Center for Strategic and International Studies

Space Strategic Dialogue: Space and the Future of Warfare with Gen. Stephen Whiting, Commander of U.S. Space Command

Fireside Chat with General Stephen Whiting

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KARI A. BINGEN: All right, General Whiting, commander of U.S. Space Command. When we last talked, I think I gave you a different title; I said strategic command. But we're so pleased to have you here, commander of U.S. Space Command. He and I have talked on a couple of different forums over the year, each one a little different. But we've never been here in person at CSIS, so thank you very much for making the time to come talk to us at this inaugural event.

CSIS convenes multiple dialogues. We have a Maritime Security Dialogue, a Landpower Dialogue. I think by the end of this conversation you'll see why there's a need for a Space Strategic Dialogue as well.

I do recognize we're competing with the Pentagon's budget rollout day, so thank you all for being here. I think you'll see, though, is, as the general lays out, you know, where we're going and what our needs are, and hopefully we'll see that in the budget request that comes out later today in the J-books.

So we'll go ahead and take audience questions. So if you're here in person, scan the QR code. And if you're online, please go ahead to the website and submit a question. First, I'm going to start with some current events. We'll go to a discussion on space and the future of warfare. And then we'll dive into joint and coalition warfighting.

First let's talk Artemis II. You know, Artemis II just a few weeks ago, we saw it take the – we saw the SLS and Orion take off with four astronauts, fly by the Moon, NASA civilian mission. But I don't think people realize that Space Command and our U.S. Space Force also had a role in that mission. So can you talk a bit about Space Command's role? But also, as a national space leader, what has seeing us return to the Moon meant to you and to all the space professionals that you lead?

GENERAL STEPHEN WHITING: Yeah, Kari, it's just so inspiring, and just congratulations to NASA and all involved in the Artemis Program. You know, I was alive when Neil Armstrong walked out on the lunar surface, but I was less than two years old so I don't remember it. I do have a memory of one of the latter Apollo missions. I must have been four or five, laying in the back of my dad's station wagon. You know, they didn't belt us kids in back then; it's amazing any of us – (laughter) – from Gen X are still alive at this point.

MS. BINGEN: (Laughs.)

GEN. WHITING: Anyway, I remember my mom and dad saying there's a – there's a man on the moon right now, and that's a memory that's stuck with me. And now we're going back, 50 years later. So inspiring. I think it's just the first step – you know, one small step in this giant leap of what's about to happen over the next several decades as we move out into the – out into the solar system.

But U.S. Space Command did have a role, and we were so proud to be a part – just small part of the team effort. But when the astronauts were recovered, you know, they were on the

Orion capsule under the parachutes, as those – as those astronauts went into the Pacific Ocean it was our job to have the recovery forces there that got those astronauts and safely brought them onboard the ships.

One of my responsibilities is I am the DOD manager for human spaceflight support, and so we worked across the joint force with the Navy, with the Air Force, with Indo-Pacific Command, with U.S. Transportation Command. And we had all our forces arrayed, the forces that you saw, because that was a nominal, exactly as planned recovery, but also if it had gone off nominals and landed somewhere that we did not expect a contingency recovery. We had forces ready to do that, too. So we were very proud to be a part of that.

And then when the Artemis mission was on orbit, it was also Space Force forces that were performing conjunction analysis, making sure they weren't hitting a piece of debris, that they had all the GPS they needed. So, yeah, we were proud to be a part of that mission.

MS. BINGEN: Oh, that's super to hear. It was very inspiring and great to see Space Command's role.

You know, there's another dimension to this as we think about the broader picture of strategic competition, as we return to the Moon and expand our cislunar activities. You know, China is also pushing into this area. Can you help us understand the security dimension to this race and what role the U.S. military will play in that aspect?

GEN. WHITING: If we go back to the beginning of the space age with the launch of Sputnik, space was birthed in great-power competition. It was the United States against the Soviet Union, and the Soviet Union won the opening chapters of that space race when they launched Sputnik, the first animal, the first man, and the first woman. But ultimately, the United States won that space race when Neil Armstrong walked out on the lunar surface.

I think there's another race right now. China wants to get to the moon. Certainly, the United States, we're going to demonstrate that not only did we do it 50 years ago; we're going to do it again. And I think we've just seen the importance that China has placed on their space aspirations. They have moved unbelievably fast. You know, I could say remarkably fast, jaw-droppingly fast, breathtakingly fast; it's every time we think they're going fast, they accelerate. And they've done that with their military space capabilities, with their quasi-commercial space capabilities, now with their civil space capabilities.

Now, my desire is to see that as they go to cislunar that that is only for exploration purposes, you know, to achieve their own national goals. But we've got to maintain vigilance to make sure that China or any other actor is not using cislunar space – xGEO, we call that more broadly, space – for military advantage.

MS. BINGEN: And we'll dive in in much greater depth on what we see China and what we see others doing in space.

But let me also talk through another headline, you know, that we've been watching closely, and it's the recent military operations. So whether we talk Operation Epic Fury or Operation Absolute Resolve, the chairman of the Joint Chiefs of Staff, General Caine, has publicly discussed how space and cyber effects have been layered into those campaigns. So for those of us that are wondering what the heck does space effects mean, what the heck does space effects mean? (Laughs.) And how are they being integrated into that broader joint military planning and operational process? You know, what does it look like? How should we think about it?

