

120916 Air Force Association Mitchell Institute for Aerospace Studies Friday Space Group Seminar on “Space Power to the Warfighter” Seminar with General John Raymond, Commander, Air Force Space Command, on “Shaping the Space Force for the 21st Century.” (For additional information on The Friday Space Group Seminar series contact Peter Huessy at phuessy@afa.org)

MR. PETER HUESSY: Good morning, everybody, my name is Peter Huessy. On behalf of the Mitchell Institute for Aerospace Studies and our partners, NDIA and ROA, I want to welcome you to this, the 14th of our Space Seminar Series on Space Power to the Warfighter. This is our last of the year and we will be reconvening either in late January or early February. I also want to thank Winston Beauchamp and Doug Loverro, who are our guests here today, for their earlier presentations. And also of course welcome our featured speaker General Raymond and our USAF colleague General Teague.

This series began in 2014. This is its third year and we’ll be beginning our fourth year next year. General Teague, as many of you know, is the Director of Space Programs in the Office of the Assistant Secretary for Acquisition. He directs the development and purchasing of space programs to Air Force major commands, product centers and laboratories. He has been a guest at our series for many times, and also has been a speaker, and we’ll hopefully have him again next year.

I want to welcome everybody here from Brazil and Japan, among our other foreign friends and partners. I also want to thank my friend Kath Ryan, who is in Colorado Springs, and her company. I also want to thank General Raymond’s staff, who did an extraordinary job in helping put this together. I would also be remiss if I were not to let you know Abby Gillett is our AFA person who handles our external affairs and she does a really remarkable job in helping to put all this together.

I also want to thank the staff here at the Capitol Hill Club. This is the 52nd event we’ve done this year on various things, and they do an extraordinary job. So with that, would you all welcome Major General Roger Teague?

(Applause).

GEN. ROGER TEAGUE: Good morning, ladies and gentlemen. Thank you all so much for coming out. It’s a great turnout this morning in honor of General Raymond. We sure appreciate the continued support, certainly by the Mitchell Institute and Peter your great leadership, and Kath Ryan. Thank you so much for being able to pull this together. It really makes a difference to help spur the conversation and the dialogue and grow the awareness of the critical role that our space assets provide.

We are sobered in remembrance this week. This was the 75th anniversary of the attack on Pearl Harbor, an amazing event, certainly one that we all remember and certainly will be remembered in infamy. We lost five out of eight of our battleships,

2,400 lives, another 1,200 were injured. It certainly was a very difficult time in our nation's history and a lot of heroes were born on that day.

Similarly, many of you may have seen the report last week on CNN, a conversation that's starting to gain a lot of public traction with regard to the threats that we now face in space. I find that interesting, not only with that report but as well the report that we saw a year ago on "60 Minutes," a growing public awareness on the challenges that we face in space. Fortunately we've got great leaders like General Raymond who are focused on this with laser precision to make sure that we won't ever experience that space Pearl Harbor, to ensure that we are always prepared. These kinds of dialogues help promote continued responsibility and focus on our space enterprise vision and making sure that we will be prepared should an adversary chose to engage on us.

Having taken command just a few weeks ago, General Raymond is responsible for organizing, equipping, training, and maintaining mission ready space and cyberspace forces and capabilities for North American Aerospace Defense Command, U.S. Strategic Command, and other combatant commands around the world. He oversees the Air Force's network operations, manages a global network of satellite command and control, communications, missile warning and space launch facilities, and is responsible for system development and acquisition.

The Air Force Space Command consists of 38,000 proud space and cyber professionals assigned to 134 locations worldwide. General Raymond was a proud graduate in 1984 of the Harvard of the South, Clemson. He also holds a couple of Master's degrees. But as you all know, he's a war fighter.

He has commanded at every level, including the 5th Space Surveillance Squadron at RAF Feltwell, the 30th Operations Group at Vandenberg. He was also the Director of Space Forces in Southwest Asia and commanded the 21st Space Wing at Peterson. He has also served as Vice Commander of 5th Air Force and Deputy Commander of 13th Air Force at Yokota Air Base, Japan. He has commanded 14th Air Force and served as the JFCC Space for STRATCOM. And he has recently just completed a tour as our first non-rated headquarters' Air Force Deputy Chief of Staff for Operations.

