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April 2024

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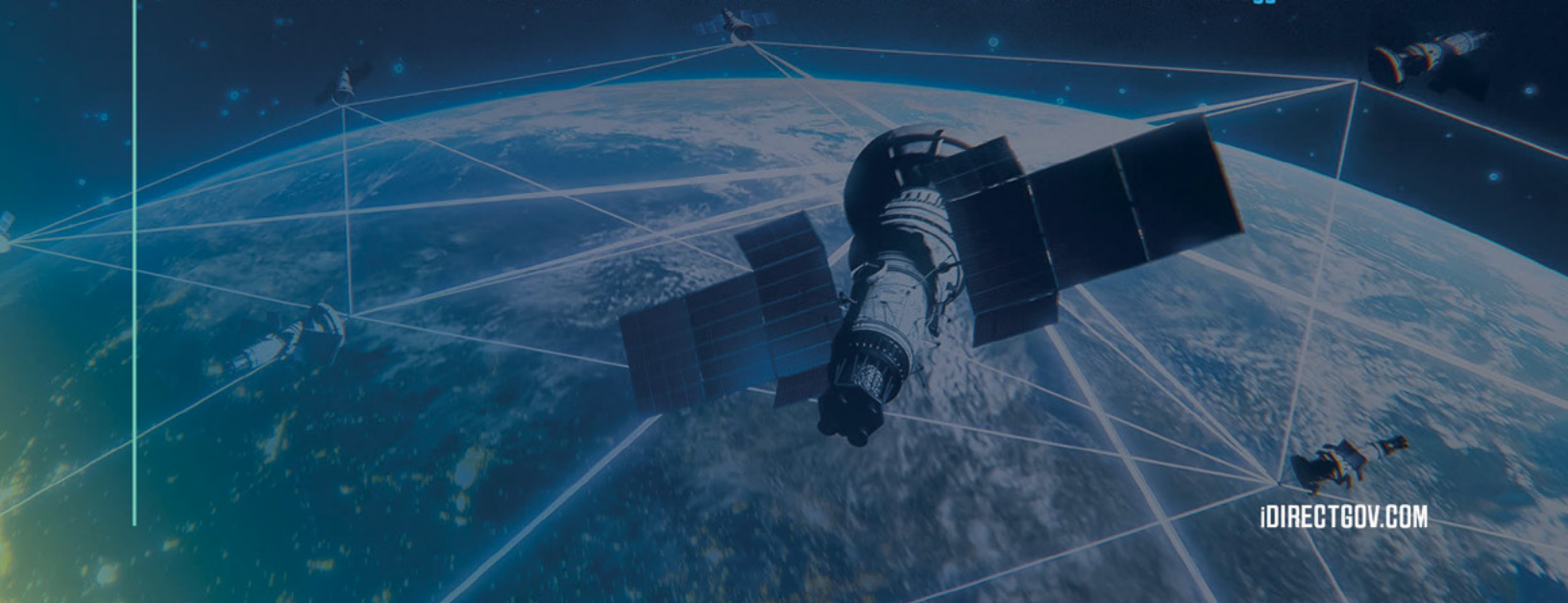

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— SPACE SYSTEMS COMMAND BRIEFING #1 — COMMAND CENTER: LT. GEN. PHILIP GARRANT

SPACE SYSTEMS COMMAND'S NEW COMMANDER

Authors: Space Systems Command

Lt. Gen. Philip Garrant *assumed command of* ***Space Systems Command*** *on February 1, 2024, taking the reins from* ***Gen. Michael Guetlein****, who is now serving as the* ***USSF****'s Vice Chief of Space Operations.*

Garrant is now responsible for leading SSC's global workforce of more than 15,000 military, civilian, and contractor personnel, as well as overseeing an annual $15.6 billion space acquisition budget, which ensures our Nation's warfighters have the premier space capabilities required to counter the threats in today's and tomorrow's contested space domain.

Lt. Gen. Philip Garrant

His command at SSC is something of a welcomed return: earlier in his career, he held leadership roles with SSC's predecessor organization headquartered at Los Angeles Air Force Base.

Prior to his new role as Commander, Garrant served as the Space Force's Deputy Chief of Space Operations, Strategy, Plans, Programs, and Requirements at the Pentagon in Arlington, Virginia.

He also previously served as a program executive officer in the Missile Defense Agency and spent time at the Air Armament Center.

Lt. Gen. Garrant recently sat down in SSC's Public Affairs studio to talk about his vision for the command, with the ***Space Force Association****'s Matt Anderson.*

(The interview has been edited and condensed.)

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Chief of Space Operations, U.S. Space Force Gen. Chance Saltzman (left) with Lt. Gen. Philip Garrant at Garrant's Feb. 1, 2024 Change of Command ceremony.

General, it's been about a month since your change of command — what do you see after 30 days?

LT. GEN. PHILIP GARRANT

We're going to keep building on the work that was started before me. (*Former SSC Commander*) Gen. *Michael Guetlein* really emphasized a culture of understanding the threat and getting after acquisition: going faster, exploiting capabilities that we have, buying commercial capabilities where we can, and building only when we must — relying on the defense industrial base to do that; not just with traditional (*defense*) 'primes,' but with new entrepreneurial companies, accelerating companies that might be brand new to the space business area and excited to be partners with us.

From a priority perspective, we're going to continue (*USSF Chief of Space Operations*) *Gen. Saltzman*'s vision on the theory of competitive advantage — things such as expanding on mission-focused commands, ***Integrated Mission Deltas***, ***System Deltas***.

(*We're going to have a*) huge focus on the workforce and the organization. SSC and its predecessor organizations have gone through a lot of change. Change never ends, but it seems over the last five or six years, it's been constant. We're going to finish out what a field or acquisition command looks like, including the command staff structure. And then really help the workforce understand their roles — the tie to the mission and acquisition fundamentals.

Having smaller teams focused on the mission, working closely with the operators and partners such as ***Space Training and Readiness Command***'s Commander *Maj. Gen. Tim Sejba* and **Space Operations Command**'s *Lt. Gen. David "Rock" Miller*, to give them what they need.

Understanding those needs — that's my role as the commander here at SSC. I don't have acquisition authorities. I am an organize, train, and equip function. I enable their success. (*U.S. Secretary of the Air Force*) *Frank Kendall* said, your measure is the quality of the work that the organization produces. So, that's going to be my focus: on the people and delivering those capabilities.

When you hear someone talking about Space Force or Guardians, what do you hope they think about?

LT. GEN. PHILIP GARRANT

The first thing I want them to think about is that we are a military branch, a military service. We are part of the ***Department of the Air Force***. We're partnering very closely with the Air Force and the other services, and the ***Joint Force***. I want them to know that our Guardians are the men and women who provide these amazing space and defense capabilities every day. Even in Space Systems Command, we are doing operations and providing support to the warfighter and to the Nation.

Probably the best and easiest example is the ***Global Positioning System*** **(GPS)**: the satellites that provide ***Positioning, Navigation and Timing*** (**PNT**) to the world and the world economy. Folks get on their phones and look at the best way to drive where they need to go. That's courtesy of GPS.

I want Americans and our adversaries to know that the Guardians are on watch, on the job, on the mission, delivering capability every single day.

We can't talk about acquisitions if we don't talk about the budget. The Fiscal Year 24 budget continues to be working under a Continuing Resolution. Can you talk about how that affects your command and what your team is doing to mitigate some of those risks?

LT. GEN. PHILIP GARRANT

We've been very successful as a Space Force in the last four years. We have doubled our budget from about $15 billion to about $30 billion in the 2024 Planning Programming, Budgeting and Execution process. I honestly believe that would not have been the case if we did not have a Space Force as a separate service. Having said that, we desperately need an appropriation, We're hopeful that this will be the last CR that just recently got enacted and we're going to be halfway through the fiscal year.

There are huge, significant, real impacts to the continuing resolution. I'll give you a few examples in the space launch capability. We received significant funding in '24 to upgrade and modernize our space ports: direct impact to our commercial partners who launch at our space ranges.

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With the CR, we cannot spend that money effectively, and we're limited in how much we can spend on Space Force space port modernization.

Procurement contracts are written as requirements contracts with the intent of buying a certain number every year. Under a CR, we have less funding, we're not able to buy as many launches — that will have a long-term and continuing ripple effect downstream as we try to launch out our constellations.

The ranges themselves — we can't operate the ranges. We can't modernize the ***Satellite Control Network*** that is used on the ranges to talk to our satellites and our space vehicles in a launch environment.

And then another final example is the ***Joint Commercial Operations Cell,*** the **JCO**, where we take unclassified data from commercial partners and allied partners and make that data universally available to joint operations around the world, to provide ***Space Domain Awareness (SDA)***. That funding is also limited. So, real impacts are involved when not having a budget.

What do you want Guardians and Airmen thinking about regarding the Great Power Competition?

LT. GEN. PHILIP GARRANT

You'll notice when you walk around the Schriever complex, right here on the ***Los Angeles Air Force Base***, all our banners remind everybody about the threat. When you walk into my headquarters building, there's a shot clock (*countdown timer*) in the foyer when you walk in. It's counting down to the year 2026.

The plan in the ***Great Power Competition*** is we will be ready and with resilient space architectures to operate in a competitive environment by that time. We have the pacing challenge of China. We have the acute threat of Russia.

Those threats are real. We can see what's happening in Ukraine, we can see what's happening in Israel, we can see what's happening in the South China Sea and parts of INDOPACOM - some of those adversaries are putting up threats every single day.

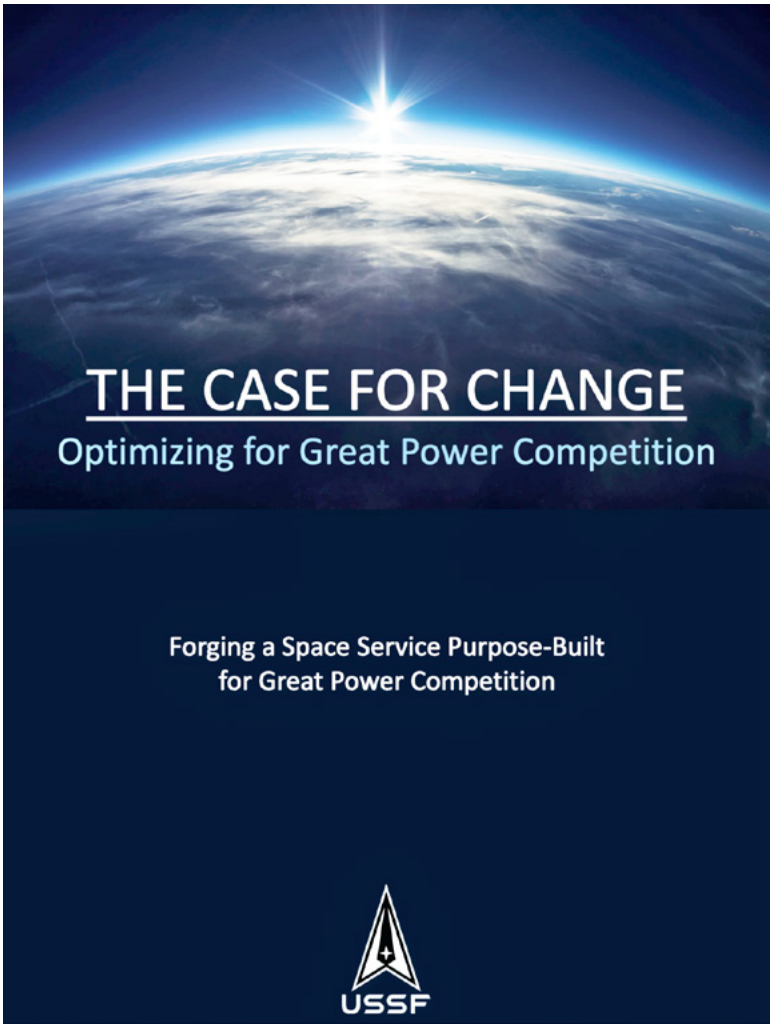
The Space Force was really designed and built around Great Power Competition. We're only four years old. We like to think that we're great in our homework and fine-tuning those dials, and making some changes to be even more effective, not just efficient.