GEN. WHITING: I really appreciate the chairman, General Caine, and the secretary, Secretary Hegseth, how they've highlighted the contribution of space forces, cyber forces. And when we say it's layered in, this means from the very beginning of the planning as we're thinking about multidomain operations – how do you bring land, air, sea capabilities – it's not just those three; it's now space and cyber that are from the beginning figuring out how do we best use those capabilities.

The capabilities people are most – most often think about with regard to space would be the effects we've provided for decades: satellite communications, how do we optimize those for operations; GPS; weather. Missile warning has been huge in this most recent operation. Certainly, Iran has built a very robust ballistic missile force, and it's our missile warning capabilities that are truly unique across the entire planet where we can detect those launches and provide that information to our fielded forces in real time, and then up to our national leaders as well.

But it's also capabilities that we've layered in like electronic warfare. The chairman has talked about how space and cyber capabilities helped to blind the adversary to what our operations are. And so it's those kind of things as well that we have fully nested into these overall operations.

MS. BINGEN: Well, and I wanted to just put – for the audience in the room here, they can see it – coming off the Space Command website I saw a picture of – this is the Army's Space and Missile Defense Command's 1st Space Brigade. This is a deployable and deploying brigade. So just can you talk a little bit, as well, about, you know, the Guardians and then the joint force, that, I mean, they're deploying around the world?

GEN. WHITING: Yeah. We have forces from all the services. Certainly, the lion's share of that comes from the U.S. Space Force to U.S. Space Command. And they're supporting operations from a lot of operations centers right here in the United States.

However, we've also had forces from the Army, from the Space Force, from some of the other services that have deployed into theater, into harm's way to ensure these space effects are provided. And you know, something that not everybody may be tracking is space capabilities in theater have been targeted, have been struck, and unfortunately we lost a soldier from this very unit, the 1st Space Brigade, Staff Sergeant Ben Pennington, who perished in the – in the first several days or week of the war. And our thoughts go out to his family, his parents, Tim and Carrie, for the incredible young man that they raised and gave to us. And he proved that, yes,

space systems tend to be hundreds if not thousands of miles away in space, but the military personnel who operate them are willing to give their all.

MS. BINGEN: Yeah. I mean, it is a tremendous sacrifice that they and their families make, so thank you very much for highlighting that and Sergeant Pennington.

Let's make sure that we level set here on just why space matters for those that maybe have not been tracking this conversation as intimately as you and I have. We've long said the United States, we are dominant – we are dominant in our military advantage, in our technology advantage, including in the area of space. So, you know, as you sit here and look at the strategic landscape before us, can you frame, you know, what does that picture look like in space right now? Why does it matter for national security? And frankly, why do we have a Space Command? Start there.

GEN. WHITING: Yeah. You know, if you go back over decades, the United States went to space for strategic advantage. You may recall in the early '60s a U-2 was shot down over the Soviet Union and Francis Gary Powers famously, you know, was captured, and ultimately came back to the United States. But we had to go to space because we could no longer use air assets to develop the critical national intelligence that we needed to be able to track the missiles and all the developments that were happening in the Eastern Bloc.

And then, as we went through the '70s and up into the '80s, we were continuing to leverage space for nuclear command and control, for strategic communications, but threats were building as well. And then, at – in Desert Storm, what we call the first space war, not because Saddam Hussein took us on in space but because for the first time we took these strategic capabilities we had built in space for strategic purposes and we applied them to the tactical battlefield. So for 35-plus years now we have driven space effects into our multidomain joint force.

And why is that important, and I give that history? It's because over the last 35 years the U.S. Army, Navy, Air Force, and Marine Corps have become optimized and assume that they're going to have access to space capabilities through all levels of conflict. If space is lost, they cannot fight the way they are designed nor sized. They do not have the force structure to fight the way we used to fight without space, because space makes us tremendously more precise, lethal, and far-ranging.

And so we've noted that the Chinese and the Russians have studied us since Desert Storm. They deeply have tried to understand how is it that the United States is able to create such global effects with what appear to be such a small number of forces, and they've assessed that space is one of those foundational issues. And so now they have developed a suite of counterspace weapons. So the strategic landscape we find ourselves in is that we derive enormous benefits from space for our national defense – also for our economy, and we could talk about how it enables our modern way of life – but now we face determined opponents who, if we get into a conflict, are going to try to take that away from us. So we've got to be able to protect and defend our space capabilities so that we can continue to derive the advantages that they give to us.

MS. BINGEN: And let's build on that. We've seen and you mentioned the integration of space into these modern battlefields. What are you taking away from the use of space in Ukraine and the use of space in the Middle East? You know, what's relevant to, say, the Indo-Pacific? But it's not just what are we learning as a space community, but also what's the joint force learning about the use of space and challenges to space?

GEN. WHITING: Yeah, and I'll try to keep the answer brief because I know CSIS and other think tanks are going to write whole studies about this – (laughter) – because, you now, this is – this is a – you know, a really defining moment, and what are the lessons that we're learning. And I'll just hit a few.

One is that space will be contested. And you can go back to the opening night of Russia's invasion of Ukraine, where Russia executed a cyberattack against a commercial satcom company because they wanted to deny Ukraine's ability to leverage that satcom for command and control. Now, unfortunately, that cyberattack kind of got out into the wild across Europe, and I think 40(,000) or 50,000 satcom modems were taken off the air. Now, Russia could have directly attacked in space. They've demonstrated that capability. In fact, they did a hit-to-kill ASAT test three months before they invaded Ukraine to send a signal to us and the West – the rest of the West. But they would rather attack us in cyber because it's easier for them, cheaper for them, and harder for us to attribute. So that's one.