Ladies and gentlemen, it's my pleasure to introduce you to a great friend, the Commander of Air Force Space Command, the number one fan of the number two rated football team.

(Laughter/Applause).

GEN. JOHN RAYMOND: Good morning. How is everybody doing?

CHORUS: Good morning.

GEN. RAYMOND: It's really great to be here. Thank you very much for the

opportunity. Roger, thank you for those kind remarks, all except the last one. It's probably longer than my speech, but that's okay. Thank you, it's always good to be with you.

I'd also like to thank Peter and the Mitchell Institute for doing this. I think this is my third opportunity to chat with this breakfast. They're always great conversations and I always look forward to it. It's really a privilege to be here.

I also want to thank our friends from Brazil and Japan and other allied partners that are here. It's great to see you all again as well.

As mentioned, I've been in my current job for about six weeks. I couldn't be more excited, absolutely more excited, for the opportunity to command Air Force Space Command. It's like going home.

I can't be more excited for a few reasons. I probably can't use this slide very much anymore because after six weeks you're kind of not the new guy anymore, but usually when I give a briefing my first slide is -- and I'm really excited to be here and the first reason why -- the slide is a picture of beltway traffic on one half of the slide, and then the other half of the slide is the view from my office of the front range of Pike's Peak. It's just a great place to be.

Secondly, though, this is a really, really exciting time to be in the space and cyber business. In my 30-something years of service I have never seen a time where there is this much excitement around the missions that we operate. We face a lot of challenges in both the space and cyber domains, and we're really working hard to make sure that we stay ahead of our strategic competitors.

As I tell my team, we simply cannot whiff. We've got to get this right. The security of our nation depends and demands that we do so.

The final reason why I'm really excited, and it's an exciting time that we have, is Roger mentioned the anniversary of Pearl Harbor. It's the 70th anniversary of our Air Force. This year, in September, will be the 70th anniversary of our Air Force. And, for an Air Force Space Command airmen, it's the 35th anniversary of the Air Force Space Command, on 1 September of 1982 is when our command was born.

For those that don't know, I'm a proud graduate of the Harvard of the South. The reason why I bring that up, though, this morning is -- and really, do you know the difference between the Harvard and the Harvard of the South? The Harvard of the South has a really good football team.

(Laughter).

For General Hyten at our change of command, I actually said he's from the Clemson of the North. I've turned that around a little bit now, because we've just

completely overlapped Harvard in everything that we do.

I'll tell you another funny story, that's the honest to God truth. My son, who is a junior in high school, I take him down to Clemson every year to get him indoctrinated and wanting to go to that school. He's been really, really good,

I was down at Vandenberg and got to interact with some folks at Stanford. I was telling Garret (ph), Stanford, they're some really smart people. We went up to San Francisco and were coming back and I said let's drive through Stanford. We drove through Stanford and he said dad, you know if I don't get into Clemson maybe I'll go to Stanford. I'm like, that's my son.

(Laughter).

That's kind of a throw-away school if he can't get in. But the reason why I bring it up today, two weeks ago I was in my office talking to my historian and on-boarding what we do in our history office. I told him, I remember when I was a Clemson ROTC cadet I heard General Hartinger talk. I can't remember what even it was, but I remember I was at Clemson.

They went and did some research and about a month before I graduated from Clemson General Hartinger had come to Clemson and spoke at an AFA event. I said, can you see if you can find that speech? They did, which is pretty incredible.

What I'd like to do is just read a little bit from that speech. This is a quote.

“Why did we establish a Space Command and why now? Our perception of space has changed. Space is a place, like the land, the sea, and the air, just another dimension, and it was just a matter of time until we started treating it as such. We had an ongoing study in the Air Force to determine when we would need an operational space command, and several factors converged which led to that decision.

The first reason is the Soviet threat. The Soviets have a major -- underlined -- military space program. Over the past decade they have launched four to five times as many satellites as we have, and 70 percent of their launches are strictly military. They have an orbital ASAT system, which they have demonstrated for years, and which is a threat to our low orbiters. They have a solid ground-based electronic warfare system and their high energy laser program is three to five times the U.S. level of effort.