Can you explain in layman's terms the difference between Space RCO (Rapid Capabilities Office) and SDA (Space Development Agency)?

LT. GEN. PHILIP GARRANT

(*Assistant Secretary of the Air Force*) *Frank Calvelli* is a fantastic partner, and we couldn't do our mission without him. And, of course, the **SSC Program Executive Officers** work for Honorable Calvelli. I like to talk about people who spend Space Force budget in terms of their superpowers — and this is anybody who spends budget. But the big three you named: **SSC**, **SDA**, and **Space RCO**.

Derek Tournear (*Director, SDA*) has mastered the use of mid-tier acquisition. He has really figured out a way to effectively use that to rapidly and consistently reconstitute new technology every two to three years as we build out this proliferated **LEO** (***Low Earth Orbit***) architecture. But in the end, his data



contributes to the fight and goes to the warfighter. So that's one part of the team, building out one part of the enterprise, using a specific superpower.

Space RCO — by statute — gets their requirements directly from the combatant commander at U.S. Space Command, but again, ultimately delivers capability and, in many cases, transitions programs to SSC for final fielding and sustainment.

And then SSC: for decades, all the way back to its origin with *General Schriever* in the Western Development Division, has a proven history of developing and fielding exquisite capability in many, many mission areas, as well as launching and operating the ranges.

We each have a part to play, and we couldn't complete the enterprise mission without each other.

Can you talk about how industry and your team here at SSC could better work together?

LT. GEN. PHILIP GARRANT

I'm a career acquisition officer. I like to say that anybody can be a program manager. It's just cost, schedule, performance, and risk. It's easy. What's hard are the relationships, the personal connections. And I think that holds true for industry. I think the best thing we can do is communicate.

Even though I don't have acquisition authorities or program budget at SSC, I'm going to be available to industry. I'm going to make sure that our program managers and **Program Executive Officers** communicate, as well. If we're not talking, when it comes time to have the tough conversations, if you

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don't have the good conversation as foundation, it makes it that much harder.

We have an organization that we call SSC's ***Front Door***. It's a way for industry to get into SSC and to learn about our business opportunities — that's another fantastic connection point for industry.

And then organizations such as the ***Space Force Association*** and some of the other non-profits that are in the space industry are incredibly important for networking, for connection. One of our Guardian ideals is connection.

What about the new Integrated Mission Deltas and System Deltas – can give us your perspective on how it's gone in the last six months, and perhaps what we'll see in the future?

LT. GEN. PHILIP GARRANT

Gen. Saltzman's primary motivation for ***Integrated Mission Deltas*** is readiness. It's all about ready, resilient, combat-credible forces to present to the combatant commanders. And in his mind, we never had a single unity of command, a single mission command focused on all four aspects of readiness that we measure: people, training, equipment, and sustainment.

Those were bifurcated in space: you had the operational field command, and you had an acquisition field command. With the IMDs, for the first time, under a single commander — with a partner from their counterpart — we have an acquisition leader and an operations leader singularly focused on delivering capability, readiness, and readiness improvements.

We currently have two provisional IMDs: one doing ***Electronic Warfare*** (**EW**), one doing **PNT** (***Positioning, Navigation and Timing***.) And then we have partner System Deltas.

If a system is developed, delivered, and fielded in operations, that's going to be in the IMD. If it's still under development — very typical of large programs that may be years away from being fielded — that's going to be in a System Delta. But the idea is to get all the right players connected and have the money and the authorities, and the mission command control to be able to drive increased readiness.

Now, the acquisition still goes through the acquisition chain. The program managers still work for the PEOs who still report to Honorable Calvelli. But you've got that singular focus with the commander who can reach into the sustainment funds, identify true operational needs, and prioritize those needs.

We're working through what's the next step on IMDs and System Deltas in the next coming weeks and will take a decision brief to Secretary Kendall and General Salzman to say, okay, here's the next batch, if you will, of mission areas that we'd like to look at.

We consider a lot of things: the complexity of the mission, the physical location of the commands and those mission areas, all the way down to the leadership of the different organizations and how they might fit together. And the goal, eventually, is to build those out so that every mission area has an IMD and perhaps an associated System Delta. This is where this concept of mission- focused field commands come from.

What has most impressed you since you've come back to Space Systems Command?

LT. GEN. PHILIP GARRANT

How passionate our Guardians are about the mission. No matter how junior, how senior, military, civilian, officer, enlisted — and I'd be reticent not to add, our Airmen — absolutely passionate about the mission, delivering capability.

We are taking on a lot of new missions. To be able to keep up with the mission demands being put on us, we can't keep doing things the same old way. But it makes me really happy to come to work every single day and just see how much our Guardians and Airmen care about delivering capability and supporting the warfighter and getting after the threat.

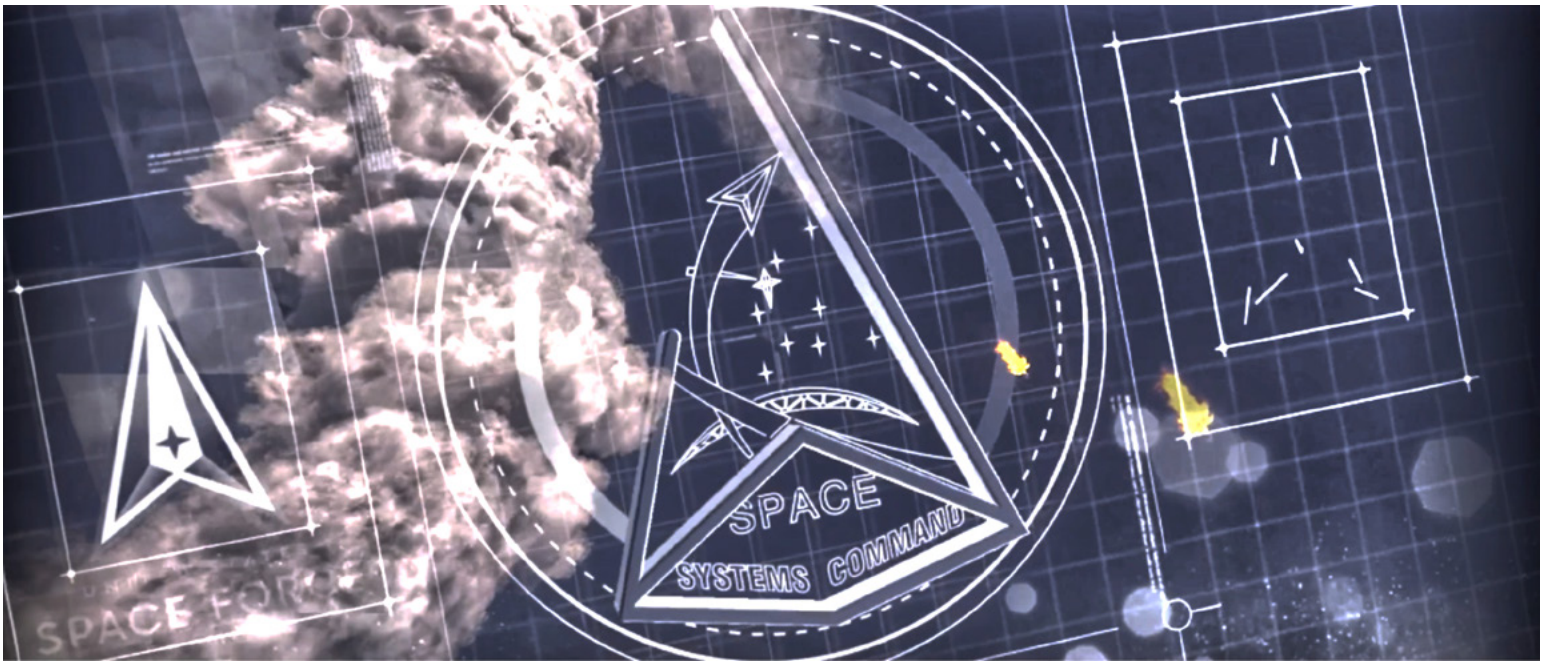
What are some of your priorities for taking this command to the next level as we approach 2026, 2027 and beyond?

LT. GEN. PHILIP GARRANT

I want to finish fleshing out the field command staff structure. I want to take a look at our workforce resourcing and where we can put the people on the highest priority missions. I want to take a realistic look at what might we stop doing? We're going to have to make some hard choices, particularly in the budget scenario.

I want to keep expanding on the IMDs and the System Deltas. In the future, there might be a situation where all the field commands are doing operations. How we can support the service components you alluded to — not just Space Command, but all of the combatant commands.
Health care, education, access to good housing, access to spouse employment, cost of living: these are all major factors for our command. If you think about where space is based right now and our core Space Force bases, those are all high cost-of-living areas. Those are big issues for our families. And if we can't support the family, we can't support the member.

When a lot of people think about Space Force, they think about capabilities. What's the latest and greatest thing that's going to help us in this Great Power Competition?



LT. GEN. PHILIP GARRANT

The biggest thing is who we're doing this with. It's this growing partnership with commercial providers, less-traditional defense contractors, partnering with the larger defense contractors and our allies as well, and even academia.

I think Space Domain Awareness is going to continue to be critically important. And then on the back end of the kill chain, battle damage assessment. Space control is important; not just to defeat adversaries if we have to, but to enable blue capabilities as well.

Recently in Colorado Springs, commanders of USSF's three field commands — ***Lt. Gen. Rock Miller***, ***Maj. Gen. Tim Sejba*** and myself — sat down and met with all of our staff and talked about what we can absolutely deliver in the next two years? (*Former U.S. Secretary of Defense*) ***Donald Rumsfeld*** (*used to say*) you go to the war with the Army you have, not the Army you want.

But we want to make sure that in two years, if we're going to a competition with an adversary, that we actually have capabilities that the warfighter can use and rely on, not just fielded, but tested, fielded, trained, ready to go, forces presented, and actually executable.

We're going to go after a few very specific threat chains to make sure that we actually do have that capability. And we're going to need our partners. We're going to need industry, we're going to need allies, to make that happen.

Last question for you, General: can you tell us about the bagpipes.

LT. GEN. PHILIP GARRANT

This is going to be a long answer to a very short question. Not many people know I play the pipes. I learned from my cousin, Pipe Major Sandy Jones. He's since passed, but he was the pipe major of the **Air Force Pipe Band** back in the 1960s and 70s. If you watch old footage of ***President Kennedy***'s funeral, he was the lone piper behind the casket.

At the change of command ceremony (*February 1, 2024*) Gen. Saltzman is talking, and I know what I gave him for comments. I tend to wear my emotions on my sleeve, and I felt very confident that I could get through that ceremony without an emotional display.

Then Gen. Saltzman said, "*And I got an email*." and I thought, "*Oh, shoot.*" And then Gen. Saltzman keeps talking and I realized, '*Okay, he really did get an email*'

The email was from my son Jake and, among other Garrant family gems, it talked about the bagpipes.

So yes, I do play the bagpipes. I've played them for a long time. I don't know "***Semper Supra***" on the pipes (*yet*), but I have found a few arrangements, so I think I'm ready to give it a shot and knock it out.

Any parting thoughts?

LT. GEN. PHILIP GARRANT

It's an incredibly exciting time. I know that's a tired cliche, but there's so much going on and we're going so rapidly, and there's so much potential.

I want to bring it back to the Guardian ideal of connection: to the workforce, to interagency, to our industry and academic and allied partners. That's what's going to make us successful.

It's the people and the passion and the desire to truly deliver capability.

Contact Space Systems Command at ***SSC@spaceforce.mil*** and/or follow on ***LinkedIn***.

