexpensively in the future? Now, I ask any of you. Maybe, Secretary Loverro, you want to start to comment on that.

Mr. LOVERRO. Thank you, Senator.

As you have articulated, the budget has zeroed the ORS program again.

Clearly, though, we received your message in the National Defense Authorization Act that passed this year, and the Department has taken steps to go ahead and establish both the executive committee called for in that act and to move the Operationally Responsive Space Office under the Space and Missile Systems Center under Air Force Space Command, reporting to General Shelton. So while we recognize that the budget reality that is in the President's budget does not reflect the direction that we have gotten from you, we do recognize that we do have to figure out how to go ahead and best manage Operationally Responsive Space.

And I think that is the key that we will be working on through the executive committee, is how do we add ORS to the host of capabilities I spoke with Senator Fischer about in terms of providing the resilience and reconstitution that we need in the future.

And I will let General Shelton talk to any specifics beyond that.

Senator SESSIONS. Thank you.

General Shelton, we have talked about it for a long time. We thought it was a way to provide, I guess, redundant, immediate, fairly quick response to a challenging situation, and we thought it would result in less expense. So do you have any comments on the Secretary's statements?

General SHELTON. Yes, sir. This is just a matter of how much budget we have got. What we are trying to do is inculcate the ORS lessons learned into the mainstream programs at the Space and Missiles Systems Center. So rather than having a dedicated office with a dedicated budget, we take those lessons learned and the disaggregated concepts, the hosted payload concepts, all those kinds of things are things that we have learned from our ORS experiences. So it is mainstreaming what we learned.

Senator SESSIONS. Thank you.

Senator UDALL. Senator Fischer?

Senator FISCHER. Thank you, Mr. Chairman and Ranking Member Sessions.

General Shelton, if I can just follow up on Senator Sessions' comments here.

So we have zeroed out the budget. I think it is by 2016. Is that correct?

General SHELTON. Are you talking about counterspace, ma'am?

Senator FISCHER. Yes.

General SHELTON. Yes.

Senator FISCHER. And you have said that it is going to be absorbed by other areas of the budget?

General SHELTON. No, ma'am. By 2016, the budget that you see has now gone into a sustainment program. So it is in operations and maintenance funds, not in procurement funds. We have completed the procurement of that particular capability.

Senator FISCHER. So you believe that we do not need to expand or grow in that area anymore. We are just at O&M. Right?

General SHELTON. Ma'am, we would have to take this into another forum.

Senator FISCHER. Can you say what other forum at this point, or is that part of——

General SHELTON. It is beyond the classification of this session.

Senator FISCHER. Okay, thank you.

How would that compare, what we are now looking at doing in the future past 2016, to what other nations are doing—say, the Chinese—and the amount of money that they are throwing at these programs?

General SHELTON. Again, I am a little bit hamstrung here.

Senator FISCHER. Okay.

General SHELTON. I would love to sit down and talk to you.

Senator FISCHER. Okay. I appreciate that. I am sorry that I headed in that direction. We will talk again. I will try another tack. Okay?

You have command over both the Air Force's cyber and space forces, and I understand that you are going to be required to generate a large number of airmen in order to meet U.S. Cyber Command needs. Is that correct?

General SHELTON. That is true. It is a little over 1,200.

Senator FISCHER. Have you identified a path forward towards providing for these forces, and do you have any concerns that cyber requirements may draw resources from your space requirements?

General SHELTON. We have not fully settled on exactly how the Air Force is going to fund those positions. It is going to happen. A little bit of an arm wrestling contest——

Senator FISCHER. It is going to happen or does it have to happen?

General SHELTON. Well, it is direction to the Air Force. The Office of the Secretary of Defense said, Air Force, this is your share of the overall Cyber Command manpower for specific purposes, and so the Air Force has direction to fund those. So there is no doubt in my mind. We will fund those. The precise mechanism for that has yet to be determined.

It will not come at the expense of space capability, though. It will not be a trade that is just given to me to fund, you know, find this somewhere within your resources. It is an Air Force-wide problem.

Senator FISCHER. And when you take into consideration the sequester and the cuts that you will be looking at and when you look at the budget that was presented, which did not take into consideration the sequester, how are you going to make this work? Do you not have to take it from somewhere?

General SHELTON. It does. It has to come inside the top line of authorized manpower. It has got to come from somewhere, and that will be the challenge that will occur at the Air Force corporate level, if you will, to try to determine where we find 1,200 positions to fund those cyber positions.

Senator FISCHER. But you are saying your preference would be not to take it from space.

General SHELTON. Not only my preference, but I am a strong advocate of not doing that.

Senator FISCHER. Thank you very much.

Thank you, Mr. Chairman.

Senator UDALL. Senator Fischer, that is an important line of questioning. In the last two NDAAs, I have explored what we could do to think of this as not a zero sum game, but maybe we and our teams could work together and work with the General and others because both functions are really crucial. But we do not want to rob Peter to pay Paul. And I appreciate the General's wry smile in saying he is not going to give any quarter, given his responsibilities, but he knows the importance of cyber.

