

SPOTLIGHT: **A New Era Of Satellite Communications Is Upon Us**



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A New Era Of Satellite Communications Is Upon Us

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A layered architecture for SATCOM in LEO, MEO, and GEO is helping to create new concepts of operations for Joint All Domain Command and Control, as well as new ways military services will pay for it.



Intelsat's FlexMove for Government managed service solution meets the connectivity needs of land-mobile operations. Shown are Intel-sat personnel demonstrating FlexMove in Germany.

With the shift from the Global War on Terrorism to a focus on the Great Power rivalries, the military is taking a fresh look at the use of its satellite resources. Strategists are weighing the importance of layered low-Earth orbit (LEO), medium-Earth orbit (MEO), and geostationary orbit (GEO) satellite constellations for resiliency and greater interoperability. They're also beginning to implement new models for how SATCOM services are purchased from commercial providers.

The Army, for example, has said that LEO and MEO satellite systems will operate collectively with those in GEO to “decrease

network latency and expand network capacity,” while easing the burden on military geostationary SATCOM systems. And with the rise of Joint All-Domain Command and Control (JADC2), U.S. Space Force sees the potential to deliver SATCOM “at all levels and across the range of military operations.”

On the funding side, the defense community increasingly is looking at the possibility of acquiring SATCOM through an as-a-service delivery model. The Army, for instance, is planning to launch a pilot program next year through which it would buy satellite communications services from commercial providers



Mike Dean, chief of DoD SATCOM.

in much the same way civilians subscribe to their mobile phone plans.

Chief of DoD SATCOM Mike Dean sees strong potential in this approach, which could give the military greater agility in how it can access and deliver services. “We have to be able to allocate SATCOM capability and bandwidth globally where and when it’s needed,” he said.

NEW NEEDS AND CAPABILITIES

SATCOM played a key role in the war on terrorism, and now its uses are evolving with the pivot to the Great Power contest. There’s an intensified focus, for example, on satellites in support of unmanned aerial intelligence, surveillance, and reconnaissance (ISR), along with an emphasis on SATCOM as a means to deliver vital communications for all-domain military operations.

“Our military operations are becoming much more distributed and SATCOM will play a key role in that,” said David Micha, president of Intelsat General. “Instead of being highly concentrated in one geographic region, it’s going to be more global.”

The shifting strategic need is driving demand for networks that are more flexible, capable, and reconfigurable, with improved terminal size, weight, and power characteristics.

“All that is enabled by the next generation of satellites that are more powerful and flexible, with more focused coverage areas, Micha said. “The threat is changing and the location is more distributed, but SATCOM is going to continue to be a very important warfighting element as we go forward.”

That evolution will be driven in part by the development of layered LEO/MEO/GEO architecture, something Dean describes as necessary given the increasing competitiveness within the space domain.

“We’re starting to see that space getting more congested and contested. We don’t necessarily enjoy the ability to lay down a big coverage beam,” he said. “We also have terrestrial providers that are now competing for greater swaths of the

spectrum, as well as adversaries that are starting to have more sophisticated impacts in spectrum, in space, and in cyber.”

Layered LEO/MEO/GEO constellations could help to address that, while also reducing the latency that has sometimes hindered SATCOM effectiveness for low-latency communications necessary for on-the-move operations.

“There are new, disruptive technologies that are being developed as we’re bringing the orbits closer into Earth,” Dean said. “Folks are starting to use SATCOM for applications that previously they weren’t able to do because of the latency.”

LEO in particular is emerging as a disruptive force. “You’re looking at programs like DARPA Space-BACN (Space-Based Adaptive Communications Node that connects LEO constellations with optical datalinks) and the Space Development Agency’s Tranche LEO as low-latency transport,” Dean said. “That is obviously going to reshape the landscape of what we’re going to do down the road in 5, 10 years as we start launching all these satellites.”

