2015 Air and Space Conference

Reinventing Space:
Increasing Awareness, Decreasing Vulnerability
General John Hyten
Commander, Air Force Space Command

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SPEAKER: [in progress] -- after Chief Welsh, quite a talk. Wasn't that great? I mean, to see our hero's, our Airmen, it's so exciting. Our next speaker at this conference is the Commander of Air Force Space Command at Peterson Air Force Base. As you well know he is responsible for the organizing, equipping, training, and maintaining, mission-ready space and cyberspace capabilities for Air Defense Command, U.S. Strategic Command and other combatant commands.

General Hyten is a Harvard grad and if any of you have not been able to see his 60 Minute CBS interview you need to go look at that. He did a phenomenal job. The Air Force Association is vested into training and reaching young people for the space and cyberspace domain. You all know about Cyber

Patriots. We're just beginning now a program for high schoolers in space called Cyber Patriot -- pardon me, it's called Stellar Explorers, and we trust that you'll get tuned into that.

General Hyten, thank you. Come up and take it away. If we have time we'll do questions. We've asked him to go into the coffee break, so that we'll have the full time.

Thank you, sir.

GENERAL HYTEN: Thank you, Jerry.

So is anybody left? [Laughter and applause]

You know when I -- I've been to more than one of these over the years and I've seen General Welsh give more than one of those over the years and the good news is I've stopped crying. That's the good news. But when I looked at the agenda and I saw where I was slotted, when I was slotted, I knew I was dead. [Laughter] I just -- there is just no way you can follow that, but I'll tell you the one thing, thank goodness Laura is here because I can look at her and I'll feel better. But the -- you know, when you see

the stories that General Welsh tells and you see our Airmen, you can't help but be excited about what we're doing and I look at friends up here because pretty much the only people in the crowd left are friends. [Laughter] So thank you, very much for showing back up.

But I look at this group of people and the reason that we do what we do every day is because of the stories that he tells. He just has a magic way of telling that story. But really when you think about what he does, all he does is he stands up here and he tells the story of our Airmen. That's all he does. You know, and you think back to what he said in the last hour, it's just our Airmen. That's what it is. And so as I was -- I have this magnificent presentation and you're all going to enjoy it, I'll guarantee you, but as I listen to General Welsh tell the story I realized that I can almost give my entire presentation on my first slide. And it may seem a little bit strange to you but when you get to it you'll see there. And I'm going to go through the

rest of the slides because I have a lot of things I want to share with you today but just bring up the first slide.

There's a famous Air Force picture. Space guys in this room will know what that picture is, but I want you to think, everybody in this room just take a minute and look at that picture and get in your mind, what do you see when you look at that picture?

I got Fingers Goldfein up front. Thanks very much for coming Fingers, I appreciate it.

But when you look at that picture I bet you the first thing you see is an F-15. You know that's an interesting angle of attack for an F-15. That was an F-15 almost exactly 30 years ago, Friday the 13th of September 1985. Friday the 13th of September, 1985, an F-15 out of Edwards Air Force Base, carrying that missile -- who knows the designation of that missile? It's the ASM-135. ASM, what does that mean, air-to-space missile. The ASM-135 was launched by that F-15 piloted by Major Doug Pearson.

Many of you in this room know Doug Pearson;

he retired as a two-star, head of AFRL -- AFRL just a few years ago. The other thing you see is that missile, that ASM-135 is actually a SRAM Altair combination with a miniature homing vehicle on the top and shortly after that launch, which according to Wikipedia happened at 38,500, but ask the pilots in this room to look at that picture and look at the color of the background and tell me that's at 38,000 feet. I can pretty much tell you because I knew Major Pearson at the time because I was Captain Hyten at the time.

The interesting thing about that story is I walked into the space business exactly 38 years ago today, when I got off a plane and walked into Los Angeles Air Force Base on a Sunday, found my job on a Monday in that program office, and that's where my space story started. But the other thing I think I about when I look at that picture is who is taking the picture. There's a good question, so whose taking the picture?