General Formica, let me come back with one final question for you. Kwajalein, an important little place out in the Pacific. Can you talk about how the site supports space situational awareness? And it is your responsibility, as you well know.

General FORMICA. Yes, Mr. Chairman. Thank you.

Kwajalein, as you know from your question, is a strategic asset out in the middle of the South Pacific. The longer I have been in this command, the more I have come to appreciate the importance of Kwajalein, and therefore, the role I play as the senior commander there is one of the most important duties that I have actually. Kwajalein is a host to the Reagan Test Site, which is a national class test that host tests for missile defense, ICBMs, and other tests that require the kind of space that Kwajalein Atoll affords.

And we have got very sophisticated radar capability out there, and those radars, when they are not being used for test, are made available for space situational awareness and to meet missions in support of STRATCOM and in direct support of the Joint Functional Component Command for space, which is subordinate to STRATCOM.

We provide space object identification and space situational awareness from those radars. We are strategically located in the Pacific to identify space launch, and we soon will be the home for the Air Force's Space Fence.

Senator UDALL. Thank you for that update. You do underline the importance of that jewel of an asset.

Secretary Loverro, let me turn to you and we will talk space policy here. I understand you are new to your job, but that does not mean you are new to the topic. You come from the Air Force Space Command, Space and Missile Systems Center. Welcome. Thank you for, again, your willingness to serve.

What actions is the Department taking to ensure that we support some sort of rules of the road, so to speak, with respect to space navigation between countries?

Mr. LOVERRO. Mr. Chairman, the Department has multiple activities ongoing in that regard. One was just mentioned by General Formica in terms of space situational awareness. Obviously, space situational awareness is fundamental to understanding what is going on in space. The Space Fence, which Air Force Space Command is going to put on Kwajalein, is a critical asset. But just as critical is our cooperative assets that we are looking at putting into Australia, the C-band radar that Air Force Space Command will be placing down there under an allied agreement. Those kinds of activities are firmly supported by the Department and are foundational to anything we do in terms of space traffic management and the freedom of space.

But it is more than just the technical capabilities. It is the agreement on what the rules of the road are for space, how do you operate in space. I think we all understand that in any economic and commerce sphere, there are rules of operations, whether that is rules of the sea, rules of the airways. So rules of space we view in very much the same way, not in a legally binding way, not in a way that will constrain U.S. national security. In fact, one of the reasons DOD is intimately involved in this is to make sure we do not constrain national security as we move forward. And yet, we all recognize that good rules allow us to go ahead and detect irresponsible behavior on the part of others.

So we are engaged with both the European Union on the international code of conduct. We have a member from the State Department, Secretary Rose, and the group of government experts to go ahead and talk about what should be the rules. And obviously, we remain very committed to working with our with our allies through multiple mechanisms to establish those rules. I think that covers most of the—

Senator UDALL. That is very helpful. You anticipated my question about Australia. That is important to get that on the record.

Let me follow on Senator Sessions? comments when it comes to those who are developing—we will put it in a politic way—an ability to deny access to space. What is our country's and the Department's policy when it comes to ensuring that we have safe access to space and the disaggregating of our assets we have been discussing? Does that help ensure the survivability of those space assets?

Mr. LOVERRO. I absolutely believe that it does. As you know, our policy that was published in 2010, both the National space policy and the National security policy that followed in 2011, all recognize that not only do we garner great benefit from space, but that we have an inherent right of protection in space.

So there will be a mixture of capabilities both from a protective standpoint, a resilience standpoint that we look to put into our systems in the future and offensive actions we may need to take in order to assure that we are not threatened in our space capabilities. As General Shelton has already indicated, a lot of that we cannot talk about in this session here, but we absolutely believe our policy supports all of those actions.

Senator UDALL. We are going to work on, what I hear you saying, the political, diplomatic, economic fronts, but we are also not going to be shy about developing our defensive capabilities, and there is no reason we should not develop offensive capabilities as well to show we are serious. We are going to be tough, but we will be smart as well. We will hold out a hand, but we are also not going to have our access limited.

Mr. LOVERRO. Yes. Just like in any other area of warfare, we understand that it takes both sides of protection and offensive capability to ensure that the warfighters get what they need.

Senator UDALL. Thank you for that.

Senator Sessions.

Senator SESSIONS. Thank you all. It is difficult to overstate the importance of space and missile capability to our modern day defense capability. It is just so critical to it.

Maybe, Mr. Secretary, I will just ask you one final question from me. The history of warfare has shown that virtually every code, every security system gets penetrated at some point or another. We are so dependent on communication through satellite guide and other things. We have the leaks and some private somewhere is intercepting the communications from the Ambassador to Russia to the Secretary of State. It is just hard to believe that that kind of thing could happen.

So I guess, do you believe we have given sufficient concern to the ability of adversaries to intercept and decode communications that we have?

Mr. LOVERRO. Senator, I think if you are asking, if I understand the question, as we decide how do we go ahead and host our satellite communications capabilities, do we recognize the potential vulnerabilities if we use satellite capabilities from other nations—is that the question?

Senator SESSIONS. Well, I am also thinking about just the basic communications system in which we send information, data through satellites that could be intercepted giving our adversaries valuable information we would not want to be made public.