The second reason for an operational command is our growing dependence on space systems. I can perform the missile warning mission only because I have the Satellite Early Warning System. Our military weather satellites provide key data to all services, and over 70 percent of our long-haul communications are handled by satellites. And the Global Positioning System -- and if you think back this is back before it was fully populated -- will let us navigate worldwide with unprecedented accuracy.

With this growing military dependence on space has come an ever increasing national security resource commitment. Ten year ago our military space budget was \$2 billion. In the FY '85 budget currently being considered in Congress, it's about \$10 billion. With this resource commitment it dictates the most effective management possible which we can provide within the operational space command."

I read that whole speech. That's just an excerpt of it. It really stuck me, and the first thought that came to my mind was that the challenges that we face with the birth of the command, those challenges have evolved today but they're very remarkably similar to where we are today, that uncomfortable intersection of resilience and vulnerability.

When Air Force Space Command was just a young nine years old we went to war in Desert Storm. The GPS constellation wasn't even fully operational at that time. After 26 years of continuous engagement we now have integrated space to the point in the joint fight where there's absolutely nothing that we do -- absolutely nothing we do -- in the joint force that isn't enabled by space -- absolutely nothing. I don't think General Hartinger back then probably -- maybe, because he was a pretty visionary guy -- would have imagined just how integrated our space capabilities are in everything that we do.

Today that integration of space and cyber provides us absolutely tremendous strategic and operational advantage, but we cannot take that advantage for granted because it's no longer a given. So today, I'm the clean-up hitter. After a year of 11 different talks -- and Doug, it's great to see you -- I actually read through all these 11 speeches that were given at breakfasts over the course of this year. What I'm going to try to do is leave some comments that you heard over the course of this past 11 months, and then at the end wrap up with a little bit of vectors on where we're headed.

Probably the biggest common denominator that I pulled out of the 11 talks that I read was the complex strategic environment that we currently face. Our Secretary of Defense has articulated the four plus one construct to help us wrap our head around that and to address the current and future global security challenges. These challenges are global, they're trans-regional, they're multi-domain and they're multi-functional.

If you put this another way -- in my change of command talk at Air Force Space Command, when you look at that: global, trans-regional, multi-domain and multi-functional, I told the airmen of Air Force Space Command that means us. That's Air Force Space Command's challenge. We operate in both space and cyber.

Mr. Beauchamp, Congressman Bridenstine, and Mr. Loverro all touched on the growing challenges that we face in the space domain. They all pointed out that space was contested, congested and competitive. Congressman Bridenstine talked about the space renaissance. I was at a dinner with Congressman Bridenstine and had heard him talk about the Space Renaissance Act.

I went home and I looked up in Webster's dictionary what renaissance means, specifically in the dictionary. If you look at it, it means a new awakening or a new

beginning, an awakening or a new beginning. I think that's a really good word for where we are in the space business, and I've told the Congressman that. I think it's a very appropriately titled act.

According to OSD's annual report to Congress, "Military and Security Developments Involving the PRC in 2015," China's military modernization has the potential to reduce core U.S. military technological advantage. Moreover, China is investing in capabilities designed to defeat adversary power, projection and counter-intervention during a crisis or conflict. Similarly, Russia is modernizing their counter-space capability. Again quoting, "These counter-space capabilities are aimed at defeating a wide range of our space-based capabilities while seeking to secure Russian freedom of action in, through, and from the space domain."

Simply put, in the not too distant future every satellite in every orbital regime may be able to be held at risk. So, if you think about that I think it's important to state up front that we don't want to fight a war that extends into space. Nobody wants that. Nobody wins that fight.

So I think deterrence is key. Doug Loverro in his talk provided a great primer on deterrence, disaggregation, diversity, distribution, deception, protection and proliferation. As he joked, he tried to get it to be R2D2, but couldn't come up with R2D2 so he came up with D4P2. That's a policy guy for you.

(Laughter).

Don't let me put words in your mouth here, but I think as you walk through the brief at the end he really summarized that it all rolls up into deterrence, and that's really what we're talking about. As George Washington said in 1780, "There is nothing so likely to produce peace than to be well prepared to meet an enemy." That was George Washington in 1780.