We've also seen persistent satcom and GPS jamming where they have, again, contested our use of those capabilities. I think we've seen the rise of commercial space, where even nations who don't have their own governmental indigenous strong space program can now go onto the commercial market to get imagery, to get satellite communications, to get other forms of intelligence. And that means any foe now that we go into a conflict with we have to assume they're going to have somehow access to those space capabilities, which speaks to the ubiquity now of imagery, for example, how that is making the entire battlefield transparent. There are not sanctuaries for our forces anymore.

We've seen that in Iran. When a medium-sized power like Iran has the ability to build long-range strike weapons, whether ballistic missile or one-way attack drones, and then pair that with the ubiquity of imagery to strike fixed targets, that's something we now have to contend with. You know, there's a lot of other lessons but maybe those are three general areas that I would highlight here.

MS. BINGEN: And I'm starting to see questions come in a couple of different areas. So I'll get to those in a moment, but I do want to hit a few other areas. Let's talk a bit further about the threats that you're seeing to the space domain. And Chairman Rogers mentioned, you know, we can see threats unfolding in other domains. We can see what aerial dog fighting looks like. You can watch Top Gun. You can see what unsafe practices at sea look like. You can see the effects of missiles. Space is just a more challenging area to visualize and get your head around. So, you know, thanks to LeoLabs and us partnering with the Bertelsmann Foundation, who's a phenomenal documentary filmmaker, we were able to create some visualizations just to give you all a better sense of what we're seeing in space. So I want to – we're going to play two videos

here. And then, General, I'd like to get your reactions to them. So if we can cue up the first one. And this is what's happening in low Earth orbit that the Russians are doing.

(Video presentation begins.)

NARRATOR: On August 1st, 2022, a Russian military satellite called Cosmos-2558 was launched on a Soyuz rocket from Plesetsk spaceport, about 500 miles north of Moscow. After reaching low Earth orbit, the region closest to Earth often used by reconnaissance satellites, Cosmos-2558 settled into nearly the same path as a U.S. government satellite, which is called a coplanar orbit. For nearly three years, the Russian satellite stalked the American one, both traveling at more than 17,000 miles per hour.

Then in June 2025, things got really interesting. Cosmos-2558 released a much smaller object, about one-ninth its size, like a Matryoshka nesting doll. The U.S. Space Force later identified this new sub-satellite as Object C. After separating, Object C began maneuvering on its own, making adjustments that showed it could control its movement and position in orbit, presumably while continuing to follow the U.S. satellite. These movements, called rendezvous and proximity operations, can be used for routine tasks like inspection, but also military ones. Satellites designed for close maneuvering could carry a range of payloads, from surveillance equipment to electronic jamming systems, and in some cases even high speed projectiles.

This is not the first time Russia has demonstrated such behavior. In 2017 and 2020, similar satellites were observed either releasing objects or shadowing U.S. government satellites, leading the U.S. chief of Space Operations at the time, General Jay Raymond, to describe the behavior as "unusual and disturbing." While we don't know the exact purpose of Cosmos-2558 and its sub-satellite, their actions highlight a growing set of capabilities in orbit that are drawing increased attention.

(Video presentation ends.)

MS. BINGEN: Low Earth orbit. So want to thank several of our commercial space analytics companies. We did take a little creative license, because we – you know, we didn't exactly see the maneuvers. But I think this is an example where we're seeing this happen fairly routinely, but I'll ask you to comment on it. But this is where space and orbital dynamics are different. So I'd really appreciate your reaction. When you see something like that, what are you seeing?

GEN. WHITING: It's evident. Russia was deploying a space weapon there. And they're putting it into a – into an orbit where they can reach critical U.S. national security satellites. And if you go back to some of those early launches of that system, the Russian nesting dolls system, they were testing that. And so it would be the same as if we had a new fighter, maybe the new F-47 that the Air Force is going to acquire, with a new missile system. And we decided, instead of testing that on our test ranges back at Nevada or in Utah, that we decided to send that airplane up to Alaska and, as Russian bombers were flying patrols somewhat near our coastline, we sent this brand-new F-47 up to test near Russian bombers.

Just not the kind of thing we traditionally see. And so the Russians were testing weapons near our satellites. And now, you know, we assess they're through testing, and now they're putting operational systems up, again within orbit reach of our high-value satellites. So it's evident what they're doing and we maintain constant vigilance watching that.

MS. BINGEN: Well, and unlike air, where, you know, you see the afterburners, can you give us a sense – and as you think about the operators that are manning consoles doing the analysis here, this is just such – it's different – it's physics, but it's just different. So how do you look at – yeah, how do you think about the maneuvers, your ability to maintain awareness, your ability to maintain command and control of your things?

GEN. WHITING: We have the world's best space domain awareness capabilities, that we've built up over decades. But now, you know, that's great to say we have the world's best, but is it sufficient? Because we have to be able to maintain constant custody of these threats. Because, as you know, Kari, if one of these Russian weapon systems starts to maneuver, we want to be able to detect that very quickly and be able to provide that warning to the operators of that critical national security satellite. And so making sure we have the ability to maintain custody of these threats is really important.