Mr. LOVERRO. Understood. Absolutely. In normal departmental policy, all of our satellite communications are encrypted to the best of our ability. Now, I will readily admit there are some places that that has not been able to be implemented, but that is certainly where we are going.

There are efforts underway within the Department to provide more protective capability to our warfighters. Some of the space modernization investments that General Shelton spoke about are aimed directly at that problem because we recognize the need for wideband communications that are protected is growing quickly, especially with the modern war systems that we have today, especially as we adopt a more CONUS-based capability for many of these controls. So we are very focused on assuring that we can provide the protective communications in the future. Those are not always available everywhere in the world today that we fight, but that is our bias.

Senator SESSIONS. Well, there is a lot of technology out there and we have a lot of penetration of all kinds of systems that are occurring today, and cybersecurity has become a huge issue for us. I think it would be a mistake, as we spend large amounts of money developing our systems, if we do not give sufficient attention to security.

Thank you very much.

Senator UDALL. Thank you, Senator Sessions.

I am going to exercise my prerogative, Senator Fischer, with her understanding, to bring this portion of the hearing to a conclusion.

Although I did want to thank Ms. Chaplain for your insights when Senator Fischer asked questions. We will direct some additional questions to you particularly on the FAB–T situation. I know you have some real expertise there.

And I did not want to leave the Navy with the impression that they either were forgotten or they were doing a perfect job. So I did want to ask Secretary Zangardi a brief question about the MUOS system. It is going to replace the so-called Ultra High Frequency

follow-on system, which is known as UFO. How fragile is the current UFO system and will the MUOS system be able to backstop the UFO as it ages out?

Dr. ZANGARDI. Yes, sir. Right now, MUOS number 1 contains two packages. It contains a WCDMA package and a legacy UFO package. So when UFO number 4 failed last year, we activated operationally the UHF package on board MUOS number 1. So it has provided backstop.

But let me back up a little bit more into this question. The UFO constellation provides a UHF communications capability to the joint warfighter. The Navy plans on meeting the joint staff legacy UHF requirement until MUOS full operational capability, or FOC, which occurs in 2017. Statistical reliability analysis has shown that the current UFO constellation plus the legacy payloads and other mitigating efforts will maintain the legacy UHF requirements for SATCOM through 2017 and probably beyond 2018. Other mitigation efforts include a host of payloads and leased satellite capability.

Presently right now, we have an additional 111 channels above the capability, which is the rough equivalent of about three UFO satellites. So we believe that despite the age or fragility of the existing UFO constellation, we have sufficient capability to backstop.

Senator UDALL. Thank you for that update. We will ask some follow-on questions. Again, for the record, I wanted it to be shown that Senator Fischer and I have a lot of sailors in our States. We appreciate what the Navy does. In fact, Admiral Winnifeld headed Northern Command before he moved over to the Joint Chiefs. So thank you for what you do. And we would not be anywhere without the Navy corpsmen and corpswomen. So thank you for being here today.

Thanks to the entire panel. We will excuse you and we will ask the second panel to join us.

Gentlemen, welcome. We will go right to, if it is okay with all of you, to a 1- to 2-minute statement, and then we will move then right to questions.

Major General Wheeler has joined us. Major General, the floor is yours.

STATEMENT OF MAJ. GEN. ROBERT E. WHEELER, USAF, DEPUTY CHIEF INFORMATION OFFICER FOR COMMAND, CONTROL, COMMUNICATIONS AND COMPUTERS AND INFORMATION INFRASTRUCTURE CAPABILITIES

General WHEELER. Senator Udall, it is good to be back here again. I appreciate you having me here today. I will be quick this morning. I have also brought my full statement, which is sitting out in the other room there that goes into much more depth.

Senator UDALL. We will put it in the record, without objection. Thank you.

General WHEELER. Sir, thank you for the opportunity today to testify before the subcommittee regarding the vital importance of scarce radio frequency spectrum to U.S. national defense capabilities, the economy, and consumers.

I will make this statement short, highlighting the key points from my full formal written statement that I have already provided

for the record, and leave the rest of the time for questions, as we have discussed.

Spectrum is a critical enabler that ensures information is dependably available to train our military forces and ensure safe and successful mission accomplishment. Within DOD, we understand that the strength of our Nation is rooted in the strength of our economy. In that regard, we remain fully committed in support of the National economic and security goals of the President's 500 megahertz initiative, the implementation of more effective and efficient use of this finite radio spectrum and the development of solutions to meet these goals is equally important to both national security and economic goals. And we understand that.

The Department continues to cooperatively work with NTIA, other administrative partners, and industry to develop the information required to ensure balanced spectrum repurposing decisions that are technically sound and operationally viable from a mission perspective.

The ability to operate spectrum-dependent national security capabilities without causing and receiving harmful interference, while understanding the critical need of our Nation's economy, remains paramount to the Department. DOD also recognizes the importance of the growing need for spectrum for economic development, technological innovation, and consumer demand. However, any repurposing decisions made without proper technical, operational, and cost impact assessment could preempt critical requirements and could cause adverse impact to military training operations and readiness. No spectrum repurposing decision is without risk, but risks can and must be managed. Together we will develop long-term solutions to achieving a balance between national security spectrum requirements and meeting the expanding demand of commercial broadband services.