Major Gary Bone is taking that picture and I

can tell you that Major Bone was concentrating on a series of pictures at the time and he was in a matched profile to Major Pearson in the other F-15. And let's just say that Major Pearson turned back quickly because he was reaching a certain altitude and he had to turn back. Major Bone kept going taking pictures. And all of the sudden over the radio you could hear, Major Bone, could you confirm your altitude. Silence, silence, silence, I'm good. [Laughter]

What else do you see in that picture? So I see Doug Pearson, I see Gary Bone. I also see Brock Strom. What do I see Brock Strom? Brock Strom was Colonel Brock Strom at the time. He was the program director assigned to the F-15 ASAT Program. And who is Brock Strom? All the Academy folks in here know who Brock Strom was. He was the first All-American football player at the Academy, an F-15 hero. One of the greatest pilots that ever flew. He was also -- had his masters in mechanical engineering from MIT and he was assigned to bring that capability in orbit.

The other thing I see when I see that

picture, besides a young brand new captain walking into a program is I see four lieutenants. I see Calvin Murray, Jim Lavadee, Tony Lock and Mike Douglas. Four Second Lieutenants who are working for me on that program at the time, that's what I see when I look at that picture.

Now, the other thing I see is a huge group of people that were on the ground that were making that system work and I see the response of the United States of America to a threat that was in the Soviet Union and the United States of America decided at that time that we needed to do something about that threat and they formed that program and in a very short amount of time were able to take that missile shoot it into space and shoot down a satellite. And I'll always remember Major Pearson's F-15 after that because it was the only F-15 in the Air Force that on the side had the sticker of a satellite, because he was the only satellite killer the Air Force has ever produced.

What else do I see when I look at that

picture? You know, maybe the most important thing I see besides the Airmen that are involved in that, I see a multi-domain technological achievement that was produced by the United States Air Force in response to a threat in space and the fact that we happened to use a fighter to deliver that weapon, nobody really thought about. It was a space problem, a space threat, but it was a multi-domain problem that we came up with, a multi-domain solution.

Why did we come up with a multi-domain solution? Because it worked. Did we think about multi-domain at the time? There was no such term. Space at that time, go to the next chart, space at that time, in 1985 was a fairly benign environment, but there was a threat. That threat you see in the upper right portion of that chart is the Soviet co-orbital ASAT. The Soviet co-orbital ASAT would launch, circle the globe, deploy a debris field, and have the debris field hit the target satellite. It would create a mess in space.

The other thing we learned is that we

created a mess in space. That mess in space we created was a significant issue that we had to deal with for decades after that. Fortunately, it was a fairly low intercept and the debris came down, but that was a significant problem for us as we went through it.

Then in 2007 we saw the Chinese do it at a higher altitude and the debris they created is going to be there for a long, long time. Now, a lot of people say that that debris is not really an issue. Why? Do the math. That intercept created somewhere between 2,000 and 20,000 pieces of debris depending on what you can see and what you can't see, what we predict is up there. But it's in a 73 trillion cubic mile area of operations. So put 22,000 objects in 73 trillion cubic miles, there's a lot of space. Because the fundamental -- the first fundamental principle in space is what, space is big. Space is big, so you have to deal with all that stuff.

So why would we worry about debris? Well, we're worried about debris because, because of that

event 15 times last year we had to maneuver to avoid that debris. Three times the space station has had to maneuver to avoid that debris. That debris, even though it's in a big area, is focused in low earth orbit and it's something we have to worry about. God forbid if it would happen in geosynchronous orbit, a confined -- a fairly confined space we'd have to figure out how to deal with those things.

So people that tell you that you don't have to worry about debris tend to be math wizards. And the math wizards stand up and they tell you, do the math, space is big. And they did the math on the iridium cosmos collision that happened in 2009, and the odds of a singular event for that iridium cosmos collision was literally one in a million that would happen. That's one in a million every orbit, but do the number of satellites we have, number of orbits. When you are done with the entire math equation the odds of that collision were three in ten. The odds of the collision were three in ten? That's why we maneuver each time so we don't have that event.

Because if we start down that path that puts us in a place we don't want to be. That's a threat situation we have to figure out how to deal with.

So if you go back to 1985 and the United States Air Force was faced with a threat, we knew what that threat was, we had to figure out what to do, we figured out what to do and responded to it effectively. It created debris. Now we have a threat in 2007 that appeared. We have to figure out how to respond to that, how to defend ourselves, and we have to do it in a way that does not create debris. It's really that simple and that straight forward.

But now in 2015 we also find ourselves facing a cyber threat, and the cyber threat is significant and we have to make sure that not only our space networks, and our ground networks, and all our networks are focused on that problem, but we have to figure out how to deal with the cyber threat that comes through and is attacking us today. The good thing about having space and cyberspace in one command is we can actually integrate the capabilities of space

and cyber and figure out how we're putting those pieces together. That's what we're trying to do.