And that's why, on my integrated priority list of the gaps and capabilities we need, number three on that list is improved domain awareness. And I think artificial intelligence, machine learning, can be very helpful in this. You know, we want the tools that help flag for our operators, hey, something's happening, so then they can bring that human analytic judgment to figure out what it is.

MS. BINGEN: And it's not just activity that we're seeing in low Earth orbit. We're seeing our adversaries also pursue technologies and experiment in geosynchronous orbit. So if I can queue up the second video, this will highlight some activities that we're seeing over the last year by China in geosynchronous orbit.

(Video presentation begins.)

NARRATOR: China's Shijan-21 satellite first drew attention in 2022, when it captured another Chinese satellite and moved it into a graveyard orbit – a higher, out of the way path, used to store aging spacecraft. In the summer of 2025, Shijan-21 demonstrated a new capability. It began a carefully coordinated approach with another Chinese satellite, Shijan-25, thought to be the equivalent of a mobile gas station. Both systems operate in geosynchronous orbit, more than 22,000 miles above Earth, where satellites circle at the same rate Earth rotates, and usually appear parked over one location. Shijan-25 was launched in January 2025. According to Chinese state media, its mission is to test technologies for refueling satellites and extending their operational life.

To meet up, the two spacecraft performed a slow, highly choreographed series of maneuvers, a dance of sorts, tracing looping figure eight patterns, as seen from Earth, and gradually narrowing the distance. Orbiting the Earth at speeds near two miles per second, they made incredibly precise adjustments to stay aligned. As they drew within about one kilometer,

roughly 0.6 miles, ground tracking systems could no longer clearly distinguish them, and they appeared as a single object. While we can't see the exact moment of contact, available data suggests the satellites successfully docked, likely to test in-orbit refueling to extend satellite lifespans. This technology could support routine servicing and maintenance in space, but the same ability to approach and interact with another satellite also carries security implications, raising questions about how such capabilities might be used in the future.

(Video presentation ends.)

GEN. WHITING: Space operators. You know, it's a complex operation. We've demonstrated those kind of capabilities. And in your voice track, very well done, Kari, you know, you highlighted the opportunity for them to extend the life of that SJ-21. Let's really think about what the SJ-21 did a few years ago, when it went and grabbed a BeiDou satellite, moved it into the graveyard orbit, and then the SJ-21 came back into the geo belt. And, yes, extending the life may be useful, and would be useful, but this also now enables that SJ-21 to really leverage maneuver in a way, maybe to go move other Chinese satellites, or to perhaps be a counterspace threat to our capabilities. And so that's something we are watching very closely.

Is China – does this demonstrate they're beginning to build out a maneuver warfare capability on orbit with logistics and servicing, you know, supporting infrastructure that they've now placed? That would be problematic from our perspective, because the U.S. joint force has derived so much benefit in the other domains of having a maneuver advantage. It's really one of the hallmarks of our joint force. And certainly U.S. Space Command, we think we should have that same maneuver advantage on orbit.

MS. BINGEN: Well, so let's build on that. You've talked quite a bit about maneuver warfare in space. So is this a hallmark of future warfare that extends into space? Clearly, we're seeing the Chinese and the Russians demonstrate it. So where are we, in our maturation of that as a concept, and then the capabilities to enable it?

GEN. WHITING: Yeah. There is this paradox that if you haven't paused and really thought about, what does maneuver warfare mean on orbit, you might say, hey, Whiting, everything in spaces is moving. It's true. But they're in almost always, typically, energy-neutral orbits where, you know, you place them into an orbit and then Kepler's equations take over. And to move them out of that orbit that they're in takes, you know, energy. And typically that burns fuel. And we only – we only have the fuel we launch with. And so every time you burn fuel, you're taking life off the end of the satellite. And so at U.S. Space Command, we want to – we want to get to the point where we can maneuver without regret, we can sustain space maneuver, so that we can execute dynamic space operations.

I've talked about this publicly over the last couple months and weeks, but later this year we're going to execute something we call Apollo maneuvers, which will be an exercise in wargaming and TTX series to go look at what would it mean for us, what are the capabilities we would need if we truly could maneuver without regret. You know, right now every time we maneuver some of our most dynamic satellites, we got to have a conversation, well, where are we on the fuel slope, and can we – can we afford to burn that fuel? And what if, again, we didn't

have those considerations? What would that mean? What would that look like? And so we're going to go test that and then see what the DOTMLPF considerations are. Sorry, I don't remember what DOTMLPF fully stands for, but it's all the supporting infrastructure – (laughter) – the personnel, the doctrine, and the equipment, all the things you need to enable a force. Yeah.

MS. BINGEN: To make it real, yeah. Well, and building on that as well, several years ago the Joint Staff released something called joint war fighting concepts, or – yeah, joint warfighting concepts. But they talk about these principles across the joint force. So expanded maneuver, pulsed operations, global fire, integrated command and control, resilient logistics. So these are concepts, you know, that the Army, the Marines, the Navy embrace. You're really thinking about space in a similar way – or, at least from what I've heard you say prior. So can you – can you unpack that a bit for us? You mentioned war maneuver, but how do we think about some of these other joint war fighting concepts as they apply to the space domain?