Space Systems Command is the U.S. Space Force field command responsible for acquiring, developing, and delivering resilient capabilities to protect our nation's strategic advantage in, from, and to space. SSC manages a $15.6 billion space acquisition budget for the Department of Defense and works in partnership with joint forces, industry, government agencies, academic and allied organizations to outpace emerging threats. Our actions today are making the world a better space for tomorrow.

— SPACE SYSTEMS COMMAND BRIEFING #2 — COMMAND CENTER: COL. MICHELLE IDLE

SPACE SYSTEMS COMMAND'S NEW DEPUTY COMMANDER

Author: Lisa Sodders, SSC Public Affairs

The installation of Lt. Gen. Philip Garrant as Space Systems Command's new commander in February included Col. Michelle Idle being named deputy commander for SSC. With the wisdom of a tenured professional and the unbridled enthusiasm that comes with a space career where the sky is actually not the limit, Idle brings a breath of fresh air and a creative mindset to her new command role.

Col. Michelle Idle

In December of this year, the U.S. Space Force (USSF) will celebrate its 5th birthday.

COL. MICHELLE IDLE

SSC will celebrate year three in August, so we're still figuring out roles and responsibilities and making that pivot from a center to a fully functioning field command. The role of deputy commander — much like SSC and the Space Force — continues to evolve, to keep ahead of the threat in the Great Power Competition.

In the past, this job has been very acquisition focused. That's not how it's going to be anymore. SSC's acquisitions PEOs don't have to go through the field command to do their acquisition jobs. They report directly to **Assistant Secretary of the Air Force for Space Acquisition and Integration**, *Frank Calvelli*. So, our jobs, the roles of SSC's commander and deputy commander, are to 'organize, train and equip' the PEOs and directors — and the workforce — to make certain they can execute their mission.

I am primarily focused on issues internal to the command: taking care of people, making sure everything is in place to execute the mission. I'm the primary interface with the ***Los Angeles Air Force Base*** installation commander and will handle any issues we have with infrastructure.

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Space Systems Command's Commander, Lt. Gen. Philip Garrant and Deputy Commander, Col. Michelle Idle, at Kirtland Air Force Base, NM, home of SSC Innovation & Prototyping and more.

right now, to take the skills and the knowledge that people have from their civilian and military expertise and create an effective, efficient new force.

Idle said she's also excited to see all the new partnerships being created by SSC's International Affairs Office as well as through the new Commercial Space Office (COMSO) under Col. Rich Kniseley.

Additionally, SSC's Warfighting Integration Office (WIO) is sending members *"on orders; deployed to support exercises that we've never had acquisition professionals in before,"* Idle shared. *"The value from the way we're operating is just immeasurable, and this is just the infancy."*

The new **Space Force Personnel Management Act,** which was recently passed in the ***2024 NDAA***, will incorporate part-time service members into the full-time force, and is something our country hasn't done and is one of the things I'm most excited about in my new role.

I have a real passion for engaging our part-time force, looking at what skills our people have who have decided to go part-time and then to make sure that we're leveraging those talents and expertise. That's a huge soapbox for me — to make that work.

> *"The value from the way we're operating is just immeasurable, and this is just the infancy."*

When you've worn a uniform for a while, it's really hard to take it off. And there are people who have done that, and two or three years later said, 'Nope, I need to go back.' That patriotism and the other things that go with being a uniformed service member get ingrained in you.

As a reservist, Idle knows that firsthand. In fact, she is the first reservist, and quite possibly the first 0-6 (Colonel), to serve in a deputy commander or vice commander capacity.

COL. MICHELLE IDLE

Our reservists all serve part-time for different reasons: it may be family, it may be a civilian job opportunity —– they get a chance to lead a start-up or manage a program on the contractor side. There are a lot of part time members with good ideas, and the fact that we are trying to do something different with the Space Force is really motivating.

There won't be another chance to create a brand new military service like this for a while. We have a huge opportunity,

COL. MICHELLE IDLE

Our collaborations with Space Force's new Integrated Mission Deltas and operators are unprecedented from where we came from — it's been exciting to see all the changes in how we do business, how we make acquisition decisions, and how we work with the joint force and our international allies.

Other challenges — synonymous with opportunities —- include continuing to build the Space Force culture as a new field command. This includes new approaches as the leadership team and the workforce move past the Covid 19 lockdown, which changed so much of what people used to take for granted about work.

On a macro scale, there's also the challenges of how USSF's three field commands — **SSC**, **SpOC**, and **STARCOM** — will work together most effectively.

COL. MICHELLE IDLE

Force design across the entire Space Force is critical as we all pivot to focus on an era of ***Great Power Competition***.

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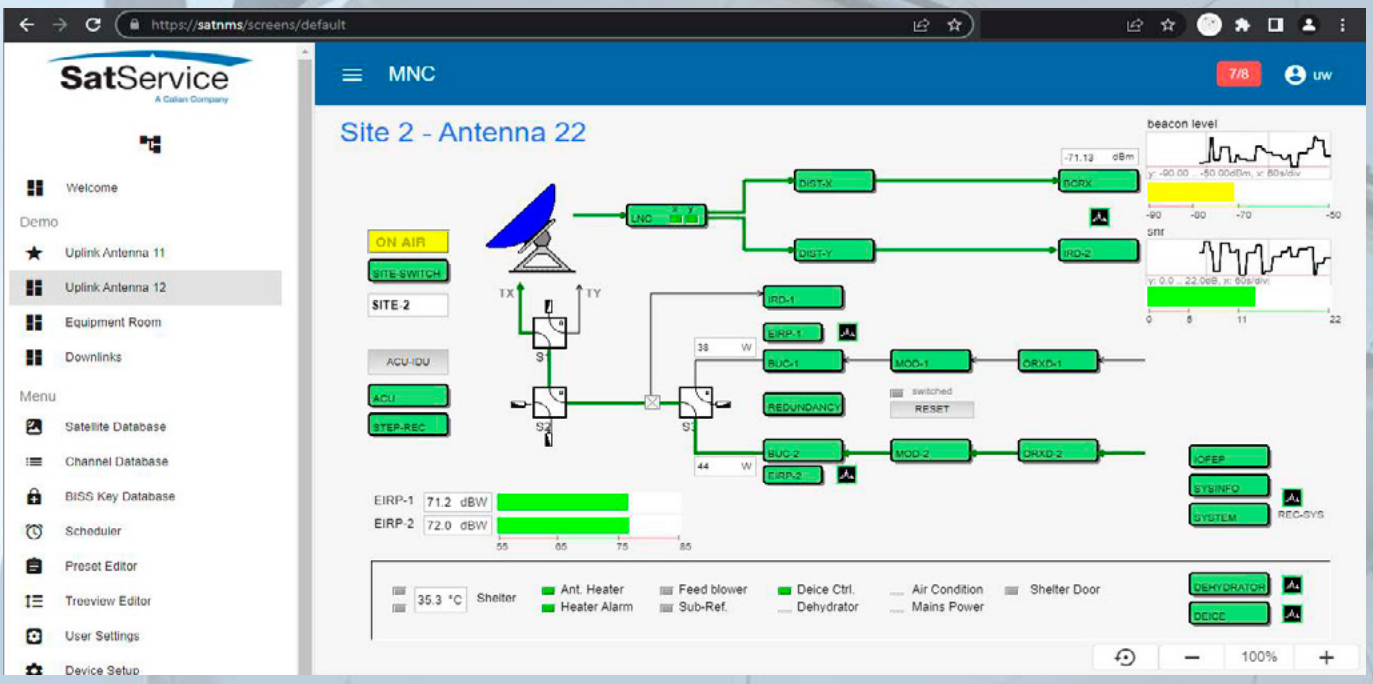

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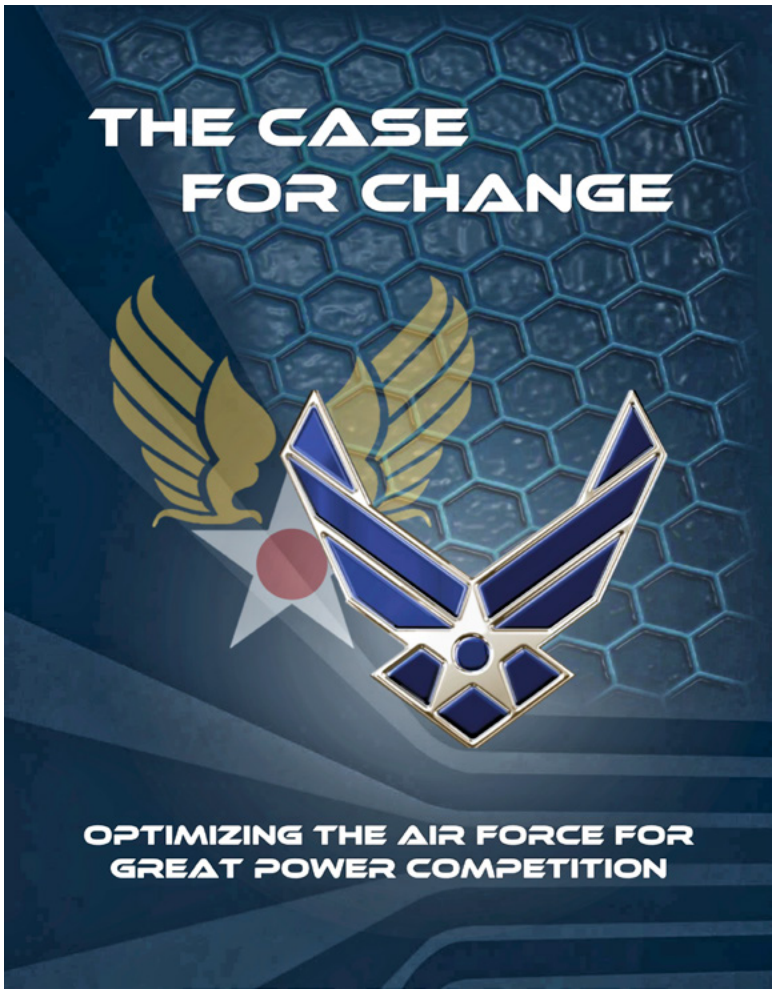

Col. Michelle Idle at 2023 Space Industry Day in Los Angeles, California. Photo is courtesy of SSC Public Affairs.

How we will continue to remove silos and work together is something that I am incredibly passionate about and proud to be part of.

The changes coming from the **Great Power Competition** are driving an even greater need for us to work together. The development of Integrated Mission and System Deltas is also driving cooperation and enabling greater mission readiness.

When Idle was a high school student in Colorado, she was familiar with the U.S. Air Force Academy in Colorado Springs, Colorado, having visited the campus many times for football games and Olympic trials. Idle knew that if she became commissioned in the Air Force, she would get to travel internationally. The fact that the Academy had a ski team — Idle competed in ski racing in high school — was also a plus.

Idle was commissioned in 1993 from the U.S. Air Force Academy in Colorado Springs, Colorado, and spent eight years on active duty prior to transferring to the Air Force Reserve. She has held a variety of positions in research and development, program management, technical intelligence, space operations and academics.

She directed the United States Strategic Command's Joint Reserve Intelligence Support Element, a unit of Navy, Air Force and Marine Reservists — developing intelligence products for the Joint Space Operations Center.

It was while serving as IMA to the Deputy Director of the National Reconnaissance Office in Chantilly, Virginia, that she started working for Gen. Michael Guetlein, now Vice Chief of Space Operations for the U.S. Space Force. In 2021, when Guetlein was named SSC's first commander, Idle joined him in El Segundo, California, and became SSC's Mobilization Assistant to the Commander.

Idle said she knew the Space Force would eventually stand up a different type of reserve force, which is what made the move to SSC so appealing.

COL. MICHELLE IDLE

For that reason alone, I couldn't say no. I was offered a senior leader opportunity to be a senior acquisition reservist on the Space Force side; building this new construct in addition to standing up a new command. You don't say no to that! You don't want to sit on the sidelines and watch other people build something when you've got ideas.