Next chart.

So you've heard me talk about multi-domain operations with the F-15, that was a fairly simple issue. The space environment at that time, in fact, I'll have a chart later that will show you what the space environment was at the time. There really wasn't a lot of space capabilities up in either the Soviet Union or the United States. And those were the only two space faring nations, but it was significant enough from a nuclear perspective that we had to respond to that effectively. Now, we did it with a multi-domain solution.

Today we put charts like this up. We do it, General Carlisle does it. We all use these charts to explain multi-domain operation. And what is the technique that we use to explain multi-domain operations? It's lines and squiggles and connections, and why do we do that? The reason we do that is that's the key piece of the puzzle and if you didn't

do that you wouldn't see it, because it's invisible. All the networks are invisible. But everything on that chart that you see, everything on that chart is connected. For that to work -- for that system to work, for the United States Air Force to work, everything has to work together.

And one of the most exciting things going on right now in our Air Force is a developmental planning effort that was started by Air Combat Command. That's now being lead by a Colonel in the air staff who is looking at air superiority 2030 from a full multi-domain solution.

And I saw the briefing the other day, General Carlisle is pushing hard on that and the amazing thing about the air superiority problem in 2030 is there have -- for it to be able to be effective we have to have in integrated capability of air, space, and cyber that is seamless in that operation. And oh, by the way, 2030 is only 15 years away. And today if you look at the way we do business, and I'll show you some of those pieces, we

are not very good at multi-domain operations.

One of the biggest changes that happened in the last year -- last year at the C2 Summit when all the four stars got together except the chief and the vice-chief and we got together and we were talking, we made two fundamental decisions. You actually saw one of them in the chief's briefing that was -- that was pretty significant. I was probably the only one in the audience that noticed it. That was he talked about the Global Cyberspace Operations Center. A year ago that was a functional operation center. We made a decision at the C2 Summit that leadership of this Air Force would no longer talk about functional op centers, because the TACC, the Space Operations Center, the Cyber Operations Center are not functional. They're global operations center that do critical missions and for us to be effective as we go forward in the future we have to figure out how to integrate our global operations center with our theater operations center and they have to be integrated seamlessly. Not just by phone, as most of

them are today, but with data moving back and forth between the two. That's how we get it multi-domain operations. That's how multi domain operations become the way that we think.

And the second term we eliminated at the C2 Summit was the term cross domain. And I'm very sensitive when I hear the term cross domain and I will correct that language every time I see it, but the great part is that I heard General Gorenc correct that behavior at a meeting as well when somebody stood up and said, I think it's a cross domain solution and General Gorenc jumped all over them. If you've ever seen General Gorenc jump all over somebody it's a pretty impressive thing to see but he said, it's not cross domain it is a multi-domain problem.

Why is cross domain a bad word? The reason it's a bad word is that when you have a cross domain solution what have we inherently done? That means we have an air problem and somebody will say, go ask the space guy if he can do anything about it, or go ask the cyber guy if he can do anything about it. Ladies

and gentleman, we are United States Air Force, we're not a space force, we're not a cyber force. We are an air force and that air force together integrates air space and cyberspace. It's in our mission statement for gosh sakes. We fly, fight, and win in air space and cyberspace and the sooner we get to the point where we think about that as a continuing medium the better we're going to be as we fight into the future. That's critical to think about.

So this chart with all the squiggly lines, AWACS hooked to fighters, hooked to satellites, all those lines are there. Some of them go through the ground, some go through space, but it's all about networked information.

So go to the next chart.

So the next chart is information superiority. We've been talking about information superiority in the Air Force really since, really Desert Storm. Desert Storm that kind of became a term of the day where we talked about information superiority but the interesting thing about that

information superiority is it became an assumption in all of our -- in all of our minds. That information superiority was something that existed that gave the United States huge asymmetric advantage that we could fly, fight, and win, with impunity in any environment because we had information superiority. But embedded in that assumption was an assumption that information superiority was almost a birthright, it was just there. We didn't have to fight for it. Nobody was challenging it. It was a benign environment. Not just in space but across the entire information network. Everything was benign.

