General Hyten, Sir,

On 12 April 2016, you are scheduled to speak at the National Space Symposium. Time allotted for speaking is 30 minutes with no Q & A. There will be approximately 600 personnel in the audience including senior military leaders, industry executives, and government representatives. There will be a lapel microphone. Multiple media outlets have been invited. Uniform is service dress.

Introduction [SLIDE 1]

Multi-Domain Video

The lines between the five warfighting domains are more blurred more than ever. Space and cyberspace capabilities ensure no Soldier, Sailor, Marine or Airman fights alone. But under no circumstance should anyone in this room take this for granted. Our adversaries are actively working to isolate our sons and daughters on the battlefield. They are actively working to take away our space and cyberspace advantages.

Thank you so much for having me here today. The National Space Symposium is always an incredible event, but I really think they have out done themselves this year. I brought that video today to highlight how seamless the integration of space and cyberspace capabilities have become in our everyday operations. In the video, you saw the speed at which capabilities from all five warfighting domains came together to create incredible, precision effects on the battlefield. Let me tell you, that is not easy. Our Airmen, Soldiers, Marines and Sailors make it look easy, but it's because they are unconceivably good at what they do. When I was a young Lieutenant, I was too busy geeking out with my other space buddies talking about sun-synchronous and highly elliptical orbits to even imagine this level of integration. But today, we do it every day on almost every mission, and no one blinks an eye. No one else in the world can conduct integrated, multi-domain operations like we do,

and space and cyberspace capabilities are critical in gaining this advantage for the US.

But hopefully the second portion highlighted how easily the multi-domain integration can be taken away by a determined adversary if we don't properly defend our space and cyberspace capabilities. That scenario is what keeps me up at night, it's what keeps me driving forward as the Commander of Air Force Space Command. Without space and cyberspace, how do we get that special ops team home? How do we confirm the identity of the High Value Target? How do we coordinate Close Air Support? How do we drop precision munitions? It all becomes much harder, and I don't ever want to see that come true. Our Airmen, Soldiers, Sailors and Marines are counting on us to build a resilient space and cyberspace enterprise that will continue to deliver these critical capabilities in the face of our adversaries.

Threat Focused Enterprise [SLIDE 2]

This is a picture of Pararescue Jumpers, or PJs. Their mission is to go into dangerous places to save the lives of wounded Soldiers, Marines, Sailors and Airmen and bring them back to safety. Their motto is "That others may live." Many times, they are flying into a "hot" landing zone where their operational environment is defined by threats. Their jobs, their lives, and the lives of the wounded depend on these PJs understanding the threats they are facing. They adapt to the environment they are operating in and are able to complete their mission in the face of the enemy. By the way, space and cyberspace capabilities give them an edge in this battle. But, they train ruthlessly for this mission, "that others may live."

The space domain is threatened by adversary capabilities too. Of course I understand that our space operators do not face the same kind of threats as PJs, but the threats to space capabilities are equally dangerous to our

Air Force's core missions. To protect our ability to conduct multi-domain operations, we must change the way we operate in space. Space operators must be as prepared to counter threats as these PJs are. We can no longer Command and Control our forces and capabilities on timelines of days and weeks. We can no longer build and operate expensive stove-piped systems. We can no longer train satellite maintainers instead of satellite operators. And we can no longer take 10-15 years to design, build and launch new capabilities, while our adversaries continue to innovate and adapt faster. The threats in space are as real as the threats these PJs face, and we can no longer conduct space operations as if these threats don't exist.

Multi-Domain Operations, Multi-Domain Airmen [SLIDE 3]

In the not so distant past, this slide would have revolved around Capt. Kristen Wolf, the F-22 pilot. I would have shown how space and cyberspace support flight operations.