We have an opportunity to look at how we do things and to do something very different — it's pretty awesome.

Contact Space Systems Command at **SSC@spaceforce.mil** and/or follow on **LinkedIn**.

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THE TRANSITION IS UNDERWAY

Author: Joakim Espeland, Chief Executive Officer, QuadSAT

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While S-band is undeniably well-suited to the all-important functions of TT&C, it is clear that something needs to be done to free up spectrum.

Last year witnessed ***the addition of 2,664 objects in space***. During the next decade, there could reportedly be as many as 100,000 new commercial and MAG satellites launched and each new launch is placing more pressure on an already congested environment.

Simply put, the industry can not continue to manage all of these spacecraft using S-band — something has to change to free up much-needed spectrum.

There's certainly no surprise, then, that that the transition to other bands is underway. This transition has started with a definite move toward Ka-band.

What might be unanticipated is that recent statistics suggest that, even a few years ago, Ka-band overtook S-band as the band of choice, with approximately 35% of satellites only using Ka-band for TT&C, with a further 30% applying a combination of Ka- and Ku-band.

Meanwhile, only 12% use S-band, with a few using S- in conjunction with another band. Also interesting is that S-band seems to be the choice for ***Earth Observation*** (**EO**) applications, whereas telecoms are almost exclusively using Ka-band.

Band	Approx Percentage
KA only	35%
KA and KU	31%
S only	12%
UHF only	12%
Other	4%

However, it is obvious that the mega constellations are a large reason for this shift. If the constellations are removed from consideration, then S-band remains slightly ahead, as illustrated in the following chart...

Band	Approx Percentage
KA only	25%
KA and KU	2%
S only	33%
UHF only	33%
Other	10%

CAN KA-BAND COPE?

When something goes wrong in any other type of satellite feed, the worst case scenario is loss of business due to an unhappy customer. This is, of course, something satellite operators take extremely seriously and strive to avoid.

However, the absolute worst case scenario for errors in a TT&C application is the loss of spacecraft, which could even lead to a collision in space which would impact the entire space environment.

S-band has always been the first choice for these systems due to it`s robustness and wide beam, and S-band will usually work even with a minor mispointing of an antenna.

Operators use expensive, but highly reliable, antennas to ensure seamless connectivity. Can Ka-band, then, actually cope with handling something as important as these operations?

There are numerous challenges with moving to Ka-band. Perhaps the most notable are those of accuracy and weather permeation.

With Ka-band, ensuring highly accurate pointing is vital. Unlike S-band, mispointing will lead to errors and the potentially loss of signal.

The challenges of weather permeation are well-documented, with many Ka-band services suffering in extreme weather conditions. This often needs to be managed by having back-up sites and reliable weather mapping in order to easily switch before an outage does occur..

However, while it brings challenges, Ka-band also brings a number of benefits. Aside from spectrum availability, Ka-band delivers much more capacity than S-band at the same spectral efficiency and use smaller antenna sizes.

Solving these challenges will certainly be advantageous for the entire industry.

THE SWITCH TO KA-BAND

The move to Ka-band is shifting the way in which TT&C is performed.

To make this work without causing risk to the space environment (*especially once this is experienced on a large scale*), means innovation is required as well as insights on network performance plus the ability to easily — and rapidly — switch when environmental conditions impact a given site. However, this move away from S-band is also leveling the playing field.

While S-band TT&C antennas have historically been developed by only a few companies, with Ka-band, there are numerous companies that make their mark in this domain.

This likely also means more innovation than ever before experienced will be seen, as these companies look to gain a competitive edge. These antennas will be under a great deal of scrutiny to ensure they offer the highest possible quality.

Insights on antenna performance are always important, especially for TT&C, because even in the most stable of environments, things can change.

This will be even more important in Ka-band, helping to ensure that these antennas are accurate all of the time, keeping that much needed link to the satellites. Also, more important than ever will be realtime knowledge of environmental conditions at any given site and how that will change.

New challenges with mitigating interference onsite will play a crucial role as operators now will have a much broader frequency spectrum to guard.

Another important concern to address will be that of security. Having TT&C handled on an isolated band makes it more secure. It is likely we will see operators continue to use dedicated antennas for TT&C, even if they are operating within Ka-band.

THE FUTURE OF TT&C

It will be interesting to note how this evolution plays out. Shifting to Ka-band opens up capacity and will likely lead to an increase in innovated products. This could ultimately lead to TT&C becoming more efficient and, perhaps in the long-run, even safer.

What is certain is that the transfer process is not without challenges — operators that are carefully planning networks ensure they remain error-free, thereby keeping the space environment safe for all concerned.

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QUADSAT

Joakim Espeland

Author Joakim Espeland is the Chief Executive Officer and Co-Founder of the company. Joakim is an entrepreneur, electrical and mechanical engineer as well as a satellite field engineer and examiner. He developed QuadSAT from his initial iidea to a start up company and upscaling the firm's global operations.

The QuadSAT system increases access to antenna diagnostics. The drone-based system enables data gathering when and where it is needed. In its hard case, the system is easily transported for use at a user's premises as well as in-field. Custom pre- and post-flight software ensures repeatability, control over UAS during measurements, ease of operation, and data delivery in a uniform format.

AWS and SES partner to enable edge compute and Cloud access on the battlefield

Author: David Pesgraves, GSR

For the U.S. Department of Defense (DoD), not all missions are executed in environments where connectivity and communications are reliable and readily available. In scenarios where the DoD must operate at the remote edge, the crucial connectivity that mission success relies upon can often be limited or completely unavailable.

As a result, ***SES Space & Defense*** recently collaborated with ***AWS*** to empower defense customers on the ***Joint Warfighting Cloud Capability*** contract enabling access to low-latency, cloud-based applications securely in ***denied, disrupted, intermittent, and limited bandwidth*** (**DDIL**) environments.

AWS is leveraging SES's multi-orbit, multi-band global satellite fleet to provide required connectivity to field-deployed AWS ***Modular Data Center*** (**MDC**) units to access critical applications and the exchange of mission-critical data in theater.

Recently, SES Space & Defense's ***G. RamosCarr*** discussed with the ***Government Satellite Report*** how the company will be delivering MEO and GEO services at the edge for DoD missions, as well as explore the various DoD use cases, applications, and workloads that will benefit from infrastructure at the edge.

G RamosCarr

Government Satellite Report (GSR)
What use cases exist for AWS MDC units in the DoD? Why would the DoD want to deploy these units to Denied, Disrupted, Intermittent, and Limited (DDIL) environments?

G RamosCarr
The DoD operates globally, meaning it has to maintain data sovereignty and comply with specific data classification requirements, both when deployed and at home, just to ensure that data is protected.

With the DoD's transition from on-prem/hybrid solutions to commercial clouds that are approved for the U.S. government, the Department is going to be more reliant on remote edge computing environments in scenarios where comms aren't as resilient as they are stateside.

Deploying in any environment where an adversary is present and negatively impacting communications — whether denying or disrupting — is a prime example of why a tool such as the AWS MDC is imperative. However, even in situations where bad weather is limiting connectivity, having different architectures like MEO with a GEO fallback, a good PACE plan is critical.

In any mission, you must always be able to operate, and that's why there is a major need for those tools that are running in the cloud. Having the ability to deploy the most important data or tools at the edge is something the AWS MDC will help achieve at scale for a larger deployment, or a unit with a higher amount of data production.

No matter what scenario they end up in, with an AWS MDC, they're able to continue operating just like they would be stateside when they were doing training.

GSR
Are there any particular applications or workloads that you think might be driving this need for infrastructure at the edge?

G RamosCarr
Imagery analysis is a perfect example. Also, IoT is another application that drives this need, especially when you need to pull a lot of different metrics on a regular basis. It's fantastic to be able to import a big pool of data into a data lake in the cloud, which will allow users to leverage the computing resources of full data centers across the U.S.

But in a scenario where you might be offline for an hour, or a couple of days, you're going to want to still have access to a subset of that full data set. You'll want to be able to take the most important data and do some processing at the edge, and be able to leverage that intel that you just developed immediately.

GSR
If the DoD is deploying these units to the tactical edge, why would they need low-latency, high throughput satellite connectivity? What benefit or advantage would the DoD gain from connecting AWS MDC units?

G RamosCarr
An AWS MDC unit elevates what you can move out to the edge. The compute devices can now become resident in a forward operating base or in some other kind of deployed scenario. That gives users access to the most important data, housed locally at the edge.

However, an AWS MDC on the battlefield can't compete against the ability of a data center back in the U.S. to be able to compute or consolidate information and process it. It's not going to be able to do it on the same level.

This is why the military would want to connect AWS MDC units through high throughput, low latency, fiber-like connectivity. MEO satellite connectivity allows these workloads and systems to operate in a much more efficient manner — with some of the work being done at the edge, and other workloads in the cloud.

MEO, as far as cloud operations go, can provide a high throughput and low latency connection very similar to a traditional fiber optic connection. This incredibly high bandwidth, high speed connection can enable those services

Before, users would have to use some kind of edge compute because of their higher-latency GEO link, or they would have to reduce the amount of throughput and the amount of data that they were sending back, because of the reduced capability of the GEO link and the latency. A low latency MEO connection enables a whole new world where practically anything can be transmitted quickly and with minimal latency.

GSR
It was recently announced that SES Space & Defense was selected by AWS to provide connectivity to the AWS MDC units. Why was SES Space & Defense a good fit for this?
G RamosCarr
We've had a lot of great engagements and have a great working partnership with AWS, and we've supported them on a number of different opportunities. I think we have a differentiated offering — owning both a GEO and a MEO fleet.

Obviously, there's a value to every satellite connection, especially when you have zero connectivity. But us being able to bring a resiliency plan to them, and it being relatively turnkey for them, has probably been the biggest differentiator. We're able to ensure that the military has connectivity — whether it be MEO or GEO connectivity options.

Going further, what MEO enables — as far as cloud operations — is so much more advanced that what the military is going to get on other constellations. The speed, capacity, and latency are second to none. We also have the ability to provide an SLA and ensure that dedicated connectivity is up and available, when that isn't always the case with other services.

GSR
SES's O3b mPOWER next-generation MEO service will soon be available for the DoD. How can this service benefit the DoD? What new functionality or capabilities will it enable for the military?

G RamosCarr
I think O3b mPOWER really opens the door for scalability on our side. We've been able to show a differentiated capability with 10 beams per satellite. There is also great flexibility that O3b mPOWER is going to bring to the table, and inherent security features that come with that constellation.

It's going to open the aperture as far as being able to more successfully deploy our assets to support our warfighters.

Author David Pesgraves is a Staff Writer for GovSat Report, in addition to several other online publications dedicated to defense, military, and federal government agency technologies.

To read more about how SES Space & Defense and AWS will assist the U.S. Department of Defense, ***select this direct link...***

David Pesgraves

This article, ***AWS and SES Partner to Enable Edge Compute and Cloud Access on the Battlefield,*** *first appeared on* ***GovSat*** *and is republished with permission of* ***SES Space & Defense*** *and* ***GSR****.*

COMMAND CENTER: CHRIS KOLB

CO-FOUNDER, AEROBOTIX

*Chris Kolb co-founded robotics company **Aerobotix** in 2005 and currently serves as vice president of sales. He plays a key role in developing innovative robotic solutions for the company's customers, which include some of the world's largest aerospace and defense contractors.*

Chris Kolb

Mr. Kolb began his career as a robotics integrator and over the past 28 years has gained extensive experience in almost every facet of industrial robotics – from programming and installation to domestic and international sales.

Headquartered in Huntsville, Alabama, Aerobotix is a leading provider of robotic solutions for the aerospace and defense industries. The company specializes in cutting-edge automated solutions for high-value, high-precision components, aircraft and vehicles. Aerobotix has more than 130 robotic systems installed in the U.S. and abroad.