We could always get that information where we needed to and nobody threatened us. When somebody threatens to take that information away from you, you have got to be able to fight information superiority. You have to be able to have agile information superiority so you can adjust when an enemy does something to you that says I don't want to take -- I want to take that advantage away from you. And when that happens you have to be able to fight.

I appreciate General Carlisle earlier talking about fighting SATCOM. I can't tell you how pleased I am with the progress we're making and how frustrated I am at the same time with the difficulty of explaining why you would need to fight satellite communications. It's real easy. Fingers, when you were taught to operate a radio my guess is that when you first started flying you turned the radio on and you never had to worry about changing channels you never had -- but when you got into a threat environment somebody taught you how to do frequency hopping. Somebody gave you a radio that did frequency hopping. Somebody gave you a radio that allowed you to fight through different frequencies, different capabilities. Go from one radio to another radio. We had to carry multiple radios for a certain amount of time, now we're going to single radios.

That's just the way we think about fighting in a tactical aircraft, but when we think about satellite communication somehow we think that we can just assign a channel and a transponder on a satellite

and everything's going to be fine. What if somebody takes that channel or that transponder away and it's not difficult to do. If somebody takes that away what about all the other channels and transponders you have, what about all the other satellites you have that hook on to various radios? All you have to do in order to effectively have agile information and superiority is get ahead of your adversary. That's all you have to do.

It's something that we have learned in this air force since the beginning of communications, but somehow when it comes to satellite communications it's hard for people to understand that we have to be just as agile in satellite communications as we do in any other communication element of our Air Force. We have to walk through those pieces because the war fighters at the bottom depend on the communications and if that communication is not there then we do not fight effectively and we go back to what it looked like when the lieutenant was fighting in World War II, and I don't know about you but I never want to go back to

that kind of fight. I never want to go back to Korea; I never want to go back to Vietnam. I always want to be in a place where we have information superiority and in order to do that we have to figure out how to build agility into that construct, and we are struggling to make progress.

But thank goodness Admiral Haney has embraced the concept from a SATCOM perspective. We're going to make progress on that, we're making huge progress right now and we're going to go down that path because this is just part of figuring out how we do this business.

Next chart.

Integrated command and control. You walk into the Joint Space Operations Center at Vandenberg today, you see Airmen doing amazing, amazing things. You see Airmen that are hooked up with CENTCOM today that are providing effects inside the CENTCOM theater of operations. You see airmen that are providing orbital safety for the entire world that doesn't matter whether you're China, Russia, commercial, U.S.,

it doesn't matter who you are they're providing that capability.

General Raymond used to be the commander out there, now the A3. I know that you're glad to be out of Vandenberg and in the Pentagon, it's a great thing [laughter] but I tell you what, you're doing spectacular things and you need to continue to spectacular things because you're the A3 because everything we do is a multi-domain problem and you understand all three domains. So for gosh sakes, General Raymond, integrate those domains, push that out across the Air Force and we're going to make huge progress.

But you walk into the CAOC in the Middle East, you walk into the CAOC in the Middle East, what do you see, you see spectacular Airmen that are integrating capabilities across the entire spectrum of conflict that we're involved in today. You see in integrating capabilities for Afghanistan, across Iraq, into the various elements of the Middle East where we're operating today, you see that being done

seamlessly without any challenge.

You see the JSpOC talking to the CAOC but you don't see data going back and forth. You don't see real-time situational awareness coming out of space going into the CAOC and in the near future that real-time situational awareness is that picture has to be in the CAOC and the CAOC's picture has to be in the JSpOC. They have to be able to share situational awareness so that if there's a threat in space, then the first action may be a multi-domain solution that does not come from space, does not come from STRATCOM, it could come from CENTCOM or wherever else. All those effects can be integrated seamlessly without any challenges.

And then we have a cyber operations center -- thank you, ma'am. So we have a cyber operations center. The cyber operations center you walk into it and what do you see? You see Airmen providing integrated effects across a number of capabilities. They're inside my command. They were a PowerPoint chart like the chief said three years ago, now it's a

real operations center. It's truly remarkable. But in my own command can I share data between the cyber operations center and the space operations center? No. Can I share between the cyber operations center and any CAOC around the world? No. Do you think every CAOC in the world has a need for cyber situation awareness of everything that's going on in their network? Yes, they do. We've got to figure out how to work that.