We have to be ready to fight a war that extends into space, and that's what Steven Whiting talked about when he came and talked about the Space Enterprise Vision. Although vision is in the name, in my opinion the SEV, Space Enterprise Vision, is really an operational construct because it allows us to execute a campaign that extends into space. The genius of the Space Enterprise Vision, in my opinion, lies in the following.

First, it's a joint Air Force and NRO construct. I think that's very, very powerful. I'll tell you that we've got a great, absolutely wonderful partner in Betty Sapp.

I actually met with Betty right before taking command. About a week before I left the Pentagon I went and had an office call with her, and both high on our things to talk about, on both my list and her list, was the Space Enterprise Vision. We've committed to keeping this a joint vision. We've committed to enhancing the partnership even greater than we have today, and I'm really excited about the possibilities of that going forward.

Second, the Space Enterprise Vision's overarching goal is to deter. As Doug Loverro mentioned, it's not to fight. Again, we do not want to go down that path.

The construct also provides roadmaps for each of the mission areas for achieving the vision. And finally, as the name implies, it takes an enterprise approach. It's everything from the ground infrastructure all the way up to the space segment.

That ground infrastructure, I would argue, might be the most important thing in the entire SEV. That was the subject that Colonel Brian Bracey and Colonel John Anttonen talked about in September when they came, the enterprise ground system. We're currently operating 15 disparate ground systems that are propriety systems. They're unable to pass data to each other. They're difficult to develop and disseminate a holistic picture of the space domain, much less multi-domain challenges.

The Enterprise Ground System is aimed at fixing the problems our ground systems face today and will create a set of government-owned standards and interfaces, exposing data to enable exploitation by space enterprise applications and services, building a robust common ground platform for C2 and data sharing, and bringing enhanced situational awareness to leaders who need them. Our chief of staff, General David Goldstein, recently published an op-ed on the information age of warfare. In this article he talked about the advantage provided through the speed and integration of information. He went on to say in the article "operational advantage will depend on our ability to harness vast amounts of information from multiple domains, to fuse it together into decision quality information, and to create simultaneous effects from all domains." I've added to this, creating multiple dilemmas for any potential adversary that may try to take us on.

In today's information-based battlefield, a commander responsible for operations in any domain has a couple of must-haves. I've been saying this since I was the commander of JFCC Space in almost every speech I gave. You have to have the ability to have awareness of the domain in which you operate, and you have to have the ability to command and control. Again, that's taking data, fusing data and coming up with decision quality information.

I will tell you on both of those fronts today in the space and cyber business, we're not where we need to be and we need to get there. We have to find ways to incorporate the massive volumes of data we gather into our operating systems, store, share and compare at machine speed. Relying on human analysis alone is going to be way too slow. We need human and machine augmented intelligence to enable the decision speed required to win on the battlefield of tomorrow.

Let me just kind of wrap up with where we're headed. The day after I took command I sent out an initial commander's intent -- memo would be too strong a word -- but commander's initial guidance. I laid out a few fundamental principles that I walked into the job with, and I thought I'd just share those with you.

The first fundamental principle -- and these really align to our chief of staff. He has three big rocks that he's working on. One is addressing the squadron, two is developing joint leaders, and three is multi-domain operations.

But in the letter I said that Air Force Space Command will be leaders in the joint fight. Our Air Force chief of staff has made developing joint leaders one of his three overarching priorities. Air Force Space Command airmen must not just be proficient in space and cyber, they also have to be proficient in air, maritime and land.

Air Force Space Command airmen must have the opportunity to attend advanced schools like the School of Advanced Air and Space Power. They must be able to attend Weapons School. We have to be able to participate in joint exercises and we have to be able to participate in joint war games, and we will. That's how we're going to work hard to develop those effective joint leaders.

The Air Force Space Command, the second tenet, is also going to be working to fuse a joint war fighting perspective. We operate in two operational domains, the space domain and the cyber domain. We're going to drive aggressively to the implementation of the Space Enterprise Vision, as I just highlighted a few moments ago. We also must continue to enhance our ability to have awareness of the domain; and we have to come up with the ability to have space command and control, battle management command and control, to meet the tight tactical timelines that we currently face. We're going to innovate and we're going to experiment to continue to enhance our capabilities, and a world-class set of priorities will drive to the required capabilities that will improve our resiliency.