Thank you, sir.

[The prepared statement of General Wheeler follows:]

Senator UDALL. Thank you, General. Again, for the record, let me acknowledge your role as the Deputy Chief Information Officer for Command, Control, Communications and Computers and Information Infrastructure Capabilities. And you are a member of the United States Air Force. So again, welcome.

General WHEELER. Thank you, sir.

Senator UDALL. We have Mark Goldstein who is the Director of Physical Infrastructure, the Government Accountability Office. Welcome, Mr. Goldstein. We look forward to your comments.

STATEMENT OF MARK L. GOLDSTEIN, DIRECTOR, PHYSICAL INFRASTRUCTURE, GOVERNMENT ACCOUNTABILITY OFFICE

Mr. GOLDSTEIN. Thank you, Mr. Chairman and members of the subcommittee. Thank you for inviting GAO to testify on the issue of past spectrum auctions and the potential cost of moving some Government functions off certain spectrum bands. This testimony addresses our preliminary findings and report to be issued in several weeks to this committee.

Our review found the following.

First, actual cost to relocate some Federal users from the 1710–1755 megahertz band have exceeded the original $1 billion esti-

mate by about $474 million as of March 2013. In contrast, the Department of Defense expects to complete relocation for about $275 million, or approximately $80 million less than its $355 million estimate. The relocation of systems from this band has been less expensive than originally estimated because many systems were simply retuned to operate in the adjacent 1755 to 1850 megahertz band.

Second, DOD's preliminary cost estimate for relocating systems from the 1755 to 1850 megahertz band substantially or partially met GAO's best practices, but changes in key assumptions may affect future costs. Most importantly, decisions about which spectrum band DOD would relocate to are still unresolved. Nevertheless, DOD's cost estimate was consistent with its purpose in forming the decision to make additional spectrum available for commercial wireless services.

Third, no Government revenue forecast has been prepared for potential auction of licenses in the 1755 to 1850 megahertz band, and a variety of factors could influence auction revenues. The price of spectrum and ultimately auction revenue is determined by supply and demand. Several factors would influence profitability and demand, including whether the spectrum is cleared to Federal users or must be shared.

Thank you, Mr. Chairman. I would be happy to respond to questions later.

[The prepared statement of Mr. Goldstein follows:]

Senator UDALL. Thank you, Mr. Goldstein.

And finally, we have been joined by joined by Mr. Christopher Guttman-McCabe, Vice President, Regulatory Affairs, CTIA-The Wireless Association. Welcome.

STATEMENT OF CHRISTOPHER GUTTMAN-MCCABE, VICE PRESIDENT, REGULATORY AFFAIRS, CTIA—THE WIRELESS ASSOCIATION

Mr. GUTTMAN-MCCABE. Thank you and good afternoon, Mr. Chairman, Ranking Member Sessions, and Senator Fischer. I appreciate the opportunity to testify before you today.

CTIA represents the wireless carriers, manufacturers, and vendors that drive America's leadership in wireless broadband.

If I may, I would like to ask consent to amend my written testimony to include a letter that was submitted to NTIA today, this afternoon, regarding the issues that we are going to talk about on the panel today.

Senator UDALL. Without objection.

[The information referred to follows:]

Mr. GUTTMAN-MCCABE. Thank you.

As I noted in my written testimony, in order to maintain our world leadership in wireless broadband, the wireless ecosystem needs access to additional spectrum. Some of what is needed will come from the broadcast incentive auctions that Congress authorized last year, but as both the FCC, Congress, and the administration have acknowledged, closing this spectrum deficit will require reallocation of spectrum currently held by Federal users.

One frequency band that would be particularly useful to meet rapidly expanding demand is the 1755 to 1780 megahertz band, a

subset of what is currently under review by NTIA. In the United States, the band is used by DOD and other Federal agencies, but internationally it is used to support commercial mobile radio services. Reallocation would harmonize U.S. and international use, produce economies of scale and scope, lower costs, speed implementation, and drive advances in our health care, energy, financial, education, and other sectors of the American economy. American consumers and businesses will get the most advanced networks and devices. The economy will benefit significantly as our industry continues to drive tremendous amounts of investment and job creation, and as we heard numerous times on the first panel, the reallocation process can help agencies to replace systems that in some cases are decades old and outdated with state-of-the-art technology.

This can be a win-win-win for the United States. We hope you can help us to move this process forward. Thank you, and I look forward to your questions.

[The prepared statement of Mr. Guttman-McCabe follows:]

Senator UDALL. Thank you for that summary.

Let me go right to General Wheeler. General Wheeler, it is my understanding that the Department of Defense, along with other agencies, resides in the block of spectrum from 1755 to 1850 megahertz. It has been proposed to transition from this spectrum as a part of the President's initiative to free up 500 megahertz for commercial use. But the estimated cost for this block is $18 billion.