GEN. WHITING: It's a great question. And certainly we have – we have looked deeply at the lessons that U.S. military, and certainly militaries for centuries, have learned. And some of those are expressed in something that the joint force calls the joint functions. And these are the capabilities you need in every domain to be successful. And it's things like fires. You need the ability to affect targets. You need command and control. You need intelligence. You need to be able to protect your force. You need to be able to sustain your force. You have to be able to leverage information. And there's one more, if I didn't say intelligence, maybe I did, but there's seven of them. And so we think we need all of those same capabilities.

If the rest of the joint force is successful with maneuver warfare, well – and, by the way, maneuver is a principle of war. We've learned this over centuries. And, again, movement and maneuver is one of the joint functions. We need all those same things, those best lessons that the rest of the domains have learned, in space. And this is part of a decades-long maturation of our space capabilities, from, yes, enabling national security, to being a place where actual combat will occur. And how do we – how do we robust ourselves to fully operate in this domain, much like we operate in the air, sea, and land.

So last week was the big space confab, the Space Symposium out in Colorado Springs. The general and I were joking earlier that if you're a sports fan, it's like the Super Bowl. If you're an arts fan, it's like the Coachella of space events. But last year, space – this year, you talked quite heavily about maneuver. Last year you made a comment where you basically said, it's time that we can clearly say that we need space fires. We need weapon systems. We need orbital interceptors. And what do we call these? We call them weapons. You mentioned space fires, or joint fires. What does that look like in space? Why do we need to have this weapons conversation?

GEN. WHITING: You know, we have – we have held on to a notion for many, many decades, that space is this romantic place for discovery. And, as I said earlier, I am so inspired by what NASA is doing. I can't wait to see, you know, men and women walking back out on the lunar surface. And at the same time it's that, it's also now a war fighting domain. And if we're truly going to normalize – and we've said this for a long time, at least a decade now – we're going to normalize space as a war fighting domain, then we have to be able to speak clearly.

And, you know, speaking clearly is to say, I need fires, because that's what the joint functions are. I need fires in space.

And what's a fire? It's a way you affect a target. How do you affect a target? With a weapon. And that can be non-kinetic. It can be kinetic. Can be – you know, we could go through all the different descriptors there. And I think it also – by clearly stating that, it also allows us to do what our secretary of war has called us to do, which is, you know, to revive the warrior ethos. And we've got to be able to speak plainly to our Guardians, to the other members of the joint force that support us in space and, you know, use the words that the rest of the joint force uses. And so when I said that last year, I was just trying to use plain language to describe what it is we need. And, again, I have to have the ability to affect those targets and be able to achieve the outcomes that the joint force needs us to achieve to be successful.

MS. BINGEN: Well, and it's a sobering conversation, but as we saw visually, our adversaries are moving in that direction, and they have been really for years, or for a couple decades now. You know, the other thing that you said last week at Space Symposium that really struck me is that you said, "the way we fight must evolve." And thinking, you know, we're used to satellites obeying the laws of Kepler and being fairly – or, at least in predictable trajectories. So, you know, given the discussion we've had so far and what we're seeing, how should space operations and warfare evolve? And really, how much of a – I'll say, a culture shock is that to our ecosystem, whether in government and the operators or in industry?

GEN. WHITING: I think let me start with the culture shock. I certainly don't think within the U.S. military it's a massive culture shock. We've been certainly having these conversations for well over a decade. It's why President Trump, in his first term, stood up U.S. Space Command. It's why the Congress in President Trump's first term ultimately created the U.S. Space Force, is because we recognized this is the journey that we're on and we need organizations optimized to be able to get after this. And I think we've – I think the rest of the joint force recognizes this now. We don't have to go convince senior leaders in the Pentagon that space is important. We don't have to go convince senior leaders in the Congress. You know, we just saw Chairman Rogers, maybe, you know, one of the two grandfathers of the U.S. Space Force. And he just highlighted the president's budget is going to have significant investments in space capabilities – generational investments.

I think the shocking part may be publicly when we talk about this, because people don't often pause and think about the ramifications of what it means to have supremacy in space, which the president's executive order recently called for, and what it's going to require as investments to be able to do that. And I think we just need to continue to educate, but I'm excited about the path that we're on.

MS. BINGEN: OK. Well, I'm going to start weaving in a few questions, because these are better than the ones that I have prepared. So we're talking about joint war fighting and integrating space. But there's a piece of this also, which is integrating our allies and partners. So there's a question here from Neil Wolf at McGill University.

About one year ago you addressed the inaugural NATO Space Center of Excellence conference in Toulouse, France, and emphasized that space is a team sport. So how does U.S. cooperation with international partners, such as Operation Olympic Defender, how has that changed in the last year? And maybe I'll broaden it as well, and tack on, you know, how do you see our allies and partners being integrated into, you know, this joint operational environment?

GEN. WHITING: Yeah. Thanks for the question. Our allies and partners are really important to us, for a number of reasons. And, you know, one is the burden-sharing aspect. And I mentioned missile warning earlier, Kari. And if you go to our base that oversees that missile warning enterprise and you walk out onto the ops floor, several of our closest allies actually contribute manpower. And if you walk out onto that ops floor, it might be a Canadian captain with an American NCO, and there might be a Royal Air Force, a Royal Australian Air Force flight lieutenant down on the ops floor. And then you come back another time. It'll be an American captain with an Australian NCO. And just integrated. So they provide manpower that help us operate that.