That's why when we look at any problem, like we're looking at air superiority 2030 but it doesn't matter what problem we look at, we have to figure out how to look at it from a multi-domain approach. And when we do that we will bring the power of the Air Force to bear on any problem and that power of the Air Force will be enormous. That's what it's all about.

Next chart.

So how many times have you seen a space guy, for you old guys, these are the charts that we used to bring to ACSC and stand up and explain to the rest of the world what space was. We'd say, you see those

green lines, that's low earth orbit and that's where our -- that's where the satellites want to take a picture operate. That's where our space based space surveillance system operates. That's low earth orbit. That's where the space shuttle is. You see the blue line, that's the most valuable real estate. That's geosynchronous orbit, you see the highly elliptical orbit, you see -- you know what? That's not what space is. It is what space is but it's not what we care about as war fighters. That's not what we care about as we look together as an Air Force and we look together in the future.

Next chart.

This is the actual view of the space terrain, and it's an integrated capability of the space segment, the link segment, which everybody ignores, which is one of the most vulnerable elements. The war fighter that has to get the information out. The network segment that links it all together, which is the ground segment and the command and control piece that puts it all together. That's what all of

the pieces are.

So when you think about, if we ever get into, you know, a conflict that God forbid extends into space someday we have to be able to defend that terrain. The terrain that was on the previous chart, the orbits, are a very small part of what we have to defend. We have to defend our ability to command and control. Right now, today, we really have just one primary command and control node. We could default to Dahlgren if we had to but if we defaulted to Dahlgren all we would have is situation awareness. We wouldn't have the ability to command and control anything.

That's one of the reasons why we're going to build with the intelligence community a joint integrated collation space operations center to basically, for the next years, experiment on what we need to know to share that kind of information. Someday that could turn into a backup.

We don't know exactly what the future is going to be but we've sat down with the intelligence community leadership, Director Betty Sapp and I are in

full agreement that we're going to figure this out and the most important piece of the JICSpOC is the first letter, first two letters to be honest, joint and interagency, because Admiral Haney is the leader of the JICSpOC. The joint functional component commander for space is the leader of the JICSpOC. I'm just the guy organize, training and equipping that capability with the NRO to provide those capabilities to the joint interagency community, but we're going to bring experts in and we're going to experiment for a year to figure out what we really need to know.

The JICSpOC has been in the news a lot lately and it's -- a lot of people are saying it's this, a lot of people are saying it's that. It's just a place where we can go to, to experiment. We're putting one person assigned to the JICSpOC in a 3,000 square foot room at Schriever Air Force Base. And with that capability we're going to experiment with people coming in TDY, experts in the field, so that we can figure out what we need to do and from that we're going to build technical requirements document update

to the JSpOC missions system and we're going to build an updated CONOPS for how we should command and control our capabilities in a multi-domain environment. That's how we're going to walk down, because if we don't have a place to experiment we really can't learn the lessons we need to learn. So we're going to walk into that, because we need to be able to defend the entire space terrain, not just the orbits you saw in the previous chart.

Next.

Here's our traditional view of cyberspace. That's the Air Force network. The Air Force network is an amazing success story. We took literally hundreds of dispirit networks across our Air Force and collapsed it down into a single Air Force network. We went from over 100 gateways down to 16 gateways. We can actually defend that network.

That network now is turning into the basis for the DoD network we're about to walk into that is the Joint Information Enterprise. We're walking that really well. So when we talk to cyber communities,

when I talk to cyber conferences, this is what everybody thinks about.

Next chart.

The big part of the cyberspace terrain is what's on the right. Our installations, our power systems, our power grids, our fuel systems, the SKATA networks, all those kind of pieces and then our weapons system. Every weapon system we build is critically dependant on cyber, critically dependant on space, and I use those terms interchangeably because they're critically dependant on networked information getting into their system. And if they have network information getting into the system that means they have vulnerabilities and we have to be able to defend those.

But if you look at where we spend all our time, we spend all our time defending the Air Force network so we can get e-mail to each other. I'm a little more concerned about having the F-35 get information from a space system or a cyber system so it can actually execute its mission. I'm more

concerned about the F-35 getting a real mission data load that is not corrupt so it can execute a flight plan before it takes off.

I'm really concerned about every UAV that we have that is linked by space and cyber to be able to operate real-time. That's where the cyber vulnerabilities are that we have to go after. It's not that we don't have to worry about the network, we do. That's a critical piece of the puzzle but the big stuff is out there on the right. That's what task force cyber security is trying to get after but we're not going fast enough in that area. We have to go fast because that's where the vulnerabilities are.