How hard is it to remove some elements from the lower 25 megahertz block in that 755 to 780 megahertz band, and how does time play a role in any movements from this block?

General WHEELER. Thank you, Mr. Chairman.

I think the way to think about this is we moved out of the 1710 to the 1755 megahertz band, retuned, as was discussed before in the GAO discussion, into this new band area, the 1755 to 1850. So we have approximately 100 systems in that particular area, most of which range the whole band, not just the lower portion of the band per se. So they go from the bottom of the band to the top part of the band.

And that was why the NTIA pushed for us to go ahead and take a study of the whole band and move that to another location, and also because from that particular perspective, giving a larger piece of spectrum—it is easier to do it from an auction perspective. So if you just do that lower portion, since we have to move many of the systems, even though it is just in the 25 megahertz, because they range the whole area, you do not save much cost by virtue of the whole band versus just the 25 megahertz of the band.

That part of the particular band of looking at that study of just 25 megahertz has not been completed because there is no other band for us to go to at this point that has been proposed. So the bottom line to it is we took a look at it from the whole 95 megahertz perspective and looking at going to 2025 to 2110, which is what all of our costs are based on.

Senator UDALL. Let me continue in that vein. I understand that one issue that is hindering communication between the Department and the industry is the sharing of classified information. To work through the problem, it has been proposed that we establish

a trusted agent program—I think you are familiar with the concept—someone from industry with the proper clearances who can be trusted by both the Department and industry to relay information back and forth to the parties.

What is the status of the trusted agent, and do you believe having one is a useful step forward?

General WHEELER. Yes, sir. Bottom line is, yes, I think it is a useful tool to have in this. What we have out there is we have working groups that work through the specific issues associated with each of the bands. And what comes out of it is a group of analysis methods and some conclusions. That is shared openly between the groups. We have American citizens and non-American citizens on these particular groups.

What industry has asked for is to go into the analysis deeper and to see exactly where all of the issues are associated with that particular analysis. So what we have done is we give the data to, normally, the NTIA and the FCC, and now we are working through the authorization to allow specific people from specific parts of the industry that are representative to have that particular data. That is presently in general counsel right now and it is going through authorization for us to do that.

Senator UDALL. So there might be more than one trusted agent. You might have some trusted agents.

General WHEELER. We are looking at 12 right now. 12 have been set forward. That is going through the process right now to have those authorized to do it.

Senator UDALL. So you are implying you think that is a useful step.

General WHEELER. I think that is a useful step in that I think it builds trust. It builds transparency in there. The fact of the matter is we give them all the analysis methods today and we give them all the actual results. It is just how we go through the specific aspect of each part of the analysis. That is closed because of the classification, because it is not just a folio for official use only data, but it is also secret and top secret data, and all of those are mixed. So that is the reason why we have to have the trusted agent aspect.

Senator UDALL. Mr. Goldstein, let me turn to you and ask you how well did the Department estimate the cost of relocating. How hard is it to factor in the time to relocate, given the complexity of many DOD systems?

Mr. GOLDSTEIN. Thank you, Mr. Chairman.

We think the Defense Department did a pretty good job, given that this was really a feasibility study approach that they did in conjunction with other agencies and with NTIA. And when we looked at our cost guides, we found that in most of the measures we looked at, they did well.

However, the biggest problem we face is uncertainty. We do not know when an auction would occur. We do not know over what period of time an auction would occur. We do not know at this point in time, as General Wheeler said, where a lot of systems would be relocated to. We do not know inflation factors. There are so many unknowns at this point in time that developing a more robust estimate which, of course, the Department would do down the line, is

something that we just cannot work through at this point until we know more from the FCC and ultimately NTIA.

Senator UDALL. Thank you for that.

Let me turn to Senator Sessions.

Senator SESSIONS. Thank you.

General Wheeler, just fundamentally how would you say the Department of Defense looks at this? Positive, negative, neutral?

General WHEELER. I would argue from the senior military side to this, they see that the strength of our Nation rides on the strength of its economy, and I believe that, sir. And I think that they want to find a solution to this because they see lighting up this Nation with broadband is a positive economic piece to us. So I would argue that all the workings that I do and all the folks that I talk to in there understand that this problem needs to be from both a military continuing on with our capabilities, because we provide some very unique capabilities, but also the fact of the matter is we have to do this for the economy because it is about real jobs. And so we understand that.

Senator SESSIONS. And you do not doubt that it can be done without undue risk in the movement.

General WHEELER. I think if we were to move, for example, in the 1755 to 1850, just for an example, the 2025 to 2110, I think our studies show that it is doable. With the proper time, money, we can make this happen and move over to that particular spectrum. The studies that we have done have shown that that is to be true.

Senator SESSIONS. I noted, General Wheeler, the FCC, Federal Communications Commission, informed the Department of Commerce it intends to commence auction on the truncated 1755–1780 megahertz band as early as September 2014. Do you think that is premature?