They also provide us geographic locations where we can operate from, which gives us that ability to surveil space globally, which is really important. But we have made progress through Operation Olympic Defender, which the question asked about. That's our named operation in space with the three countries I just mentioned, plus New Zealand, France, and Germany. And over the last year-plus we've really demonstrated how we can execute on orbit operations together, do binational RPOs with our satellites, also demonstrated our ability to advance our space domain awareness as seven nations. And I announced last week that we'll be taking the results of one of our most recent Operation Olympic defender operations, Op Selene, and we'll be making that now a full-time operation.

So very excited to work with those closest partners that they now have – just about every one of them has announced significant investments in space, and as they bring on new capability how can we leverage that for the greater good of all the countries to be deconflicted, integrated, and synchronized.

MS. BINGEN: And there's a few different questions here on expanding our threat discussion so I want to go back and hit some of those.

So Dr. Roberto Gamarra from The New School asks: How do the American, Russian, and Chinese approaches to the strategic space domain differ?

And I'm going to pair that with another question here on China consolidating much of its EW – its electronic warfare forces – under the strategic support force. So how do we look at what China and others are doing in the electronic warfare domain and, really, what does that mean for our ability to achieve superiority in the electromagnetic spectrum?

GEN. WHITING: Yeah. I think Russia – let me start with Russia – has clearly watched the United States.

Our NATO allies, our Western allies, has come to the conclusion that they are at a conventional arms deficit related to us, and so they're looking for novel ways to try to balance that correlation of forces, to use a Soviet term.

You know, so they're looking at nuclear, cyber, and space, and that's why when we read these reports over the last two years that Russia may be considering placing a nuclear ASAT on orbit, we find those just incredibly troubling.

It would violate the Outer Space Treaty to which they're a party. It would be a weapon with indiscriminate effects that would affect not only the United States but the Chinese, the Indians, the Europeans, you name it. And so that's just an outcome that, you know, we don't want to see and couldn't tolerate.

The Chinese, you know, they have studied us deeply for 35 years and, really, they're trying to replicate what we have done, and I point to typically three areas China is moving alarmingly fast, breathtakingly fast. But I'm going to add a fourth now.

So the first is they have really built out their space capabilities at an incredible speed to make the People's Liberation Army, Navy, Air Force, and Marine Corps more lethal, precise, and far ranging, and remember, the PLA is the Chinese Communist Party's military, not the state military of China.

The second way they've moved incredibly fast is they have built a suite of counter space weapons to hold us at risk, everything from cyber to non-kinetic attack to high-energy lasers, direct-ascent ASAT weapons, and then, you know, as we saw in the video, co-orbital ASAT weapons as well, because they want to deny us our space capabilities.

The third area is they've built a space-based targeting system to find, fix, track, and target U.S. terrestrial forces so our Navy, our Air Force, our Marine Corps, our Army, as they maneuver in the Indo-Pacific, and then pairing that with their over-the-horizon fires trying to hold us at risk at long range.

And then the fourth area – and your video, which was very well done, Kari, highlights this – it appears now they're starting to build out this on-orbit maneuver capability. So China is trying to leverage space for all the same advantages that we are while demonstrating that they can hold us at risk.

MS. BINGEN: You know, I'm going to tee off of your third area. They're building this, you know, large ISR architecture – I think over 500 ISR satellites that you've testified on. They have – they're building out their versions of Starlink, so they can see us and they can target us.

We've talked earlier about, you know, it's natural that a military will want to target the other side's command and control communications, ISR, early in a fight. That's what we saw Russia do as they were invading Ukraine.

You know, I think about an Indo-Pacific scenario. So much of our command and control communications, our ISR, relies on space. How are you thinking – how do we withstand that? How are you thinking about deterring that or being more resilient against those kind of threats that you just outlined from China?

GEN. WHITING: Yeah. Maybe deterrence is a useful framework to answer that question.

You know, there's a lot written about space deterrence, and I think that starts with clearly communicating what it is you're trying to deter. You know, we don't want there to be a weapon of mass destruction on orbit. We don't want our satellites to be attacked. So we've got to be able to communicate that to our opponents.

Second, we need to demonstrate the resilience of our architecture to an attack so that you deny the benefit to the potential attacker so, again, they question why would they attack you.

And then, third, you have to have the capabilities to be able to impose costs back on them and they have to understand that if they do the thing you've communicated you don't want done that you have the ability to affect them.

And so, you know, it's something we seek to demonstrate every day. We have a very, very close partnership with the other combatant commands at U.S. Indo-Pacific Command as we think about the challenge of China – U.S. Cyber Command, U.S. Strategic Command – to make sure that our, again, our forces and capabilities are completely layered in to those regional plans that Admiral Paparo and his team are working, and I couldn't imagine a better partner than Admiral Paparo and his team as we work that.

MS. BINGEN: He's been one of the non-space space advocates in the department.

GEN. WHITING: It's incredible how sophisticated INDOPACOM and their components are thinking about space, because they understand it's not a theoretical issue. They need U.S. space capabilities and they need to be able to operate in the face of Chinese space capabilities, and I have been so impressed by the thinking they've done, challenged our team. We have to elevate our thinking to match their thinking in Indo-Pacific Command.

But, again, for those who aren't inside the U.S. government, we don't go to Indo-Pacific Command and try to convince them why this is important. Frequently, it's Admiral Paparo and others who are leading the discussion about why space is so vital to the overall joint force.