Mr. Kolb, thanks for taking the time to talk with us... with a strong background in industrial robotics, what drew your interest to the space industry and then committing Aerobotix to engage in this intriguing industry?

CHRIS KOLB

Aerobotix entered the space industry via a referral from one of our core defense customers. The most common applications for Aerobotix robotics systems are automated sanding and coating as well as inspection, testing and quality control.

Because of our expertise in developing unique automated coating systems, we were asked if our robots could be adapted to apply ***spray-on foam insulation*** (**SOFI**). We ran tests in our lab and were able to confirm SOFI coating as a capability.

Please tell us about the space programs you're working on.

CHRIS KOLB

I can't mention company names for security reasons; however, Aerobotix is working with a rocket manufacturer to apply protective spray-on foam insulation to spacecraft fuel tanks. Aerobotix is also working with a hypersonic missile manufacturer to apply a thermal protection coating to protect the vehicle as it leaves the Earth's atmosphere.

A hypersonic missile that has been sprayed with a thermal protection coating to protect the vehicle as it leaves the Earth's atmosphere. (Photo credit: U.S. Air Force)

Why has missile manufacturing, in particular, become a growth market for robotics companies?

CHRIS KOLB
Defense contractors are turning to automated systems to help them increase capacity so they can meet surging production demand from the U.S. Government.

In 2022, Aerobotix marked the installation of its 40th robotic system for the U.S. missile manufacturing industry and we're now well on our way to No. 50. Automation is often the smartest strategy when defense contractors really need to ramp up production and expand capabilities.

What kinds of missiles has Aerobotix been working on?

CHRIS KOLB
Our robotic systems are supporting interceptor, cruise, air-to-air and hypersonic missile production on multiple levels.

Recent demand has focused on the automation of testing, inspection and quality operations, but missile manufacturers have had Aerobotix design, build and install robotic systems for a wide range of processes.

These include structured light scanning, active-force-compliant sanding, application of performance coatings, sculpting the outer-mold-line shape, and non-contact measurement of coating thickness.

There are certainly roles for robotic involvement in the military/agency/government (MAG) and commercial environments. How do you see the role of industrial robotics improving product within these arenas, moving forward?

CHRIS KOLB
I mentioned earlier that robots can enhance production capacity. Robots can also generate major cost savings — both via reduced labor costs and increased production efficiency — while improving output quality and worker safety.

A good example is how the U.S. Air Force saved almost $9 million in six years after engaging Aerobotix to automate the application of performance coatings on air inlet ducts for the F-22 Raptor aircraft.

Our robotic technology can paint each unit using only about 300 hours of labor, rather than 1,600 hours. That's a labor saving of around 80%, which helps to solve the challenge of getting these aircraft back into service quicker. The estimate is that we're saving the Air Force around $220,000 per aircraft in maintenance costs.

Aircraft maintenance can be difficult work. In that case study, did introducing robot helpers reduce worker injuries?

CHRIS KOLB
The Air Force has reported seeing far fewer injuries because human workers no longer need to spend hundreds of hours crawling around on their hands and knees inside aircraft inlets, wearing protective suits and respirators.

Before the Air Force started using robots, maintenance workers sustained a significant number of shoulder injuries, in particular, from working in such cramped, tight spaces. And robots can do a better job anyway, because in those conditions, it's nearly impossible for human workers to manually apply the coatings at consistent speeds and thicknesses.

Has Aerobotix worked on any other projects for the Air Force?

CHRIS KOLB
Aerobotix designed automated painting systems for the F/A-18E/18F Super Hornet and F-35 Lightning II — two of the newer aircraft featured in "***Top Gun: Maverick***," which became one of the highest-grossing movies of all time.

We also partnered with the Air Force and ***Compass Technology Group*** (**CTG**) to build an ***adaptive radome diagnostic system*** (**ARDS**), which was the first use of a LiDAR-guided, collaborative, mobile robot in Air Force maintenance depots.

The adaptive radome diagnostic system (ARDS), the first use of a LiDAR-guided collaborative mobile robot in Air Force maintenance depots. (Photo credit: Aerobotix/CTG)

The self-navigating ARDS uses microwave signals to non-destructively evaluate aircraft radomes and identify defects such as delamination or water ingress.

The ARDS won the top ***Defense Manufacturing Technology Achievement Award*** at the 2021 Defense Manufacturing Conference.

Does AI play a role in your firm's processes and, if so, how so?

CHRIS KOLB
Our robots aren't currently using a lot of AI, but we're exploring the technology and expect to use it more on the production side in the future.

Tell us about your newest innovation, the Active Taping Kit (ATK).

CHRIS KOLB

The ATK is a first-of-its-kind solution that Aerobotix developed with an Austrian partner, ***FerRobotics***, in response to aerospace industry demand for an automated tool for precision application of masking tape.

Manually applying masking tape on high-value aircraft and parts is slow and labor intensive across the major defense primes. The ATK automates the process and puts down perfectly straight tape lines every time.

The ATK was recently honored with a special prize under the **Austrian National Innovation Award**.

What are the biggest downsides to installing automated systems?

CHRIS KOLB

The upfront cost can be a large investment, but robots have compelling potential to pay for themselves in the longer term, often many times over, and systems can remain operational for up to 20 years.

If companies don't complete a formal risk assessment for any new robot, they're risking legal liability, insurance complications, potential shutdowns and, most importantly, their workers' safety.

A robotics integrator affiliated with the ***Association for Advancing Automation*** (**A3**) — previously known as the ***Robotic Industries Association*** (**RIA**) — can assist a manufacturer in selecting the correct robot for a task and also perform a risk assessment to ensure the robot will meet A3 standards.

Reviewing your career, could you tell us what project or projects truly bring you a smile of satisfaction?

CHRIS KOLB

Mold-in-Place (**MIP**) is the project that brought me the greatest satisfaction and, at the same time, the most hair loss! The Air Force funded a project through Aerobotix to develop an MIP solution to apply a very thick performance coating onto the side of the F-35. This was a complex project and I, not so jokingly, called it ***The System of Seven Consecutive Miracles***.

One of the companies on our team had to invent a very demanding, high-performance coating that could be mixed, injected and cured to meet all of the requirements of an F-35 spray coating. This coating then had to be rigidly validated over several years.

Another company on our team had to design an incredibly precise mold that our robot could push up against the aircraft for the injection of the coating. This tool had to create a perfect seal against the aircraft, heat up to cure the coatings, and then assist in popping the mold off the cured coating as the robot pulled away.

We needed to develop highly advanced metrology so the robot could find the aircraft and land the mold in exactly the right place, and then use that same metrology to make sure the final material thickness was within tolerance.

Making the job even more challenging was the fact that we had to install all of this on a mobile platform that drove up the side of what was, at that time, a $100 million aircraft.

Previously, coatings for F-35 engine inlets were applied as a separate process in a paint shop. But when MIP coatings are applied using our robotic arm, work can continue on other parts of the aircraft at the same time.

The process delivers cost savings of $6,000 per jet, which potentially adds up to $27 million over the life of the program. That's a pretty good ROI for a $742,000 investment.

aerobotix.net

AEROBOTIX

An Aerobotix robotic system applies Mold-in-Place (MIP) coatings to the side of an F-35 aircraft. (Photo credit: Lockheed Martin)

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REVOLUTIONIZING SIGNALS INTELLIGENCE

THE IMPACT OF HIGH-PERFORMANCE SOFTWARE-DEFINED RADIOS (SDRS)

Author: Brandon Malatest, Per Vices

Signals Intelligence (SIGINT) plays a crucial role in gathering and interpreting information from the electromagnetic spectrum. The advent of Software Defined Radios (SDRs) has transformed the landscape of SIGINT by providing unprecedented flexibility and performance.

This article explores the impact of high-performance SDRs on SIGINT, focusing on their key features such as very high RF sampling bandwidths, numerous independent radio chains, wide band tuning capabilities, and the integration of on-board ***Field-Programmable Gate Arrays*** (**FPGA**s) for advanced digital signal processing.

In the ever-evolving world of signals intelligence, the ability to swiftly adapt to emerging threats and technologies is paramount. Traditional hardware-based radios have limitations in terms of flexibility, upgradeability, and adaptability to evolving communication standards. ***Software Defined Radios*** (**SDRs**) have emerged as a game-changer in the field of SIGINT, offering unparalleled advantages in terms of performance, agility, and versatility.

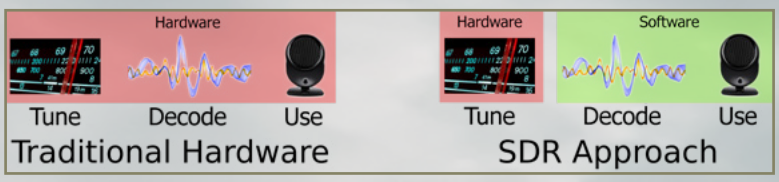
SDRs represent a paradigm shift in the field of wireless communication by redefining the traditional hardware-centric approach. Unlike conventional radios with fixed functionalities determined by their hardware components, SDRs leverage advanced software algorithms to perform various signal processing tasks.

The key distinction lies in the flexibility to adapt and modify radio behavior on-the-fly, allowing for the implementation of diverse waveforms and communication protocols through software configurations. This adaptability makes SDRs highly versatile, enabling users to address evolving communication standards without the need for hardware modifications. Essentially, SDRs convert the traditionally hardware-defined functions of a radio into software-defined processes, providing a dynamic and programmable solution for a wide range of applications.

EVOLUTION OF SIGINT + THE ROLE OF SDRS

Historically, SIGINT has been crucial in gathering intelligence by intercepting, analyzing, and interpreting signals from communication systems, radars, and other electronic sources. Traditional SIGINT systems relied on dedicated hardware for specific frequency bands and modulation schemes, making them rigid and challenging to upgrade.

SDRs, on the other hand, decouple the signal processing tasks from dedicated hardware, allowing for the implementation of diverse waveforms and protocols through software. This flexibility enables intelligence agencies to adapt rapidly to changing communication technologies, a critical capability in today's dynamic and fast-paced environment.



Comparing Traditional to Software Defined Approach

High RF Sampling Bandwidths: Redefining Signal Capture

One of the defining features of high-performance SDRs is their ability to achieve very high ***Radio Frequency*** (**RF**) sampling bandwidths. This capability allows SDRs to capture a wide range of signals simultaneously, providing a panoramic view of the electromagnetic spectrum. This is particularly advantageous in SIGINT, where the ability to monitor multiple signals across various frequencies is crucial for comprehensive intelligence gathering.

The increased RF sampling bandwidth not only enhances the breadth of signal coverage but also improves the resolution and accuracy of intercepted signals. This is essential for the identification and analysis of complex communication networks employing frequency-hopping or spread spectrum techniques.

Numerous Independent Radio Chain: Unprecedented Parallel Processing

Traditional radios often have limitations in terms of the number of simultaneous channels they can handle. High-performance SDRs, however, feature multiple independent receive and transmit radio chains, enabling parallel processing of signals. This parallelism significantly enhances the SDR's capacity to handle a large number of signals simultaneously, a capability that is invaluable in crowded and contested electromagnetic environments.

The ability to process signals independently opens up new possibilities for intelligence gathering, allowing operators to monitor and analyze multiple targets or communication channels

concurrently. This parallel processing capability is especially crucial in scenarios where real-time intelligence is essential, such as in military operations or counter-terrorism efforts.

Wide Band Tuning Capabilities: Adapting to Dynamic Threats
Traditional radios are typically designed to operate within specific frequency bands, limiting their adaptability to dynamic and agile communication systems. High-performance SDRs, however, boast wide band tuning capabilities, allowing them to rapidly switch between different frequency ranges. This flexibility is vital in the face of adversaries employing frequency agility, where they can dynamically shift their communication frequencies to evade detection. High-performance SDRs empower SIGINT operators to swiftly adapt to such changes, ensuring that no communication goes unnoticed or unanalyzed.