General WHEELER. I think there are a couple of problems with it. Where are we going to go is the real question at that particular point because that is not in the FCC's transmission of their letter. There is no proposal as to, okay, for the Department of Defense, you are going to move to this particular band or go over to this part with your systems and move. So for us, it is a difficult aspect as to how do we study this and how do we take a look at it because there is a requirement for us to present a study as to how we would do that. So there is no actual direction for us to go as to what we are supposed to do in the next steps to move into another band.

Senator SESSIONS. And, Mr. Goldstein, as I understand it, Federal law requires the auction revenue to be at least 110 percent of the cost of relocation for an auction to take place. Is that correct?

Mr. GOLDSTEIN. Yes, Senator, it is.

Senator SESSIONS. And given the Government-wide costs to relocate, there has been an estimate as high as $18 billion?

Mr. GOLDSTEIN. $18 billion, yes, sir. That is the current estimate.

Senator SESSIONS. Is an auction of the entire band likely to reach the 110 percent requirement?

Mr. GOLDSTEIN. Once again, sir, I think it is probably premature to know. There are still so many factors out there because not only do we not know the length and time of the auction, where various

systems would end up going, we do not know the price. There is only one study that I am aware of that has been done. It is several years old by an economic consulting group that basically makes assumptions that the price would be essentially the same price it was in the last auction adjusted for inflation. That may or may not be true. So there are still so many variables. It is truly hard to know.

Senator SESSIONS. Mr. Guttman-McCabe, do you have any comment?

Mr. GUTTMAN-MCCABE. I do, Senator. I think it is important maybe just to take a half step back.

So the letter that I asked for consent to enter into the record specifically asks NTIA to focus just on that lower 25 megahertz. The General is right. There really has not been a study on that 25 megahertz, and there has not been a full analysis of the $18 billion for the entirety of the band.

So what we are asking for is a focus on the 25 megahertz because two important things. One is there is a natural pair for it that our systems can use and that pair is scheduled for auction by congressional mandate, and it has to be actually allocated and assigned by February 2015. So there are 25 megahertz that is about to be auctioned, and we are looking for the pairing for it. The natural pairing is the lower 25 megahertz that General Wheeler referenced.

What we are trying to get a sense of is what needs to happen with that 25 megahertz. Do all the systems need to be relocated? Can some of them be retuned? Can we move forward quicker with that 25 megahertz? The remaining 70 megahertz has no natural pairing to it. So the industry did not say let us look at this 95 megahertz. The industry said, I want to say maybe a half dozen years ago, let us look at the 25 megahertz.

In the interim, Congress has moved forward mandating an auction of a natural pairing for it. And so what we are asking is can we really focus on that 25 megahertz such that it can be auctioned in a way that it is valuable to the industry.

And I would love to hear what General Wheeler says, but I also think we have got to move a little bit quicker. It took us 6 months to execute a nondisclosure agreement with the Department of Defense. So 6 months just to put an NDA together so we can move forward with this analysis.

And we do. We need to have a little bit of alacrity here because we have a deadline for the other half of the auction, and that spectrum, if auctioned unpaired, will bring a fraction—and I think Mr. Goldstein might agree with that—as compared to if it were paired with the spectrum that we are looking at.

So right now, you have the uplink spectrum that would be auctioned and it would be auctioned by itself, which is not beneficial to the wireless networks in the United States. So we are looking for a pairing, and that logical pairing is the bottom 25 megahertz of the entire band that the General is looking at.

Senator SESSIONS. Considering the statute, the 110 percent rule, are you concerned that that may not be reached?

Mr. GUTTMAN-MCCABE. I hate to say this because it is almost against interests, but our members seem to pay more and more every time they come to auction. Right? So the last two auctions

raised $33 billion combined. We have a couple auctions coming up. We see usage—we call it a hockey stick. The usage rates are just going through the roof. And when we began this process in 2009 and said there was a looming spectrum crisis, there were not tablets. There were not what we call verticals. So there was no medical usage, no smart grid, no education. You know, the uses have changed dramatically even since we sort of did a call to arms to say something needs to be done. And so, again, I am hesitant to say it but I think it will raise a great deal of money.

I think what we need to do is find out logically what is on the other side of the equation. And when we did this 10 years ago when I first started at CTIA, we did it for the AWS band. The initial DOD estimate ended up being 400 percent above what the final amount was. So what we want to do is take a good, hard look at that $18 billion, but really zero in on the 25 megahertz, what is in there, what needs to be moved or what can be retuned, what can we help to upgrade. In this environment of budget constraints, what can we take this money to legally outside of the sequestration process and outside the budget process? What can we do with this money to help some of these systems upgrade to advanced technologies? And it is all incumbent on us zeroing in on that 25 megahertz.

Senator SESSIONS. Thank you. It is a complex and important matter.

Senator UDALL. Thank you very much.

Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman.

So we have a finite resource, and we have a resource that is very, very valuable. You said the costs or the value of it is increasing like a hockey stick, and I see that even becoming even more valuable as we see technology advancing.

Focusing on the 25, the lower 25 here, General Wheeler, in your prepared statement you said it is important to understand the long-term status of the full band as part of any decision on the lower 25 megahertz. Do you feel that the DOD can consider the lower 25 at this point without having a full plan in place, without looking at what is going to happen to the rest of it? Can you look that far into the future?