MS. BINGEN: And a lot of how we demonstrate or address deterrence we do campaigning in other domains. You have freedom of navigation maneuvers at sea or other campaigning activities, bomber flights. So what does campaigning look like in space for space command and what do we tend to misunderstand about space campaigning, I'll say?

GEN. WHITING: Campaigning – I think the definition paraphrased is it's linking together military operations, activities, and investments to do three things.

One is to set conditions in your AOR. In U.S. Space Command, we have responsibility for the space AOR starting a hundred kilometers above the Earth's surface and then moving out from there.

The second item is to – our second goal of campaigning is to deter conflict, and then number three is to reduce risk if we had to execute our operational plan.

And so we consider a whole host of activities campaigning, like the recent operations we've done on orbit with Operation Olympic Defender when we and our French counterparts or we and our British counterparts have demonstrated that we can do RPOs together. That demonstrates our ability to do so together and we've done that in certain parts of the world to demonstrate we can operate over those certain parts of the world, and so that's important.

But it's also interesting to note that without an on-orbit maneuver capability at scale, it constrains our ability to do campaigning, again, because we always have to be making that trade-off – hey, if we're going to maneuver these satellites for some purpose of campaigning, what's that going to do to the life of the satellites? What's that going to do to our ability to operationally employ them when needed?

And so we're constantly in that dynamic. That's another reason we want to improve our ability to do on-orbit servicing and refueling so that we can do better training, we can do better campaigning, better testing. Those kind of activities.

MS. BINGEN: Well, so that's exactly where I want to go with this next question.

So a friend of ours and Space Command alum, retired Colonel Dennis Wille asks about your – if you can share your perspective regarding how a future in-space logistics architecture might change the way you would employ space forces.

GEN. WHITING: Well, Dennis – I think I started to answer that question. Good to see you.

But let me talk about one other aspect, and this is – this is an idea that somebody introduced to me within the last year. Because we almost always only operate with the fuel that we launch with, there is a psychology of scarcity that has sat over our enterprise for decades, and that has a lot of impacts.

You know, if you're a lieutenant or an O-3 captain fighter pilot, you know, we're going to give you an airplane and we're going to send you cross-country to train, and you're going to go – if you're a fighter pilot, you're going to go to the Nellis test training and we're going to send you up to do big exercises, and we're going to give you those first 10 missions that we used to talk about at Red Flag.

In the space domain, we can't just give our crew or captain the ability to do those kinds of things, the analogous kinds of things, on orbit if they're flying an operational satcom satellite or

an operational GSSAP satellite because, again, we've got to be thinking about how are we husbanding the fuel to get to the end of the program life of that.

And so this psychology of scarcity means we don't enable mission command the way that we could. It means we centralize decisions sometimes at a higher level, because if we're having to make a decision between training and burning the end of the life of the satellite, well, do we give the captain that decision or do we pull that up, you know, to a colonel, to a one-star, two-star, three-star, four-star?

And so I think, Dennis, enabling better on-orbit logistics and maneuver capability allows us to really push down responsibility and authority and enable the training that, perhaps, we've only been able to do synthetically up till now.

MS. BINGEN: You're given the keys to a Ferrari but you only get one tank of gas.

GEN. WHITING: Exactly.

MS. BINGEN: It really modifies your behavior, though.

GEN. WHITING: It does.

MS. BINGEN: So you're right, that enables so much more to be able to pursue that kind of concept.

So let me shift back here. We talked about, you know, the Chinese being able to see and others see across the battle space – a much more transparent battle space.

There's been a lot of discussion as of late on both the benefits and risks of proliferating commercial imagery providers, and so the question here is that while U.S. companies right now are voluntarily restricting the dissemination of regional imagery, there are others that have not been inclined to do so, and China's been out actually very publicly displaying some of their imagery that they're seeing in the Middle East.

So how is commercial imagery helping Space Force operations and then how is it becoming a risk in operations?

GEN. WHITING: I think we've certainly seen U.S. imagery companies have been, you know, fantastic partners in this, trying to limit the ability of their imagery to get in the hands of our opponents, and definitely appreciate that from the U.S. commercial industry.

You know, U.S. commercial space industry, Kari, is such a massive advantage for the United States, and so we in the U.S. government get to leverage that imagery, for example, to augment U.S. imagery systems, and that just creates a better picture of our – you know, where it is we're operating, what it is we're trying to do.

But the fact is there are so many imagery sources now. I think the ability to completely cut off any opponent from that is going to be very, very challenged and so we have to understand what does that mean for our terrestrial forces.

It means if you're operating a fixed location that's within range of an opponent's strike systems, they're likely going to be able to target you and we've seen, you know, the success of our missile defense systems but we've also seen how challenging it can be to – you know, to try to interdict when you have hundreds of missile attacks over multiple days and one-way attack drones.

So I think it's just a complete reflection of the world we live in today that we can expect the battlefield will remain transparent, going forward.

MS. BINGEN: OK. One more question from the audience and then I'll wrap up with a final question.

We can't let you get away here without talking Golden Dome and space-based interceptors and, really, the space layer to it.

So there's a question here in terms of can you speak to the progress of Golden Dome, but then I'll build on that and ask you to talk about what Space Command's role is and how do you envision Space Command working with NORTHCOM or other combatant commands that will likely have responsibilities in this area?