On-Board FPGAs: Powering Advanced Digital Signal Processing
The integration of on-board Field-Programmable Gate Arrays (FPGAs) is a key feature that sets high-performance SDRs apart. FPGAs are reconfigurable hardware devices that can be programmed to perform specific digital signal processing tasks efficiently. In the context of SIGINT, on-board FPGAs bring a host of advantages, including real-time processing, advanced filtering, (de)modulation, and more.

Real-Time Processing
The real-time processing capabilities of on-board FPGAs enable SDRs to analyze and respond to signals on the fly. This is particularly crucial in scenarios where split-second decisions are required, such as in electronic warfare or intelligence operations in contested environments.

Advanced Filtering
Filtering is an essential aspect of signal processing in SIGINT. On-board FPGAs allow for the implementation of complex and adaptive filtering algorithms, enhancing the ability to extract relevant information from a wide array of signals. This is especially valuable in situations where the signal of interest is buried within noise or interference.

(De)modulation: FPGAs enable high-performance SDRs to demodulate a wide range of signals with precision and accuracy. This capability is fundamental in understanding the content of intercepted communications, whether it's voice, data, or other forms of information.

Spectrum Analysis: The on-board FPGAs also facilitate advanced spectrum analysis, providing detailed insights into the frequency and modulation characteristics of intercepted signals. This information is crucial for signal classification, identification, and the detection of anomalous or suspicious activities.

APPLICATIONS OF HIGH-PERFORMANCE SDRS IN SIGINT

The impact of high-performance SDRs on SIGINT extends to various applications, ranging from military intelligence to law enforcement and cybersecurity. Let's delve into some specific scenarios where these SDRs have proven to be indispensable.

Military Intelligence and Electronic Warfare
High-performance SDRs play a pivotal role in military intelligence by providing a comprehensive view of the electromagnetic spectrum. Military operations often involve complex communication networks, and the ability to monitor, intercept, and analyze enemy communications in real-time is crucial for gaining a tactical advantage. In ***Electronic Warfare*** (**EW**) scenarios, where disrupting or deceiving enemy communication is paramount, the agility and flexibility of SDRs become even more significant. The parallel processing capabilities, wide band tuning, and on-board FPGAs allow military operators to adapt rapidly to changing threat environments.

Counter-Terrorism and Law Enforcement
In counter-terrorism and law enforcement efforts, the ability to monitor and analyze communication networks is essential for preventing and responding to threats. High-performance SDRs provide law enforcement agencies with the tools to intercept and decipher a wide range of communication signals, from traditional voice transmissions to modern digital data exchanges> The versatility of SDRs allows for seamless integration into surveillance systems, enabling law enforcement to monitor and track potential threats. The real-time processing capabilities of on-board FPGAs are particularly valuable in scenarios where rapid response is critical for public safety.

Cybersecurity and Spectrum Monitoring
As cyber threats continue to evolve, monitoring the electromagnetic spectrum for suspicious or malicious signals becomes a crucial aspect of cybersecurity. High-performance SDRs, with their wide band tuning capabilities and advanced signal processing capabilities, provide cybersecurity professionals with the means to detect and analyze anomalous activities. Spectrum monitoring using SDRs is not limited to cybersecurity alone; it also extends to regulatory compliance and spectrum management. Monitoring and analyzing the spectrum allow authorities to identify and mitigate interference issues, ensure adherence to communication regulations, and optimize spectrum allocation.

CHALLENGES + FUTURE DEVELOPMENTS

While high-performance SDRs have revolutionized SIGINT, they are not without challenges. Some of the notable challenges include:

Spectrum Congestion and Interference
As the demand for wireless communication continues to grow, the electromagnetic spectrum becomes increasingly congested. This congestion can lead to interference issues, making it challenging for SDRs to distinguish between signals of interest and unwanted noise. Advanced signal processing techniques and machine learning algorithms are being explored to address this challenge.

Cybersecurity Concerns
As SDRs rely heavily on software, they are susceptible to cybersecurity threats. Ensuring the security of SDRs and preventing unauthorized access or manipulation of the software is a priority.

There have been significant improvements in overall network security which helps to ensure these SDRs connected to networks are safely operated, however, the integration becomes a crucial element to consider.

Integration with Other Intelligence Sources
SIGINT is just one piece of the intelligence puzzle. Integrating information from various intelligence sources, such as Human Intelligence (HUMINT) and Geospatial Intelligence (GEOINT), remains a challenge. Future developments may focus on creating more seamless integration between different intelligence disciplines.

The impact of high-performance Software Defined Radios on Signals Intelligence cannot be overstated. These advanced systems have redefined the way intelligence is gathered, providing unprecedented flexibility, adaptability, and performance. Very high RF sampling bandwidths, numerous independent radio chains, wide band tuning capabilities, and on-board FPGAs for advanced signal processing have collectively elevated the capabilities of SIGINT to new heights.

As technology continues to advance, the role of high-performance SDRs in SIGINT will likely expand further. The ability to rapidly adapt to emerging threats, process signals in real-time, and analyze complex communication networks positions SDRs as indispensable tools for intelligence agencies, military forces, and law enforcement worldwide. The ongoing evolution of SDR technology holds the promise of even greater advancements in the field of Signals Intelligence, ensuring that intelligence professionals stay ahead in the ever-changing landscape of electronic communication.

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Bryan Malatest

Author Brandon Malatest is the COO and Co-Founder of Per Vices Corporation, a leader in Software Defined Radio technology. Brandon has an honour's degree in Physics with a specialization in Experimental Physics from the University of Waterloo in Ontario, Canada.

Per Vices, a leader in software defined radios, offering the highest channel count and bandwidth SDRs for signals intelligence and EW markets while working closely with customers for successful integrations. The high performance radios with extremely high sampling bandwidths, channel counts, and on-board signal processing capabilities, enables customers to leverage Per Vices SDRs to achieve superior performance, enhanced flexibility, and future-proof solutions. Contact solutions@pervices.com to learn more information...

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SVSW.EVENTS

General Atomics to provide missile tracking payloads for Lockheed Martin's SDA Tranche 2 Tracking Layer contract

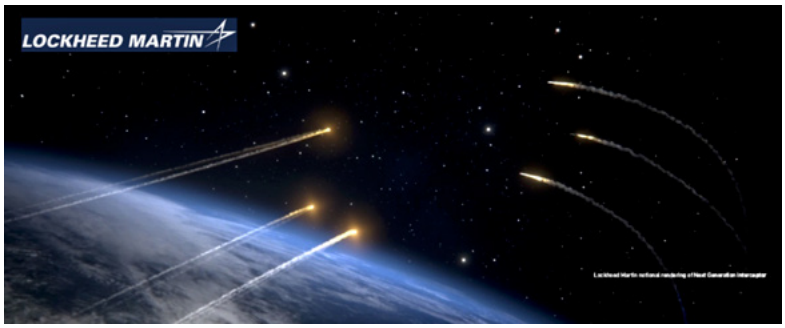
General Atomics Electromagnetic Systems (GA-EMS) has been awarded a contract from Lockheed Martin Space to deliver missile warning, tracking and defense payloads to support the company's recently announced contract award to deliver 18 satellites for the Space Development Agency's (SDA) Tranche 2 Tracking Layer Program.

GA-EMS is developing the ***Electro Optical and Infrared*** (**EO/IR**) sensor systems that includes the 16 ***Wide-Field-of-View*** (**WFOV**) Missile Warning/Missile Tracking infrared payloads and two ***Fire Control/ Missile Defense*** (**FC/MD**) infrared payloads for integration into the Lockheed Martin satellites scheduled for launch in 2027.

GA-EMS' missile warning/tracking payloads and fire control/missile defense payloads, which incorporate on-orbit mission data processing, deliver missile tracks in real-time and will be integrated onto the Lockheed Martin satellites. The satellites will be launched into LEO to be incorporated into SDA's ***Proliferated Warfighter Space Architecture*** LEO constellation to provide persistent worldwide real-time missile detection and tracking capabilities.

"We are proud to be a part of Lockheed Martin Space's team supporting the Tranche 2 Tracking Layer program mission," said Scott Forney, president of GA-EMS. "We look forward to our payloads becoming an integral element of a satellite constellation providing significant military operational support for the detection and tracking of advanced and conventional missile threats, including hypersonic missile systems. The team's Tranche 2 satellite solution represents a significant step forward in delivering real-time global missile warning, tracking, and defense capabilities to the warfighter."

"GA-EMS' dedicated optical sensor team specializes in the design and deployment of compact, high-performance, and affordable EO/IR sensor system solutions, that are ideally suited for this next-generation in missile tracking payloads," said Dr. Steven Wein, senior director of GA-EMS Optical Sensor Systems. "Our in-house, end-to-end payload systems' expertise is key to our ability to rapidly innovate and deliver these cost-effective, highly advanced solutions critical to our national security interests. The missile warning, tracking, and defense payloads add to our expanding portfolio of high-performance surveillance and sensing assets, including our compact, 16 spectral band EO/IR weather sensors for the U.S. Space Force's EO/IR Weather System (EWS) satellite program."



General Atomics Electromagnetic Systems (GA-EMS) Group is a global leader in the research, design, and manufacture of first-of-a-kind electromagnetic and power generation systems. GA-EMS' history of research, development, and technology innovation has led to an expanding portfolio of specialized products and integrated system solutions supporting aviation, space systems and satellites, missile defense, power and energy, and processing and monitoring applications for defense, industrial, and commercial customers worldwide.

www.ga.com/ems

www.lockheedmartin.com/en-us/capabilities/space.html

www.sda.mil/tracking/

DISPATCHES

Viasat selects Rocket Lab for LEO satellite services

Viasat's selection of Rocket Lab USA, Inc (Nasdaq: RKLB) will support Viasat's hybrid space communications networks demonstrations by producing a spacecraft bus and providing mission operation support.

The demonstrations will add to Viasat's portfolio of multi-band, space-based relay communication services in support of *Low Earth Orbit* (LEO) space missions with substantial flexibility in managing data, with lower data latency and higher throughput in real time.

The partnership will bring Viasat, a global provider of satellite communications, and Rocket Lab USA, Inc (Nasdaq: RKLB), a launch and space systems company, together as part of Viasat's work across two awards, totaling $80 million, under ***NASA's Communications Services Project*** (CSP).

The project evaluates commercial satellite communications services and technologies to support NASA near-Earth communications requirements as it sunsets the *Tracking and Data Relay Satellite System* (TDRSS).

LEO satellites typically require direct line-of-sight to a ground station to communicate, introducing significant data latency into the mission operations.

Viasat's Ka- and L-band relay solutions are designed to address this challenge with near real-time, low-data latency communications.

The *Real-Time Space Relay* (RTSR) space-qualified Ka-band terminal will use Viasat's high-capacity Ka-band network of satellites in *Geostationary Orbit* (GEO) to enable LEO operators on-demand access to critical mission data.

The ***InCommand*** system will use Viasat's global L-band network to provide real-time *telemetry, tracking and command* (TT&C) operations at any point in the spacecraft's orbit.

Rocket Lab will also provide a new L-band radio for InCommand called ***Frontier***, which will support demonstrations of various TT&C applications.

Scheduled to launch in early 2026, the demonstration mission will also include direct-to-ground communications through Viasat's *Real-Time Earth* (RTE) *Ground-Station-as-a-Service* for S-, X-, and Ka-bands.

All transports will be integrated through Viasat's *Integrated Space Access Network* (ISAN) to show the benefits of adaptable transport, giving LEO operators the ability to access data while balancing network availability, cost, and time-sensitive applications.

www.viasat.com

www.rocketlabusa.com

DISPATCHES

SpacePath debuts their new high-power 750W outdoor TWTA

SpacePath Communications ('SpacePath'), a provider of high-performance satellite uplink amplifiers and associated equipment for the global SATCOM market, has developed a 750W traveling wave tube amplifier (TWTA), offering the highest power available in Ka-band.