General WHEELER. I think the way I would approach it is the fact that—if I could give you an illumination of some of the systems that are in the band. We are looking at airborne platforms that go across the whole United States that actually span that whole band. We actually have satellite control functions that are in the 1755 to 1780 type area. So of those 100 systems, most come across that whole area. That is really the problem. By just going after that 25 megahertz, we really have to redo all of the systems. So where do we put those systems since we retuned out of the 1710 to 1755 and many of these receivers and transmitters no longer have the ability to do that? They are actually at the high end of their capability. So we are going to have to move them to a separate band.

We have not done a specific study, directly to your question, ma'am. And so that part of it is definitely something that we can do. We are directed through Commerce or NTIA to do what we are supposed to look at, and we put all of our assets, if you will, on

the movement of us from the 95 megahertz out of that particular band because the other fear we have at this particular point is we only finished moving out of the 1710 to 1755 in March, and we were told to move to the 1755 to 1850 because that was supposed to be where we were going to reside for the future. And then now it has only been a year later and we are told we are going to have to move out of that and just try to push your systems into a different area. We are trying to find a place where we can go actually reside without actually affecting the commercial aspects. We believe that is important for them as well. So we are trying to move out of the whole band.

Go ahead, ma'am.

Senator FISCHER. Did I understand you earlier when you said that this bandwidth that you are currently on now—the Department of Defense uses that in the United States, but internationally it is used commercially?

General WHEELER. In different parts of the world, it is used for different parts, but that is true.

Senator FISCHER. How does that play into the usage that the Department of Defense has? How does that work when we are overseas? How do we accommodate our system to work on this?

General WHEELER. An interesting question, ma'am, because what happens is our allies do not have enough training frequencies to come to. So they actually come to the United States to do the training with us and use our systems in many cases because we have the airspace, for example, we have the ground ranges, and we have the actual capabilities with that spectrum to train with them. So it is part of the training that we actually do with all of our allies for Afghanistan, Iraq, and all those different locations. So they come back over to our side.

From a satellite perspective, ma'am, when we control a lot of our satellites, that particular realm, they just happen in geographical areas within the United States. It is the downlinks and uplinks.

Senator FISCHER. In another part of your prepared statement, you said that the DOD is evaluating sharing part of the band with the private sector. What is the status of your evaluation of the sharing part? And then I would like to ask Mr. Guttman-McCabe how he feels about sharing.

General WHEELER. Ma'am, there are five separate working groups in that particular area. Some have already brought out their thoughts and some are completing it by the summer. We think there is some value in sharing. It is a way to make the capability for the particular bands available sooner. I would argue that probably a real solution out of this particular arena is going to be a combination of sharing while we vacate. So if you could look at it from that particular perspective, if you kind of pair the different methodologies while you are vacating out of a specific band, you also share. And the sharing can be either by time or it can be by geographic. For example, a satellite that is in space—they sometimes maintain 30 years of capability without the ability to change the frequency, but you can do geographic sharing there while you are waiting for the new system to come online.

So we agree that sharing is a methodology for the future, and to be frank, with a finite resource, I think it is going to be the only

way that we will finally get to the full solution. But I also believe in the short term that using sharing while we vacate a band is the way to get that spectrum released the quickest.

Senator FISCHER. On average, how long does it take the Department to vacate?

General WHEELER. What they are saying in our studies right now, that we are looking at 10 years approximately for most systems. Now, to be frank, if you share while you are vacating in those areas, you can open up wide areas of the band within 5 years, but just not all of it, obviously, because of the satellites, et cetera.

Senator FISCHER. Thank you.

And do you want to share? Are you going to play nice?

Mr. GUTTMAN-MCCABE. It may be overly simplistic, Senator, but sharing requires two parties. And the Department has been good about sort of opening up its information and allowing us to investigate. Aside from the five groups that are working through the NTIA, we also have—three of our carriers through CTIA have what is called an STA, a special temporary authority. And they are investigating independently with the Department the systems.

Now, the net result has to be that the asset can be used in a meaningful way, and right now what we are finding with some of the analysis is that the folks at the Department are taking a real, sort of absolute worst case scenario look at the analysis. And I will give you an example.

Two of the aerial systems, if you overlay their exclusion zones right now, your State may be one of the few States that actually has any availability in the United States. There is some space in Maine, some in the central U.S., but in the majority of the United States, both geographically and population-based, would not be usable. And so sharing when the net result is that you actually do not get access to the asset, whether it is geographic or time-based, temporal, it does not really drive any benefit.

And so we are investigating sharing. We have spent a significant amount of money working with and hiring trusted third party agents, Chairman, that you talked about. And we are trying to work through what it would look like ultimately. But both sides need to be willing to take fresh looks at it, to take not aggressive but real-world looks instead of worst case scenario. And if we do not do that, then this notion of sharing is almost a lost cause.

Senator FISCHER. Thank you.

Thank you, Mr. Chair.

Senator UDALL. Thank you, Senator Fischer.

I am going to begin to bring the hearing to a close. Do you have any other questions, Senator Fischer, you wanted to ask?