Next chart.

So let's think about it, I talked about 1985 a while ago. What was there in 1985? You had DSCS satellites, you had DSP satellites, DMSP satellites, those actually date back to the '60s. All those satellites that you see there were classified when they were created, nobody knew about them. Even into the '80s you couldn't talk about a lot of the

capabilities that were there. A weather satellite for gosh sakes, you couldn't even talk about what the weather satellite was doing it.

That radar that you see there, that's an early [inaudible] at Griffiss Air Force Base, New York. Then you see a VAX-11/780. The chief had a better picture than I do a while ago when he looked at what was there in 1955 and what's there today, but what's really amazing is look at 1985. That was the state of the art in 1985, a mainframe VAX-11/780. Thirty years after the picture the chief showed that's what we had come to. Now, look at the next 30 years. That's a remarkable achievement.

And then you look over on the right and all the things that we have in space and cyber it's just amazing how embedded everything is and everything that we do as an air force and everything that we do as a military. It is the most joint capability, but like I said last year, it is an Airmen's story and we should tell it proudly. Because those capabilities have fundamentally changed warfare and they've

fundamentally changed warfare forever and we're never going back.

So we have to figure out how to defend it. So that multi-domain solution I talked about with the F-15 ASAT, that's where I started in this business, I'm proud of that experience. I'm more proud of the Airmen that I work with in that than anything else. I really loved the people I got to work with there and they put me on the right path, but it was a multi-domain solution to a single domain problem.

Where we sit today we really have very few single domain problems. All problems are multi-domain problems. So why is it that we struggle so much with realizing that all solutions are multi-domain solutions? They have to be for us to walk that in the future, and we're going to work multi-domain -- General Carlisle and I are tied at the hip and I was glad the Chief mentioned that because we are going to -- we're going to make sure that we figure out how to do a red flag in a multi-domain environment.

We've had red flags where we've turned on

some very unique capabilities in the past and turned them off after 15 minutes so we can continue to fly. This last year we turned those capabilities on and we left them on and we told the community as a whole, air, space and cyber, that's the environment you're going to be in, you better learn how to fight through it, because we have to train for that kind of environment. Training is the key piece of this and it has to be multi-domain training. It can't be single domain training. We're going to walk into changing how we do that in the space business. We're going to build a space mission force where our best operators stay on crew for multiple years. We're going to have experts there and we're going to train in an integrated multi-domain high-end environment and that's how we're going to move into the future. Because every problem that we have is a multi-domain problem, and we're an Air Force, the strength of our air force is our Airmen. Powered by Airmen, fueled by innovation, that's who we are and that's what we do. And this problem demands Airmen. It demands

innovation from everybody that's in this room and we have to walk into that. It really is an exciting time to be an Airman.

One of the blessings of this world is to get up every morning, still, after 34-plus years and to be able to put on a uniform and go to work. And the best part about it is that when I get to spend time with young Airmen and you see what our young Airmen do, you realize we're really not that smart, because they are. You look at the people the Chief introduced a while ago, holy cow. If we would just -- half the time, just give them the tools and get out of the way they'll figure it out, but we put so many barriers, so many barriers in the acquisition process, so many barriers in our traditional status quo. We put so many things in place that we can't seem to get there, but that's what Air Force Space Command is trying to do in conjunction with the other MAJCOMs, in conjunction with the joint partner, as a component MAJCOM to Strategic Command, in line with our functional component for space, in line with our cyber

capabilities, working with Admiral Rogers and Admiral Haney, that's where we're trying to walk into, and we're making enormous progress and an exciting time. And I ask for your help as we walk into that, because everybody in this room is part of the solution to that problem.

So I thank you very much for your time, especially after the Chief. Thanks for a few more people coming back in. I know that meeting Airman Spencer [Stone] was way more interesting than meeting me, but I thank you for your time and hope you got something from my message. I'll take some questions.

Thank you. [Applause]

QUESTIONER: Thank you. I think that many didn't bring up a bunch of questions because of our time but I do have one or two that I'd like to pose to you, General Hyten. What do you think right now is our greatest threat to U.S. space superiority?