But the Air Force is evolving its culture and its understanding of how we gain and maintain our advantages on the battlefield. Multi-domain operations are the future of the Air Force, and multi-domain operations will become the norm for our Airmen. I am the Commander of Air Force Space Command, but I am not a Space guy or a Cyber guy. I am an American Airmen that understands the battlefield effects produced from space and cyberspace. No longer do we care about where battlefield effects come from, because our Airmen understand the intertwined nature of all 5 warfighting domains. Today, space and cyberspace operations may suppress aerial threats by neutralizing adversary air defenses, while air operations may strike ground based anti-satellite capabilities, an ISIS/ISIL media chief, or a building housing state sponsored hackers. Operations from any domain may be supporting or supported by other domain operations. That is why multi-domain operations are critical to our success on any

battlefield, and we must protect and preserve our ability to conduct these multi-domain operations.

This year marks the 25th anniversary of Operation DESERT STORM. It's said that this was the first "Space enabled war" and our adversaries took notice of the overwhelming advantage that we had. Precision strikes enabled by space effects shocked militaries around the world as the US swiftly decimated, at the time, the third largest, modern army on the planet. Since DESERT STORM our adversaries have developed new capabilities to take away our advantages in space and cyberspace in order to deny our multi-domain advantages. So we must evolve as an Air Force and as a military to preserve our ability to deliver integrated multi-domain effects.

Organize, Train, Equip [SLIDE 4]

My job as the AFSPC Commander is to organize, train and equip our forces and now that means that I have to

organize, train and equip our Airmen to operate in the threatened operating environment they face. So I'd like to walk through how we are building a resilient enterprise. We will start with how we are organizing.

JICSpOC [SLIDE 5]

By now, many of you have heard about the JICSpOC. If you haven't heard the name, the Joint Interagency, Combined, Space Operations Center may sound like the JSpOC, but I assure you it is not the JSpOC and the JSpOC is not going anywhere. The JICSpOC is simply an experimentation environment that we are using to learn how to respond to threats as an enterprise. We really only have one person assigned to the JICSpOC, so for each experimentation period we bring in Subject Matter Experts from different organizations for a few weeks with the objective of testing and improving our ability to conduct battle management and command and control in the face of

adversary threats. Each experimentation period is a building block to introduce increasingly complex threat scenarios coupled with live and simulated data to introduce realistic timelines that our teams have to react to.

We just wrapped up experimentation period #3 in the middle of March and will be pushing onto experimentation period #4 in May. But we really did start from scratch. In the first experimentation period, we had to develop tools and methods to make sure everyone was on the same page. Our most effective tool during the first experimentation period wasn't a high speed, 3D graphical interface, and it wasn't PowerPoint or Excel. We went down to Home Depot and bought a hand full of white boards and had some really smart people huddled around them all talking about how to respond to threats. It wasn't pretty, but it was the most effective tool we had. At the start, it was more about having the right people in the room together. In the subsequent

experiments, we've started learning what information we need and brought in programmers to prototype better tools, but we certainly have challenges ahead. It's still pretty underwhelming for most people when they see it.

But just because our tools are still maturing, doesn't mean that the JICSpOC hasn't been successful. We have learned an incredible amount in the short time since we stood up the JICSpOC out at Schriever. The first and most important lesson we have learned is how important it is to have the DoD and Intelligence Community working together and closely integrated. I have great admiration and respect for Ms. Betty Sapp, the Director of the NRO, and I am extremely proud of our partnership with the NRO. But after seeing the results of our experimentation, I am convinced that the DoD and IC's relationship isn't close enough to stay ahead of the threats we are facing. The JICSpOC is showing us that the DoD and IC must have an unprecedented level of

unity of effort to succeed in a threatened environment. Indications and Warnings, identification and characterization of threats and situational awareness all require the fusion of data that comes from DoD and IC sensors. And by the way, that isn't just the NRO, it's the whole IC. Anything less creates blind-spots, leaving our enterprise more vulnerable and may compromise our ability to deliver multi-domain effects on the battlefield.