The third tenet was that the Air Force Space Command is a service component to U.S. Strategic command, and we're going to be good stewards of that role in order to be a ready and able service component for General Hyten in his role as Commander of U.S. Strategic Command. The fourth one was Air Force Space Command will be at the leading edge of multi-domain operations. I mentioned to you that our chief of staff has a big rock -- he calls it big rock 3 -- of advancing the volume up at main operations.

All of the services are working hard to do that. The officer that is leading that for the United States Air Force is Brigadier General Chance Saltzman, who is a space operator by trade. I'm going to work hard to position the command to help partner with Salty and help lead that effort.

Again, the airmen of Air Force Space Command operate in two of the three domains that the Air Force operates in. We must find ways to operate seamlessly between domains and to generate effects at a tempo that cannot be matched; networks to allow superior decision speed at all levels of war capable of seamlessly synchronizing and commanding and controlling forces in multiple domains and enabling multi-domain maneuver, in a concept some have referred to as "domain on demand." Where do you need that effect, which domain can give it to you the best, and go with that domain.

At Air Force Space Command we have two-thirds of those domains and we already have an incredible level of talent in this business. The Air Force is an air force that operates in air, space and cyber. We don't just operate in stove-piped domains of air, space and cyber, we integrate operations in those three domains. When we do, we have great advantage, and when we don't, there's consequences to be had.

The last big tenet that was in this initial memo, and arguably the most important, in my opinion, is that we're going to continue to enhance our capabilities through meaningful partnerships. In the space domain, we haven't done that as well as we needed to. Really, we haven't had to because the domain was a relatively peaceful and benign domain and we really didn't need them. That's not the case today. We cannot do this alone.

When we operated in a relatively benign environment these partnerships were important. Today they are absolutely critical. We are going to work extremely hard to build partnerships with the intelligence community, with other government agencies, with allies and foreign partners, with the civil space and commercial sectors, and with industry.

So for the industry partners that are here, about a week or so after taking command I sent a letter to your CEOs saying I want to engage in the conversation with you. I look forward to that. We really have to work together.

As Mr. Beauchamp pointed out in January, "Effective partnerships can further strengthen our deterrence posture as well. Our coalition partnerships have evolved from just information sharing to joint war fighting, and they provide an incredible deterrent value. We must leverage the growing space capabilities of our allies."

In conclusion, today space and cyber space are more integrated, in my opinion, than General Hartinger could have ever dreamed. That is largely based on the work over the last 35 years of our airmen. Space and cyber not only fuel our American way of life, they fuel our American way of war. So it is our job to make sure that this information provided in, through, and from space, is always assured.

It's like the light switch. When you turn on a light the lights come on. The war fighters in-theater need to know that when the light switch comes on that space information is always going to be there. There's a lot of hard work to do to stay ahead of our advancing competitors. However, I could not be more proud of the airmen that I am privileged to lead, and I am confident that they're going to meet these challenges head on and position us for an even greater 35 years ahead.

I would also be remiss if I didn't take a moment to recognize John Glenn. It was a sad day for American yesterday. The work that he did and his pioneering spirit really opened the doors for all of us to follow in the space business. I think it's worth a moment just to recognize him and thank him and his family for all the sacrifices that they made.

With that, I'm open for questions.

(Applause).

MR. GEORGE MICHAEL (ph): George Michael from Global Special Operations Foundation. Last spring I was attached to General Neller, the Marine commandant. He started off by saying, my biggest concern in the Marine Corps right now is our dependence on GPS and our dependence on SATCOM. He said, I've got Marines out there right now who can't read maps. He said, what we're going to start doing right now is in our future exercises we're going to pull the plug to see what we can do.

The next week I was with Admiral Richardson, the Chief of Naval Operations, and he said exactly the same thing. He said, right now he's directing that within the Navy they're having to go back to learn how to use sextants. Then he talked about hardening and what we're doing today. Now he's talking about one of the best books to read is Pete Singer's "Ghost Fleet" and what happens in that book.