SpacePath's new ***STA-5575P-KA6ZN Ka-band amplifier*** offers 750W of peak power and is intended for military and ***high throughput satellite*** (**HTS**) applications and will benefit customers who need more power or extra margin in their links.

The amplifier's innovative design also incorporates the company's unique carbon fin air-cooling heat sink. Offering similar thermal properties to copper, this cooling method allows the amplifier to be both smaller and lighter than comparable amplifiers as the carbon is approximately half the weight of equivalent cooling systems.

With users in mind, the amplifier is designed for cost-effective maintenance and convenience.

In addition to the lightweight cooling structure, the TWTA features removable and washable air intake filters, metric and imperial mounting threads and plug-n-play compatibility with competitive system interfaces.

Colin Bolton, ***Director of Business Development, SpacePath Communications, said,*** *"Our new product roadmap is driven by our customers and understanding their requirements for higher levels of functionality and performance. As such, this third-generation amplifier features a combination of design innovation and superior performance to firmly meet future market demands."*

SpacePath's high performance uplink amplifiers cover all mission-critical segments including HTS, mobile satellite, fixed-Earth stations and military satellite communications (MILSATCOM).

www.space-path.com/

DISPATCHES

Viasat's first U.S. Navy MSC ship installation

Viasat, Inc. (NASDAQ: VSAT) has completed the first ship installation for the U.S. Navy Military Sealift Command (MSC) under the Next Generation Wideband (NGW) Follow-On (FO) 10-year, Indefinite Delivery/Indefinite Quantity (IDIQ) contract awarded to Inmarsat Government by the Defense Information Systems Agency (DISA) on June 30, 2022.

Under the contract, the company maintains and operates commercial communications infrastructure, which includes satellite systems, teleport services and terrestrial services. Inmarsat Government is now part of Viasat's government business, following Viasat's acquisition of Inmarsat on May 30, 2023.

This first installation of 105 ships demonstrates the company's ability to deliver a robust, reliable global managed satellite communications (SATCOM) solution.

The company upgraded the MSC ship's primary afloat network from Ku-band to the Global Xpress (GX) Ka-band system and ELERA Enhanced L-band Maritime Antenna (ELMA), a variant of the award-winning, LAISR L-band solution to provide communications on the move via a small-size, high throughput terminal.

The hybrid solution of Ka- and L-band service ensures that the MSC ships have secure, resilient, worldwide communications capabilities, as well as a reliable global, on-demand backup network.

This approach is designed to provide significant enhancements over legacy Ku-band by providing higher and scalable data rates on ships' primary and back-up systems, and uniform coverage across the GX and ELERA networks.

Additionally, by delivering the primary and secondary SATCOM capabilities in a holistic, managed service model that includes satellites, ground networks and type-approved terminals — SATCOM as a Service.

The MSC fleet benefits from an integrated, worldwide solution that delivers high throughput with RF (Radio Frequency) band and path diversity to ships at sea.

All of the network aspects are designed as a single solution and for mobility, so users experience a reliable, on-demand continuous service.

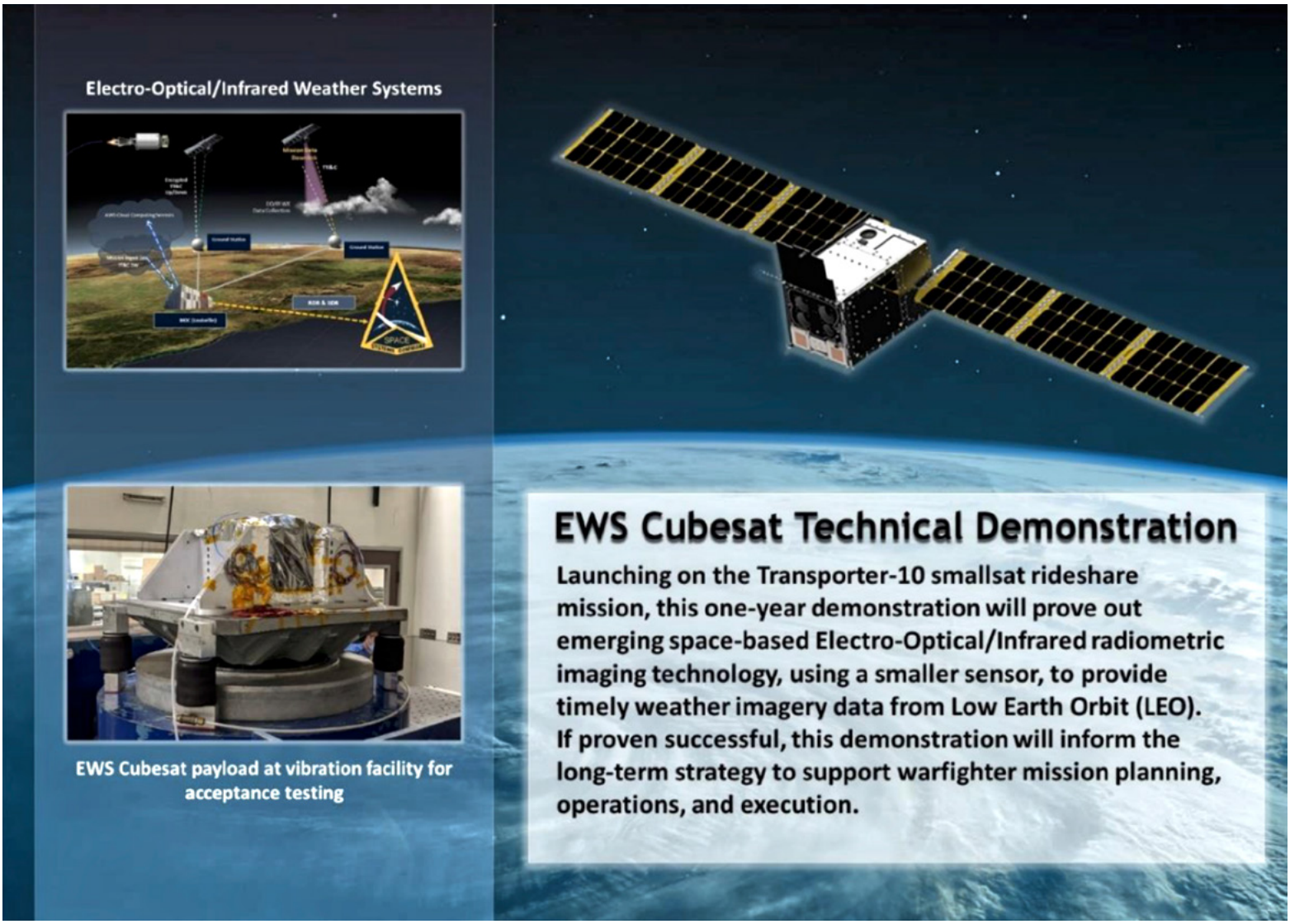
"The Military Sealift Command plays a critical role in our nation's defense. Our ships must have resilient communications capabilities that deliver consistent performance and can be relied upon regardless of location or weather conditions," said Eliot J. Skinner, Deputy Command Information Officer. "These upgrades ensure that our Mariners can confidently operate anywhere in the world knowing they have a reliable, redundant communications network supporting them."

"We have reliably served the U.S. Navy Military Sealift Command for more than 10 years, and we are proud to continue supporting its operations around the world," said Steve Gizinski, Managing Director, Viasat Government Services. "These upgrades provide the MSC fleet with significant enhancements in SATCOM capabilities.

Photo from the General Dynamics National Steel and Shipbuilding Company (NASSCO) Builder's Trial of USNS John Lewis (T-AO 205), the Navy's lead ship of its new class of fleet replenishment oilers. Builder's Trials consist of a series of in-port and at-sea demonstrations that allow the Navy and the shipbuilder to assess the ship's systems and readiness prior to acceptance trials and delivery to the Navy. (Courtesy photo by General Dynamics NASSCO)

DISPATCHES

Space Systems Command EWS tech demo smallsat is launched



***Space Systems Command* successfully launched the organization's Electro-Optical/Infrared (EO/IR) Weather Systems (EWS) cubesat technical demonstration onboard the SpaceX Transporter-6 mission at 9:56 a.m. (Eastern, 6:56 a.m. Pacific) from Cape Canaveral Space Force Station, Florida on January 3, 2023.**

This one-year EWS cubesat tech demo will prove out emerging, space-based, EO/IR radiometric imaging technology, using a smaller sensor to provide timely weather imagery data from LEO.

In February of 2002, the EWS program competitively selected two vendors to develop and launch two separate, sensor prototypes.

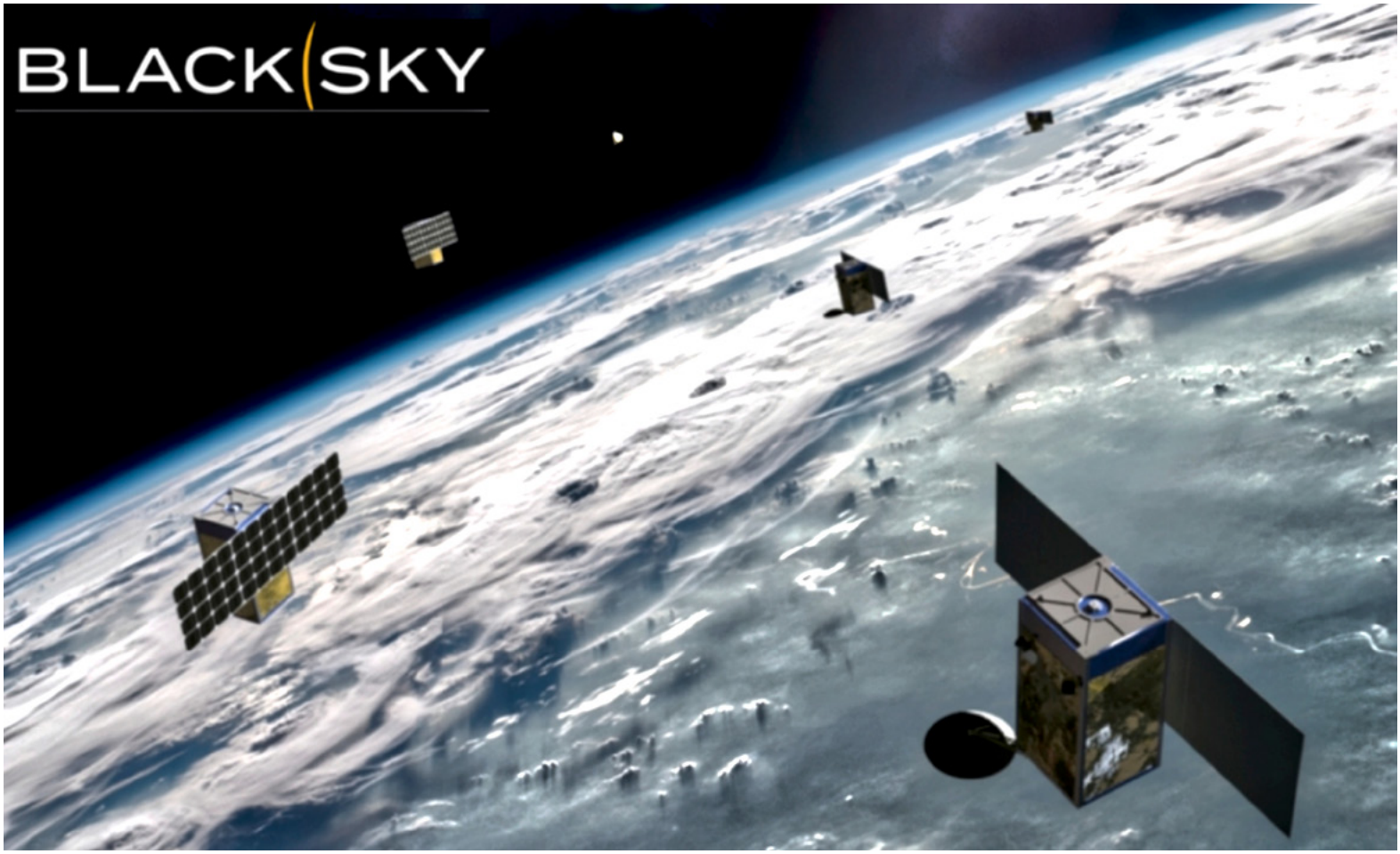
Orion Space Solutions, a non-traditional government contractor, delivered the cubesat for this demonstration. ***General Atomics Electromagnetic Systems Group*** will deliver the second prototype by 2025.