The JICSpOC experimentation has been so successful that it is now informing new Concepts of Operations, helping us re-envision our new infrastructure and ground architecture, and defining mission-essential requirements and capabilities. We still don't know exactly what the JICSpOC will transform into in the end, but for now we are happy with the progress we have made.

Organize, Train, Equip [SLIDE 6]

Moving on, let's talk about the Space Mission Force, our effort to train and build a resilient force.

Space Mission Force [SLIDE 7]

Our effort to transform training is called the Space Mission Force or SMF. SMF is not a hard concept for the rest of the Airmen in the Air Force. It is designed to make our space operator training and crew force resemble the rest of the Air Force. Our old system was designed in direct opposition to how we train the rest of the Air Force, by putting our capabilities in the hands of our youngest operators. We use to put our newest operators, usually our young Airmen and Lieutenants, on a crew for a year and then sent them to the back shops for the rest of their tour. The average age of our crews operating GPS was 23 years old! Don't get me wrong, these young Airmen are incredible! But it's the wrong way of conducting operations, especially in a threatened environment. We told these young troops that it

was best if they spend as little time as possible doing operations, and that it was better to be in a training or engineering back shop. That's a very simplified description, but it's basically true. Do pilots or even cyber operators want to stop doing operations and go do back office work? Do we only send our youngest, least experienced pilots into the fight? No, operators in other career fields try to keep doing operations until they absolutely can't any more. Additionally, we never trained our crews to operate in a threatened environment. They were essentially satellite maintainers, whose first steps in troubleshooting a satellite anomaly was to put the vehicle in safe mode and call an engineer. In the face of growing threats, we just can't do operate this way any longer.

The cornerstone of the Space Mission Force is the creation of a twin crew force. One crew force will be in the fight, operating the mission, while the other crew force is "in

garrison" conducting advanced training. But to build this twin crew force, we haven't gained any additional manning. So we had to blow up the traditional day staff and bring them back on crew. Again, this mirrors the way other parts of the Air Force execute their missions. While this second crew force is "in garrison", they will be conducting high end, advanced training that simulates threats, so we can learn how to respond to them and continue to deliver effects. The crews will switch every four months, so our crews continue to gain experience through training and then apply that training in real world operations. We are calling this Combat-to-Dwell.

I am pleased to announce that we started this effort at the beginning of the year in the 50th Space Wing. They are acting as our pathfinder program for SMF so we can see what works and what doesn't work and then adapt our best practices to the mission sets of our other Space Wings. So

far, we have several positive indications that SMF implementation is moving in the right direction. We are seeing the development of an evolving, advanced training program that addresses tough questions of how to respond to different threats. It has put the advanced skills of our space weapons officers to better use, by expanding a debrief process that identifies problems, hunts out root causes, then develops solutions to those problems. They are developing Tactics, Techniques and Procedures that will make our systems more resilient and help continue to provide increased battlefield effects. We have crew assessment events, instead of just individual evaluations, that help our crews respond to threats together. And our crews have verified the lesson I talked about with the JICSpOC, that a greater integration of intel and operations is essential to success in a threatened environment. Of course we have challenges that we are working through as well. Our trainers were not necessarily built to highlight a threatened

environment, so our crews are not seeing realistic enough inputs yet. We are working to standardize the quality of our advanced training and working through how we share lessons learned throughout the squadrons. And we need to figure out how this change will affect our civilian and contractor force. But overall, I am very happy with the progress we have made in a short amount of time and know that SMF will develop better operators that are ready to respond to threats.

Organize, Train, Equip [SLIDE 8]

Finally, let talk about how we are equipping our forces to be more resilient capabilities. We call it the Space Enterprise Vision or SEV, and it will change the way we acquire, operate, and think of space capabilities. We are looking at how the entire space enterprise can work together to create resiliency and tightly coupled, multi-domain effects.