GEN. RAYMOND: My job is to make sure that we never have to pull the plug. That's why I come to work every day. I think in one of the breakfast talks that was here a couple of years ago, I think, if I recall correctly, was "A Day Without Space." That'd be a really bad day. That would be a really, really bad day. That's our job, to make sure that doesn't happen.

Having said that, I think it is appropriate that when you exercise you train through all contingency scenarios. One of those might be that you might have degraded space capabilities. But again, my job is to make sure that that doesn't happen.

MR. PAT WILSON (ph): Pat Wilson, Defense Daily, will you continue the General Hyten's initiative on resiliency and responsiveness?

GEN. RAYMOND: If that didn't come out loud and clear in my speech then I've failed.

(Laughter).

You have to, there's no option. You've got to. Our capabilities are absolutely too critical, not just for the military but for our nation. If we can't protect and defend and have a resilient architecture, then we're not doing what we should be doing.

MR. WILSON: Where does rapid launch fall among your priorities?

GEN. RAYMOND: Again, if you look at the SEV, it's an enterprise, so everything from launch to on-orbit operations falls into SEV.

MR. WILSON: Thanks.

GEN. RAYMOND: Brian, great to see you again.

MR. BRIAN WEEDEN: To your points about awareness and partnership, recently the Air Force wrote a couple of small contracts for commercial SSA, a small pilot program, and there's been discussion on moving some SSA responsibility to civil agencies. How do those fit into what you're talking about on improving future awareness and partnerships?

GEN. RAYMOND: I have long stated, Brian, in my job when I was 14th Air Force Commander and JFCC Space Commander that I didn't have the data that I needed. Other data that I get comes from the Air Force Space Surveillance Network, which is a great network and provides a lot of information, but there's other sources of information out there as well. That's one of the big parts of the JICSpOC, unity of effort and having more data information flowing into the commander, to be able to fuse that data together and make a decision.

So I think we have to do that going forward. We have to take advantage of multiple data sources to be able to gain the awareness of the space domain that we need.

MR. JAMES DREW: (Off mic) -- grand vision of the Air Force to put people in space.

GEN. RAYMOND: Today the Air Force does put people into space through NASA. As you look into the future and you look at the possibilities of where this domain goes, there may be a time when you would do that. My initial focus is a little bit closer in than that, but I wouldn't rule that out at all.

MR. DAN BROOK (ph): Dan Brook, Orbital ATK. There's a lot of discussion right now on whether to implement the vision of we need to have an efficient and timely acquisition system. What are your thoughts on the debate that is going on in terms of acquisition reform and restructure?

GEN. RAYMOND: I would think -- I know there's a lot of work going on looking at organizations of space and acquisition. I would just thank Congress for their interest and leadership in doing that. I think it's important that we look at that. We're going to be really good partners with Congress going forward to make sure that we get this right.

As I talked about in my speech, we can't whiff. We've got to get this right. If there's adjustments to be made that would be helpful, then we're going to be strong partners with Congress to do that.

MS. ERIN MICHAELS (ph): Erin Michaels, with Congressman Markey's office. (Off mic) -- best way to protect our soldiers, sailors, airmen and marines is to keep them

away from the battlefield. The new drone technology and the new unmanned drone technology is really intended to protect the war fighter. Can you talk about the space force's role in that kind of emerging technology?

GEN. RAYMOND: Absolutely. If you look at -- and in my previous job as the Air Force A3 I worked a lot on -- probably the thing that I worked the most on in my 18 months in the job was RPA and remotely piloted aircraft. If you look at the Air Force, though, the weapons system that has the largest number of pilots in our Air Force is RPAs. If you look at it, that business has been in a constant state of surge for the last 20 years. We worked really hard across the Air Force to develop plans to be able to put that on (battlefield ?)

None of that happens, none of that happens without space. Those RPA vehicles are operated by operators that are remotely located from their RPAs, and that is all being done over satellite links. So it's a fundamental to the success of the RPA program.

MR. : (Off mic) -- Voice of America. You mentioned that Japan and Brazil, other colleagues here, I'm wondering about working with foreign allies. What have you been doing and what do you expect?