Senator FISCHER. Could I?

Senator UDALL. Yes, please, yes.

Senator FISCHER. Thank you very much.

I love this stuff. Thank you, guys. [Laughter.]

General Wheeler, how does the DOD plan to move forward on this?

General WHEELER. Ma'am, we are continuing to work through the working groups right now. We are pushing hard.

Senator FISCHER. Working group studies. You are including the private sector I would assume?

General WHEELER. Yes, ma'am. So the working groups is part of the CSMAC groups that is part of Commerce that we are going forward—we are being aggressive in those particular areas. We are working with those carriers that we discussed, bringing them on the various bases, and trying to get an understanding of their expertise versus ours and what we see in the different areas. We brought them across the country, allowed them on the different bases to see if there are some ideas because we think partnering with industry is the way to go.

We have used sharing a lot. If you look above that prime real estate below 3 gigahertz, 54 percent of our spectrum today is shared with Federal and non-Federal entities that we do today. 54 percent of that particular one we share this environment.

There are some systems that are difficult to share. The airborne platforms are one of them, ma'am. And that is why we talk about sharing and vacating as a package because there are certain systems that do not lend themselves to easy sharing, whereas a satellite uplink where you have geographic sharing capacity does because the exclusion area is relatively small when you look at it from a geographical perspective from the Nation.

But again, from an airborne platform that rides across the whole Nation and does this, that is an issue. We have over 10,000 flights using one system per year over the United States. It is a 24/7 operation. As an aviator and as someone who flies stealth air assets, it has been one of the edges that we have used in combat. So that is a system I would argue that we would have to move out of the spectrum. The ones for satellite uplinks I would argue is geographical sharing.

So if you start to pair those and come up with that, those are real ideas to move open space and to share at the same time while you are finally going to vacate out there at a future date.

Senator FISCHER. And what does the private industry see as a way forward on this?

Mr. GUTTMAN-MCCABE. I think we would agree with the General. You know, realistic sharing with the goal of ultimately clearing. And I think when you talk about competitiveness around the world, you could name the top 10 or 15 countries we would want to compare ourselves to, Japan, South Korea, United Kingdom, Italy, Germany, France, Spain, Mexico, Canada. All of these countries have brought hundreds of megahertz of cleared spectrum to market in the last year. They all get it. They are all a fraction of our size, have a fraction of our usage, and they know they want to catch up to us in terms of our leadership in the mobile space.

So for us, sharing can be an on-ramp to clearing, but to the extent that we can get the cleared spectrum that can allow us to continue to maintain the edge, we have. Military is one of them, but there are not a lot of areas in the United States that you can say we have the technological edge. We do in the mobile platform. We really do, and everything gets launched here first, and we want to maintain that. But we need real help. It cannot take 6 months to execute a nondisclosure agreement. I mean, that cannot be part of

this process when we have a deadline, a clock, established by Congress to auction some of these bands.

Senator FISCHER. Thank you all very much.

And thank you, Mr. Chairman.

Senator UDALL. Thank you, Senator Fischer, for eliciting some passion and helpful responses as we face perhaps having to play King Solomon.

Mr. Guttman-McCabe, I want to give you the final question and then I will make a comment and we will bring the hearing to a close.

Talk about the trusted agent concept. I asked General Wheeler his point of view. Share your thoughts, if you will.

Mr. GUTTMAN-MCCABE. Yes. So I think we would support, we have supported. As the General suggested, the industry gave the Department a list of 12 names that go across both carrier and manufacturer companies to try to give a broad swath of what we call our ecosystem. It makes sense.

But the entities in the trusted agent environment have to have the requisite knowledge of our systems, of our networks. Our networks move so quickly that if you—and I am going to get myself in trouble, but if you leave it to NTIA or the FCC to be the trusted agents, the reality is they do not have a clear real-time understanding of our networks. And we found that with some of the working groups. We went in and said, no, this is not what LTE, our newest technology—this is not the power levels. They are not the outer band of missions. They are here. And it changed some of the exclusion zones by up to 80 percent. And so we would love a trusted agent as long as those trusted agents have the requisite knowledge of our industry, of our ecosystem and our networks.

Senator UDALL. I did hear General Wheeler talk about 12 such agents, and I what I hear you saying is let us make sure they know in detail. And I think the General agrees.

Well, this has been very helpful. Senator Fischer and I come from a part of the country where water is a finite resource. It is the most valuable resource. The Office of Science and Technology Policy, OSTP, convened a group of experts who advocated that since spectrum was a finite resource much like water, we could move towards a scheme of sharing spectrum. In the West, our water law has led to the famous saying that "whiskey is for drinking, water is for fighting over." [Laughter.]

And sometimes Colorado and Nebraska team up against Kansas and sometimes Kansas and Nebraska team up against Colorado. But I would hope we could find a way to share this crucial, valuable finite resource with all the various nuances you all have shared with us.

So thank you again for attending the hearing. We look forward to further commentary and testimony you might want to submit. And we will keep the record open and ask additional questions.

This hearing is adjourned.

[Whereupon, at 4:04 p.m., the subcommittee adjourned.]