Threat Focused Enterprise Vision [SLIDE 9]

Today, we find ourselves operating numerous disparate, stovepiped capabilities. Ten years ago, this approach worked because we operated with near impunity in a benign environment. We valued longevity and cost above factors like defensibility, interoperability, and data sharing. We call this "Functional Availability." When is my satellite's life going to end? That's when I need to have the next one ready to launch. That's "Functional Availability."

In those days, tracking objects in space was enough to predict future collisions and preserve our capabilities. Those days are over, we operate in a threatened environment, but we are still delivering the same capabilities that are incapable or unprepared to respond to adversary threats.

We have to move away from this "Functional Availability" metric of fielding systems, and move to a new metric we are calling "Resilience Capacity." Resilience Capability will account for a capability's ability to respond to

threats and continue to deliver effects. This is a dramatic departure from where we are, so it will change how we design, develop, acquire, sustain, and operate our space systems.

So when we stepped back and looked at how to create resilient capabilities, we quickly understood that we couldn't accomplish this resiliency, capability by capability, system by system. It would take way too long to refresh every satellite, and it would cost way too much. We have to take an enterprise approach and focus on Warfighter Minimum Essential Requirements. This enterprise approach is call the Space Enterprise Vision and its AFSPC's vision for how our enterprise will ensure we continue to meet Warfighter Minimum Essential Requirements in the face of adversary threats. Notice I didn't say it was my vision. I was the one that commissioned the study, but it was our Airmen at

AFSPC, with NRO experts that designed the Space Enterprise Vision.

First and foremost, the Space Enterprise Vision revolves around our Resilience Capacity metric and our ability to stay ahead of adversary threats. And as we discussed with the JICSpOC, this starts with increased Indications and Warnings, Intelligence and Space Situational Awareness. The only way to properly respond to a threat is to see it, characterize it, and understand its intentions. We must integrate more closely with the IC, but we also have to increase our capacity in both personnel and capabilities. Next we have to build layered, multi-domain defenses, capable of responding to a full spectrum of threats, from reversible jamming, to destructive kinetic weapons. Just like in the other domains, we are going to create force packaging concepts that couple multiple capabilities and create increased resilience.

But to stay ahead of threats, we also need increased refresh rates to ensure our capabilities can adapt and counter evolving threats. This requires increased launch cycles that can put small, medium, and large payloads in every orbital regime at lower costs. We like to call this the freight train to space.

And finally, we have to be able to respond on operationally relevant timelines. Today space operations take place over timelines of days and weeks. But the threats we are facing operate in timelines of minutes and hours. If we can't respond on these same timelines, all our other efforts are worthless.

Ultimately, the Space Enterprise Vision is about creating an enterprise capable of operating and delivering effects in the face of adversary threats. We must create an enterprise that is disruptive to any adversary trying to take away our

multi-domain advantage on the battlefield. Let's take a closer look at how we are going to build this enterprise.

Agile Acquisitions – New Space Fence [SLIDE 10]

To start, we have to do a much better job of fielding capabilities that are resilient, capable of operating in a threatened environment, and most of all, we have to do it on an operationally relevant timeline! As it stands, our operational enterprise is not changing fast enough to keep up with Combatant Commander's needs or to stay ahead of the threats we are facing. Our average Major Defense Acquisition Program takes 9 years to field! 9 years isn't going to cut it anymore. Programs that take 9+ years don't allow us to generate the critical space effects we need when confronted by adversary threats. So we have to change the way we do business. We have to embrace innovation, prototyping, experimentation and pathfinder programs that test assumptions, validate solutions, and field ad-hoc

capabilities. This approach will help evolve capabilities over time, and allow us to learn and evolve with technology. We can no looker look for the "Big Bang" delivery of capabilities because they are inevitably late, provide less than we need, and never adapt to threats. We need to reduce system and programmatic complexity by using open standards, relying on proven, yet state of the art technology, while minimizing new technology development. An incremental approach, like the IPhone, will help provide this, while keeping up with the pace of technology innovation.