GEN. RAYMOND: I had the privilege of being stationed in Japan back in 2011 to 2012. I was there right before -- I got to Japan about a month or so before the great earthquake of 11 March 2011 and the tsunami and the nuclear reactor disaster that that country faced. As a space operator, the thing that I walked away from with that experience is that when we went to support, we were partners and allies. I started thinking about what we do in the space business, which is my primary business, and we didn't have that relationship.

So that was a nugget that I put in my head that said we've got to start developing those capabilities, because I saw the power of working together as partners. So today what we're really focusing on -- and largely at the beginning it has been focused on space situational awareness, making sure that we are able to share information. Across multiple partners we have sharing agreements with many, many different allies that we can provide data and get a better understanding of the activities that are going on in space. So I would throw that out as one of the primary areas that we've been working on.

MR. SYDNEY FREEDBERG: Sydney Freedberg from Breaking Defense. You've hit on multi-domain operations a few times. The Army and other services use the term. But how do you actually do that? I mean, it's hard enough providing space support to the Air Force -- (off mic). But when you actually cannot -- (off mic) -- and space has to maneuver in some way for a fluctuation on the ground or a fresh space, what type of command structure or what type of mindset writ large keeps all those balls in the air at once? JICSpoc you mentioned, but that's just one piece.

GEN. RAYMOND: We do multi-domain operations today as you talked about. We are very proficient at multi-domain operations. We operate in three different

domains: air, space and cyber. We'd like to take that to the next level.

One of the fundamental things that we have to do is we have to develop, as you mentioned in your question, the ability to do that multi-domain command and control. That's really one of the big focus areas of General Saltzman and his team going forward, is to figure out how to do that. As I mentioned in my talk, some of the foundational things are having standards and data standards so you can share data back and forth between multiple domains; having commanders that have a level of understanding greater than they do today on the effect of multi-domain. So there's a lot of work going on and we've got a team working through exactly what you just said, to figure that all out.

MR. WILSON ROSETTE (ph): Wilson Rosette, Air Force Magazine, General Whiting at this breakfast earlier this year talked about the need for a great train to space model. The DARPA director has made similar comments recently. Do you agree that this is what we need, and what are some of the basic steps required to get there?

GEN. RAYMOND: I have not looked into that specifically, that part of it yet, in my first few weeks on the job, so I don't feel comfortable answering it. I will be happy to have you ask me that question here in the next couple of months when I dig into it.

MR. TONY CAPACCIO: Can you talk a little bit about how your space assets are contributing to the fight against ISIL, aside from GPS? This organization is given a lot of citations for operational space detachments for work over in the Middle East, can you talk a little bit about some of what they're doing?

GEN. RAYMOND: I would just say, Tony, as I said in my remarks, when I came back after serving as the director of space forces in theater, the standard thing -- and this was back in the 2006, 2007 timeframe -- the standard thing I got from the space community when I got home was, what's the one thing that the war fighter needed? And the answer is not one thing, they needed everything. So as I mentioned in my remarks, there is nothing that we're doing in today's fight against ISIL that isn't enabled by space.

Let me just give you a scenario. I was visiting the CENTCOM AOR six, seven or eight months now, and I was at an airfield in the region. There's an F-16 pilot that's getting ready to take off on a mission.

Talking to that pilot, if you look at what was done leading up to that, all the intelligence -- a lot of the intelligence that is done to go after what his target might be is derived from space capabilities, are derived from RPAs that are operated via satellite communications, as I mentioned earlier on the RPA discussion. Then before the plane takes off the weapons that he is carrying on that F-16 -- 100 percent of the weapons that we're dropping in theater are precision weapons. About 75 percent of those are GPS enabled.

Right before he takes off he makes sure that the weapons have the right GPS signal, that they're adequately locked onto the satellite. He takes off and as he heads to

the area that he's working, the airman that is controlling him from the CDC is doing that via SATCOM, in large cases. When he gets to the area that he's going to operate in and is going to strike the target, there's an airman called a JTAC. That JTAC is using SATCOM to a satellite communications receiver in that jet to direct him to drop munitions on that target. When that weapon is released it's using GPS.

When you're driving down the road and it says turn right and you've reached your destination, well GPS is telling that bomb when it has gotten to its destination very, very, very precisely. So as you look at that one scenario, everything about that scenario has been enabled by space capabilities.