This launch satisfies the ***FY20 National Defense Authorization Act*** (**NDAA**) Congressional mandate to launch a weather EO/IR pathfinder prototype by FY23. The program expects the first transmittal of data early in 2023.

*"The EWS cubesat technical demonstration effort represents SSC's continued commitment to working with non-traditional partners to broaden the competitive industrial base. If successful, this will provide an innovative option to deliver Space-Based Environmental Monitoring data to the warfighter at an operationally relevant speed," said **Lt. Col. Joe Maguadog**, EWS Materiel Leader and Program Manager. "This demonstration will inform our transition toward a more affordable, scalable, and resilient EO/IR weather constellation."*

DISPATCHES

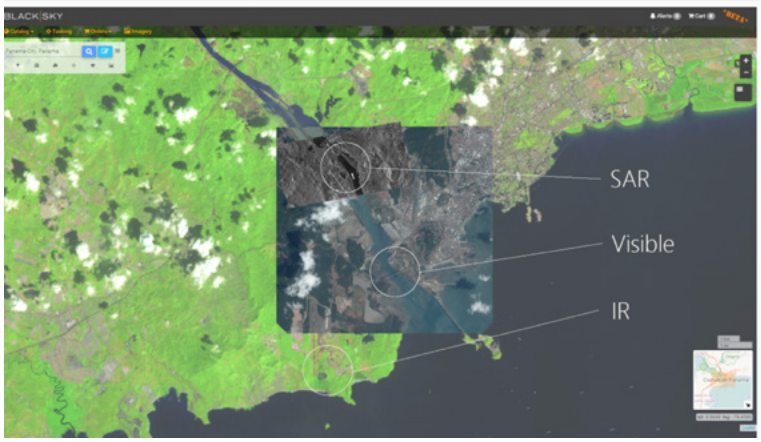
BlackSky wins multi-million$ contract from the DoD



BlackSky Technology Inc. (NYSE: BKSY) has won a multi-million dollar contract in support of the U.S. Department of Defense (DoD) to collect and annotate thousands of BlackSky multi-frame burst images to train moving target artificial intelligence (AI) models for commercial motion imagery.

BlackSky multi-frame burst images are collected in rapid succession during a single satellite pass over an area of interest.

With multiple view angles captured within a matter of seconds burst imagery can be used to generate 3D volumetric products and accurate movement-oriented detection analytics.



Above image from BlackSky Spectra, displaying visible, SAR, and IR data over Panama City and the Miraflores Locks. (Images from Airbus Pléiades, Airbus TerraSAR-X, and USGS Landsat).

Burst imagery, along with all BlackSky offerings, can uniquely be captured from early in the day to late in the evening.The contract provides subscription-based access to the BlackSky Spectra® tasking and analytics platform.

The customer expects to use BlackSky's high-cadence, low-latency imagery and automated analytics to support customer-approved exercises, technology demonstrations and operations.

*"We are taking BlackSky's industry-leading ability to monitor moving objects from space another step forward by enhancing analytic accuracy and the ability to recognize patterns of life," said **Patrick O'Neil**, BlackSky chief technology officer. "This foundational work is expected to help decrease the time to develop moving target algorithms for other related customer-led initiatives."*

www.blacksky.com

DISPATCHES

ThinKom intros ThinAir® GT aero antennas for special missions

ThinKom Solutions, Inc. has debuted the ThinAir® GT line of airborne solutions for government customers. Engineered to operate in the most demanding EMI, EMC, and EMP environments, ThinAir GT unlocks a new level of capabilities, while maintaining ThinKom's proven reliability.

The ThinAir GT 2517 and GT 1717 Ka-band systems are approved on operational commercial and government networks, including LEO, MEO, GEO, and HEO constellations. This includes proven compatibility with the expanded frequency ranges of the WGS and SDA constellations. Other GT product variants operate in Ku-, K-, Ka-, and Q-band frequencies.

Modern networks require operation in expanded frequency ranges, larger channel sizes, and higher ***instantaneous bandwidth*** (IBW). ThinAir GT supports these demands for hopping and protected waveforms, critical to the **U.S. DoD Joint All-Domain Command and Control** mission.

The GT line includes solutions delivering up to 1 to 2 GHz IBW (*K- and Q-band, respectively*) to enable **AEHF** (***Advanced Extremely High Frequency***) operation. All GT systems include enhanced emission controls for robust anti-jam capabilities, including low probability of intercept/detection.

ThinAir GT terminals have demonstrated throughput up to 370/110 Mbps in live testing. The company anticipates achieving speeds exceeding 800/200 Mbps on select networks as new constellations are fully activated.

In addition to fuselage-mount offerings, ThinKom offers smaller terminal options for UAVs, and cavity-mount versions. These conformal designs deliver full system performance while mounted below the fuselage surface, eliminating incremental drag and obscuring the presence of SATCOM functionality on the aircraft.

The ThinAir GT line builds on ThinKom's two decades of innovation to deliver efficient performance across multiple frequency bands. Incorporating the company's patented, proven VICTS technology, ThinAir GT provides the best performance on the market while maintaining an optimal SWaP profile.

The company also recently completed an analysis showing significantly lower drag from its contoured radome designs compared to flat panel ESA technology. This supports lower fuel burn and extended time on station for critical missions. U.S. Government aircraft have been flying with ThinAir systems on board since 2018.

vThinAir antennas boast proven reliability, with a measured MTBF in excess of 50,000 hours based on more than 40 million accrued operational hours to date.

*"Governments are rapidly adopting a multi-constellation, multi-orbit communications profile, and our upgraded ThinAir GT product line is the perfect match," said **Bill Milroy**, ThinKom's chief technology officer and co-founder. "We're proud of our GT solutions, which deliver the best performance today while engineered to work with the next generation of satellite networks. This future-proof architecture ensures governments can easily access the most resilient and secure networks wherever they need to operate around the globe."*

www.thinkom.com

DISPATCHES

CopaSAT stirs up a STORM

***CopaSAT LLC* (CopaSAT) has released the company's STORM V3 satellite communication (SATCOM) terminal engineered for commercial, government, military, and national security operations.**

The electronically steered antenna (ESA) boasts high-throughput data rates of up to 200 Mbps downlink and 20 Mbps uplink.

The unit comes in a shock-resistant, IP68-rated package of only 23″x20″x2.65″ and a weight of less than 30 pounds (13.6 Kg).

STORM V3 is easy to deploy with auto-provisioning and no commissioning required anywhere in the world.

A service plan is included and the terminal attaches to vehicles and vessels via standard mounting systems.

STORM V3 provides flexible connectivity via a mobile hotspot that can use SD-WAN to select between cellular, Wi-Fi, or satellite networks for optimization, failover, or balancing.

"As the demand for resilient, low-latency satellite communication solutions intensifies, CopaSAT has designed the STORM V3 terminal that integrates state-of-the-art technology including the Starlink and Starshield antenna systems. This transformative system leverages low-latency LEO constellations that are setting new benchmarks for reliable SATCOMs-on-the-Move (COTM) and Communications-on-the-Pause (COTP) connectivity. Designed with precision and rigor, the STORM V3 terminal is currently undergoing testing to MIL-STD-810H standards, ensuring durability and reliability in even the most demanding environments. This milestone underscores our unwavering commitment to innovation and excellence, as we strive to provide our customers with unmatched performance and connectivity solutions that transcend boundaries and elevate possibilities," said ***Charlie Daniels,*** Business Development Director, CopaSAT

copasat.com

DISPATCHES

Lockheed Martin's next missile defense interceptor process

In November of 2023, Lockheed Martin (NYSE: LMT) successfully completed a Missile Defense Agency (MDA) acquisition milestone for the nation's modernized long range ballistic missile interceptor.

The company completed the first ***Knowledge Point*** — known as **KP1** — ahead of schedule, taking a major contractual step forward that allows the firm's ***Next Generation Interceptor*** (**NGI**) program to continue development toward the ***Critical Design Review*** (**CDR**).

During KP1, the MDA evaluated Lockheed Martin's development progress to date. This includes completing design review milestones and demonstrating significant maturation across critical technologies, manufacturing readiness, and utility of the company's NGI Software Factory.

This KP1 achievement follows the program's ***All Up Round Preliminary Design Review***, which Lockheed Martin executed on-schedule in September.

The company remains on its accelerated path to the next engineering milestone, CDR.

Current work includes building ground test vehicles and virtually flying the interceptor during system integration trials, enabled by our digital engineering tool suite.

NGI is designed to deter and defeat evolving rogue-nation long range ballistic missile threats to the U.S. homeland.

The first Lockheed Martin NGI is forecast for delivery to the warfighter as early as Fiscal Year 2027.

"I'm proud of the technical rigor our Lockheed Martin and industry team demonstrated. We proved at KP1 that we have reached a level of maturity unprecedented at this stage of a missile defense program," said ***Sarah Reeves,*** Vice President of NGI at Lockheed Martin*. "With MDA's approval, we have turned a corner into our detailed design phase and will keep testing our integrated NGI hardware and software in preparation for production and flight testing."*

lockheedmartin.com

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Summit III

Introducing Summit III C - the latest generation of our popular Summit high-power SSPA systems. Utilizing the Genesis-HP amplifier as its building block, up to 8 modules can be combined into a single amplifier system capable of delivering extremely high levels of RF output power. Summit III C systems are populated with 400W or 500W C-band Genesis-HP SSPAs with Gallium Arsenide (GaAs) device technology necessary to accommodate wideband, multi-carrier applications with superior linearity over comparable Gallium Nitride (GaN) base architectures.

Features

- Soft-fail Redundancy
- SSPA or SSPB option
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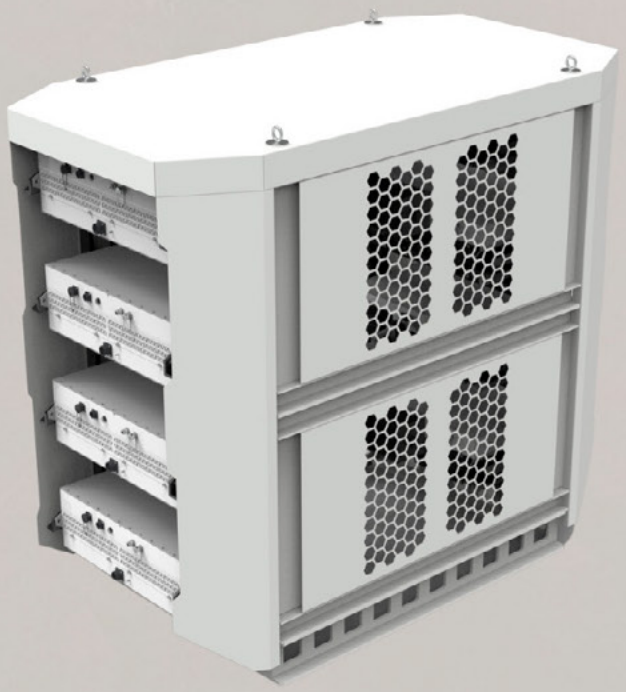
- CANbus architecture for advanced troubleshooting
- Single point for Customer Interface
- Single Point-of-Control M&C, eliminating external controllers
- System Level RMS RF Power Detection
- Secure SNMPv3 Interface
- Advanced Web Interface for entire system monitor and control
- Automatic Gain Adjust to compensate for loss of amplifiers



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