What you are looking at here is a perfect example of this approach. These pictures are of the new Space Fence Integration Test Bed ribbon cutting ceremony in Moorestown, New Jersey on the 23rd of March this year. This new capability is on schedule for operations in 2018, and will dramatically increase our ability to track space objects. We are anticipating a 10 fold increase in our space catalog, from

around 23,000 objects to between 100,000 and 200,000 objects. But the unsung heroes of this story are the acquisitions professionals that have this program on time and on budget.

It started with critical Risk Reduction Studies that allowed us to work with contractors and users in the System Design Review to optimize the warfighter requirements, and reduce the overall system cost. But the key was a requirement that each contractor build prototypes in the Preliminary Design Review Phase. This pushed each contractor to raise the bar, and resulted in high-performing prototypes which also incorporated improvements to drive down system and operating costs. By the time we awarded the contract to Lockheed Martin Mission Systems and Training, we were using proven technology and had reduced risk so much that we were able to use a fixed-price contract. The Integration Test Bed you see here is built with

production hardware and end-system software. It will be used to run early checkouts of hardware and software, and will support remote troubleshooting of the operational radar on Kwajalein Atoll during installation, checkout and follow-on testing. The power of early prototyping carved the path of success for the new Space Fence and will do so for the rest of our Future Space Enterprise. The industry partners that embrace this model will help us thrive in the contested domains of space and cyberspace.

Enterprise Ground/BMC2 [SLIDE 11]

And as we acquire new capabilities on an operationally relevant timeline, we also need to be able to command and control them on operationally and tactically relevant timelines. 20 years ago, the ground architecture was an afterthought to the capabilities that were launched into space. Unfortunately this mindset has left us with numerous stove-piped and proprietary ground systems that weren't

designed to communicate with each other or be defended. Now we know that the ground segment is one of the most important parts of our space enterprise and it is comprised of cyber capabilities that like all networks are vulnerable to attack. We have to stop building stove-piped ground systems which force our space operators to fly alone in the face of threats. We have to build a mission enterprise that allows for true battle management and command and control of our forces and capabilities across the whole enterprise in order to properly react to threats. This means we need a common operating picture that shows blue, gray, and red forces. And the COP must be fed with real time status of threats, by integrating Space Situational Awareness, Indications and Warning, and intelligence.

Additionally, we must enable the force packaging of our space capabilities to create multi-layered defenses and resilience. Just like we force package air assets together, F-

15E Strike Eagles for strike capabilities, F-22s for air to air engagements, F-16CJs to suppress enemy air defenses, AWACS for BMC2, and KC135s to get them to the target, we will package multiple layers of space and non-space capabilities including offensive and defensive, to defend against threats and deliver global space power projection to Combatant Commanders. This force packaging of capabilities must be synchronized. AWACS serve this function in the air domain. Our future Enterprise Ground architecture must perform this battle management and command and control function for our space enterprise.

I want to point out that innovation will be essential in realizing our Enterprise Ground System, because the founding principles that will guide its development are automation, data sharing, a robust backup capability, and built in cyber security, both active and passive.

Threat Focused Enterprise - Conclusion [SLIDE 12]

So that is how we are organizing, training and equipping a threat focused, resilient enterprise able to deliver multi-domain effects in the face of our adversaries. But it all comes back to this picture. We have to maintain a focus on our adversary's threats in everything we do. We have to experiment, prototype, and innovate. We have to integrate with the IC and create a tightly coupled unity of effort. We have to use advanced, threat focused training to prepare our operations for a threatened environment. We have to operate on tactically relevant timelines. And we have to rapidly deliver capabilities that are a part of a resilient enterprise. These are not separate efforts. Everything we are doing is completely interconnected and integral to creating a truly resilient enterprise. It's an incredible amount of change for our Airmen, but if we fail to build a resilient enterprise, we will end up with the same constellations we have today, and that simply keeps us on a path to the status quo, mission

failure, and the loss of precious blood and treasure. Thank you for your time, enjoy the rest of the Symposium.