MR. CAPACCIO: How about SBIRS, though. Can you talk a little bit about that?

GEN. RAYMOND: I know you wrote an article about it, and we have integrated SBIRS, as you mentioned in your article, into every capability we have, Tony, every single capability. Our job, we come to work every day, is how can we get the information provided by space into the hands of the war fighter? That's what we work hard on every day.

MR. JORDAN THOMAS: Jordan Thomas. You talked a lot about partners that are foreign, you talked about partnerships with agencies inside the United States, and you talked about sharing information. All that stuff is great. Who is working the plan on multi-level security? (Off-mic).

GEN. RAYMOND: It's clearly an issue that has to be addressed. I wouldn't say it's a barrier. I think there's ways to do it and we've got folks that are working on ways to do it. It's a challenge, but we've got to get there and we have ways to do that.

MS. COURTNEY ALBON: Courtney Albion with Inside the Air Force. Could you talk a little bit about the anti-ground systems. I wonder, how is the Air Force applying lessons learned from GPS/OPS into (the ground future)?

GEN. RAYMOND: The good thing is the folks that are working on Enterprise Ground are the folks that work for Air Force Space Command and Space and Missile Systems Center out at LA, are the same people that will be doing the Enterprise Ground. So we are doing all those lessons learned to make sure that we don't fall into the same traps that we've fallen into on programs where we've had challenges.

MS. LEPORE: (Off mic).

GEN. RAYMOND: Where did you go to school? Michigan?

MS. LEPORE: Yes, Michigan. I know, I'll be at the Orange Bowl while you're tossing the coin at the championship game.

(Laughter).

So, how about weather.

GEN. RAYMOND: It's really cold outside.

(Laughter).

It's a lot warmer here, though, than it was in Colorado Springs. Weather is an Air Force mission and we're going to step up to that Air Force mission and we're committed to doing what we need to do in weather to meet the requirements that the war fighters need.

MR. JAMES DREW: (Off mic) -- you said that Russia had an orbital ASAT?

GEN. RAYMOND: What I was reading was a speech from back in the early '80s. That wasn't what I said, that's what General Hartinger said.

MR. DREW: And you also said -- (off mic).

GEN. RAYMOND: Same thing that was back in 1985, the speech that I quoted in the general's name.

MR. : So what have they got today that might worry you?

(Laughter).

GEN. RAYMOND: I would just say there's a lot of things that worry us. There's a full spectrum of capabilities, everything from low-end reversible jamming to high-end - and I'm not just talking Russia, I'm talking a group of competitors throughout there -- everything from low-end reversible jamming like com-jamming or GPS jamming all the way up to high-end direct ascent ASATs like we saw China do back in 2007. We're concerned about the whole spectrum.

MR. : One question, would you address the reorganization language in the National Defense Act?

GEN. RAYMOND: As I mentioned, I applaud the look. As I said up front, we've got to get this right. We've got to get this right.

We look forward -- in fact, I've had a couple of conversations already with Steve Katay and others. I look forward to continuing that dialogue and sharing some thoughts and working closely together to make sure that we've got this where we need to be. It's really, really important that we're able to most fast, that we're able to continue to operate, that when the light switch comes on space is always there. If there's things that we can do to get towards that end more efficiently than we're doing today, we're open for the

conversation and looking forward to participating in it.

MR. HUESSY: Thank you, General.

(Applause).

Thank you all for your support for this seminar series. I also want to wish you all a Merry Christmas and a good holiday. Be safe, be well. For our sponsors in particular, without you this series can't go on.

I want to thank our Congressional staff and friends that continually help us and inform us as to how we ought to address some of these issues. And I want to thank our guests here from the military. You go out there in harm's way all the time and often in bad conditions, bad weather and bad folks out there, but thank you for everything you do.

General Teague, thank you for your remarks. Doug Loverro and Winston Beauchamp, thank you for your hosting here as well as your previous remarks. Again, thank you all in the space community for making this a series that we are going to continue. I want to thank you all for your support and we will see you probably at the end of January or early February for our next series.

Again, thank you General Raymond. That was an extraordinary series of remarks. Thank you all for your support and help. We will see you next year.

(Applause).