GENERAL HYTEN: So our greatest threat to U.S. space superiority is, I'll phrase it this way, our greatest threat to our own space superiority is

our inability to do what we need to. It's not the threats that are out there. The threats that are out there, they're real. But in every domain that we've ever operated in we've faced threats. I never want to go to war in space. Nobody in this room should ever want to go to war in space, it's a bad thing. But if conflict ever does extend into space we'll face threats and we'll figure out how to deal with them. We just have to get past our own hesitation about responding to those threats and respond effectively. And if we do that when we do get into a fight we'll be able to maintain what we need to do in the space domain to continue to carry out our operations. It's really not that difficult.

And so I don't like to point at threats as the problem, because I guarantee you that every aviator in this room did not grow up expecting they would face no threats in their environment. That's just part of being in the military. How do you deal with a threat? You deal with a threat the way Airman Spencer [Stone] did. You see it, you take it on, and

you defeat it and then you move on. All the way from the most basic human act, the most complicated things, military operations is that simple. But somehow we make it very, very complicated in space and cyber and we've got to get to a place where we just look at them as other operational domains that we use and operate and we just move forward. It's not that hard.

QUESTIONER: Good. One last question. At the Air Force Academy football games, at graduation, we have flybys of all those aircraft and it really makes people aware, it thrills them, and you know, gives them goose bumps. How do we get goose bumps for space both in the public awareness as well as in the awareness of our high school students coming up and our own Air Force?

GENERAL HYTEN: So that's a set-up question, Jerry. [Laughter] So you gave a commercial at the beginning and now you want me to give the commercial at the end, which I will because it's a valid point.

So, you know, Cyber Patriot is a big thing that the Air Force Association and others have built.

Cyber Patriot is an amazing thing because it gets high school students, college students engaged in cyberspace. My high school is Grissom High School in Huntsville, Alabama. There's a student there named James Brahm. James Brahm, he's a pretty smart guy, he maxed his SAT as a sophomore in high school. He won, his team, won Cyber Patriot last year and I got to talk to him a few times and act as a little bit of a mentor and -- because he was looking at MIT or the Air Force Academy, where do I want to go? But the Cyber Patriot experience and maybe a little -- you've got to realize, I was in Detachment 365 at MIT, that's where I was. So I told him the good parts about MIT as well but he made a decision to come to the Air Force Academy. It's pretty exciting to have a cadet like that coming into the Air Force.

We need to be able to do the same thing for space. And so the whole concept of the AFA is trying to push now, what's it called, spectral --

QUESTIONER: Stellar Explorers.

GENERAL HYTEN: Stellar Explorer, is to get

after that same kind of excitement. And the amazing thing about space, is if you want to get excited about space, watch a launch. If you want to get excited about airpower, watch an airplane. It's the same thing. You can't see a satellite, though -- well, actually if you walk to Schriever Air Force Base today and you see a certain capabilities, I'll just say, not only do you see the operators but we can see satellites today. And some day it will be classified at a level where most people can see it. But if you look at the capabilities of the GSSAP, the Geosynchronous Space Situational Awareness Program, we can see satellites fly now too. It's pretty amazing the things that we can do in this Air Force and I appreciate the AFA pushing that back out so that we can get young people involved. Because I tell you what, where I got excited was my dad worked on the Saturn 5 and I got to see the F-1 engine in test and I got to see the Saturn 5 on the ramp at Cape Canaveral and I got to watch that work being done and that's why I developed a passion for it and we have to engage our

youth again to do that and that's what the program is doing.

So Jerry, thanks very much,

QUESTIONER: Well, growing up in Huntsville didn't hurt you.

GENERAL HYTEN: Growing up in Huntsville didn't hurt me, I got to meet Von Braun, I got to meet some pretty amazing people. But you know why I got to meet Von Braun, because I was already excited about science and so the kids in Chaffee Elementary School and Chaffee Elementary School up, the best math and science students got picked to go meet Wernher von Braun and I was one of those because I was excited. Then I really got excited and it's amazing how a little bit of passion and excitement can carry a long way in this world.

QUESTIONER: That's right. Well, General Hyten, thank you very much. I want to give you a book, *Mission to Berlin* by Robert Dorr.

GENERAL HYTEN: I've heard about it. It's a great book.

QUESTIONER: Personally signed by Mr. Dorr.

GENERAL HYTEN: All right.

QUESTIONER: Thank you, very, very much, appreciate it.

GENERAL HYTEN: Thank you, Jerry, thank you a lot. I appreciate it.

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