GEN. WHITING: You know, I'll certainly let General Guetlein, the direct reporting program manager for Golden Dome, talk about the progress, and he's been on Capitol Hill recently talking about that.

We are in full lockstep with him and with the U.S. Northern Command, and you asked, Kari, about what is U.S. Space Command doing. You know, going back to the executive order, the president in the executive order for Golden Dome – this, you know, visionary call to arms to be able to protect our citizenry here in the United States from these modern threats we now face – he talked about the importance of the space-based layer for tracking and he talked about space-based interceptors, and certainly because of that, our AOR at Space Command, you know, we expect to have responsibility for those systems and it's why we partnered with U.S. Northern Command to write the requirements document that went up through the Joint Requirements Oversight Council last year.

And now we're partnering again with them to write a concept of operations for how the space layer will fold into the other layers of Golden Dome, and just could not have a better partnership with General Guetlein, General Guillot, and their teams to make sure that we can deliver this as the president's executive order calls for.

MS. BINGEN: OK. Thank you for that. That's an area that we'll continue to watch and engage on closely.

OK. Last thoughts from you. I want to shift to – you know, this is a really big year. It's our 250th birthday as a nation, and for those that did not get to see General Whiting's comments last week at Space Symposium, you very much talked about that theme and, really, what it means for space.

But we've only been in space – I did a little bit of the math – we've only been in space about 70 of those 250 years. So I'm going to break the history down here in terms of General Whiting's epics.

You know, I'm going to say three epics in space. The first epic, Cold War epic. You had Sputnik, Corona, Apollo. We were just early, early in the inception of our use of space and our space technology.

My second epic – this is the General Whiting epic – Lieutenant Whiting commissioned into the U.S. Air Force in 1989 and I think about what were we doing in space in 1989.

1990 was your first operational space assignment. I think it was a space warning squadron. That was the year that we launched Operation Desert Shield and Desert Storm, which has called – has been called by many the first space war. First time we used space in a conflict.

So we're kind of at this transition point now, right, this third epic of space, and we've been fortunate over the years to engage with many, you know, university students, undergrad masters, many cadets that are now starting to commission into the Space Force and other services.

So can you reflect for a moment what does this third epic look like for those cadets getting ready to commission and any advice that you'd give them as we look forward here?

GEN. WHITING: Yeah.

First, I wish I was young again. This is an amazing epic that young people are entering into if they want to be a space professional, whether uniformed or serving elsewhere in the government or serving in commercial industry.

You know, there's a law, I think it's called Amara's law, that says in the short term we overestimate the amount of technological change and so sometimes that leads to us being disappointed. You know, we hear about, well, why aren't there self-driving cars yet? Why aren't there humanoid robots?

But in the long term, we underestimate that, and so the world is going to look fundamentally different, I think, in the next five to 10 to 15 years. Some of the technologies I just mentioned.

But we're going to have – we're going to have a lunar base. That's only the stepping stone out to the broader solar system, out to the asteroids, out to Mars, and think about what that really means for a second.

You know, today, it's such a thrill to get to interact with our astronauts. They really are the best of us. You know, it's almost like you go to central casting and you say, you know, deliver me the astronaut, and whether a man or a woman, they walk out and they all look the part. They talk the part. They're brilliant. They're all incredible.

In the next couple of decades we're going to send not dozens of astronauts, maybe not even hundreds, thousands of people are going to have the opportunity, and it's going to be every trade we can think of.

You know, how do you sustain a lunar base? You're going to have to have plumbers, electricians. You're going to have to have the guy or gal who runs the comm system – you know, who runs the electrical grid, and that's going to be an opportunity that, you know, future generations are going to have.

And what does that mean for us in the military? It remains to be seen a little bit. But if history is a guide – and we know that Clausewitz gave us maybe the best expression in the Western world of how we think about warfare – he said that warfare is politics by other means, and where people go politics ensues and then warfare and tension might come.

And that's the history we saw of the maritime world. Trade started over the oceans and piracy started. Eventually, countries developed a navy, and the countries that had the best navy could secure their lines of communication and they became the richest, most powerful countries. You know, just think about the Royal Navy as the wooden wall of the United Kingdom for so many centuries.

Well, if we start to see that dynamic play out in orbit as we're leveraging the moon, leveraging the asteroids for commercial – you know, commercial development, we're going to need potentially a military that can secure those space lines of communication.

And so for young military professionals going into space, I think it's going to be incredibly exciting. Most of those missions will happen from planet Earth, but I think it's very possible we'll have a need to have uniformed Guardians and maybe other members of the joint force executing military missions on orbit, and that's an incredibly exciting future.

MS. BINGEN: Hard to imagine. But to your point, it's going to be here in the next years, decades to come.

Well, General, I want to thank you so much. One, thank you for the clarity that you provided on the trends, the challenges, and the opportunities in this area; two, for guiding the command and really us as a nation at such a pivotal point with the use of space and challenges to space.

But then, lastly, for leading all the men and women in uniform and the civilians who do this mission every day. So it's been tremendous talking to you. Thank you very much.

I'm going to ask everyone to just take a few minutes here. We'll take about five minutes. We'll reset the stage here and we'll bring on our next terrific panel to continue this discussion.

But, General, thank you.

GEN. WHITING: Great. Thank you, Kari. (Applause.)

(END)