GROWING INTEROPERABILITY

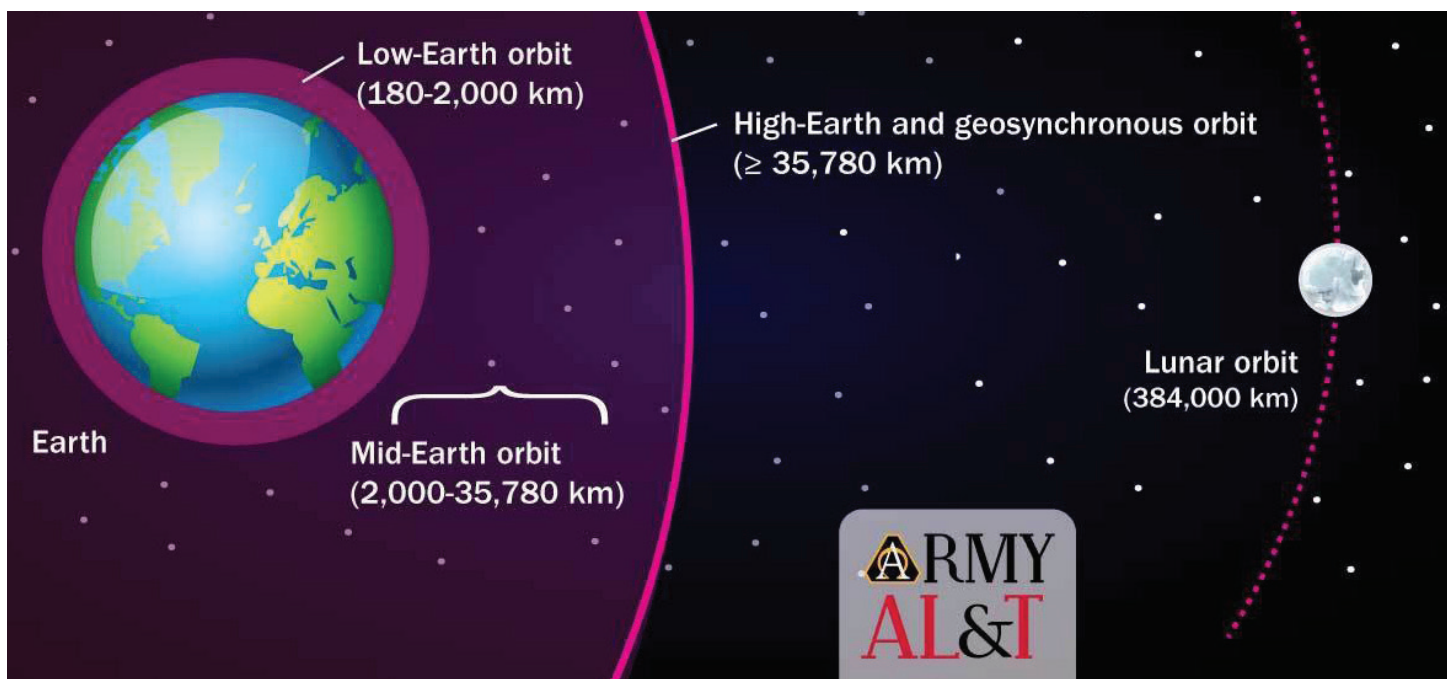
In the arena of SATCOM command and control, enterprise capabilities have traditionally been siloed—by spectrum, by the ground control network, and by particular orbits. With an eye toward shared ISR data, JADC2 promises to make this siloed approach obsolete.

This will have an impact on the way the military allocates its satellite resources. In this emerging vision, “I need to be able to take information from multiple sources, put that together, and then create a fused picture so that I can decide and act and improve my OODA loop,” Dean said. “As we look at JADC2 and the C2 component of multi-domain operations, it’s all about speeding up your OODA loop.”

Greater openness and interoperability of SATCOM systems will enable the military to make more effective use of those resources. “If I can rapidly visualize what’s going on in my SATCOM enterprise through multiple sources, whether it’s spectrum or cyber, I can then decidedly act,” Dean said.

The impact of this will be especially apparent in the application of SATCOM to unmanned aerial systems (UAS) in support of all-domain operations.

“Unmanned systems are going to be the wave of the future,” Micha said. “They’re going to operate autonomously, in swarms, and they’re going to have to operate with manned



New, disruptive technologies for low-latency applications are being developed for low-Earth orbit..(NASA illustration by Robert Simmon).

platforms. All that happens through a network of SATCOM links. That's how they're going to move data back and forth for the various domains we have to operate in."

There's a growing demand for rapid communications links as the military seeks to transmit and receive command and control data, sensor data, and other ground, air, sea, and space data for on-the-move and other tactical applications. In addition, defense leaders are looking to ensure the security of UAS, which by definition require LPI/LPD—low probability of intercept/low probability of detection.

"That's where Joint All-Domain Command and Control pulls everything together," Micha said. "SATCOM is going to be a key piece of that to securely move data."

In line with the effort, the military also is exploring new methodologies around software development, with an eye toward greater agility and flexibility in the delivery of SATCOM services. "To support that, you need more than just having interoperable systems. You have to automate your resource allocation processes to where you can turn around allocation of capacity on a dime," Dean said.

This in turn could help to drive a higher level of situational awareness in a post-siloed SATCOM world.

"I always like to say that there's no such thing as a common operational picture because everybody needs to see their own set of information," said Dean. "For example, an operating

center in Space Command wanting to determine what its information requirements are in SATCOM might be interested in what the enemy is trying to do to them, or what they are doing to themselves through electromagnetic interference. Once I make that decision, then the resource allocation process has to be automated so that I can know what services I have out there."

NEW FUNDING MODELS FOR SATCOM

In tandem with pivotal changes like development of a layered LEO/MEO/GEO architecture and a growing emphasis on interoperability, the defense community also is looking at new ways to purchase its critical SATCOM capabilities.

There's a shift away from military purpose-built SATCOM driven by budget allocations in support of particular service-centric missions. "We're starting to see that model change," Dean said. In its place, there is growing emphasis on a subscription model for end-to-end managed services.

"The commercial SATCOM office at Space Force is actually looking at an initiative where they're going to transform how commercial SATCOM is procured," he noted. The goal is to develop a central pool of SATCOM capabilities, delivered as a managed service. That's going to drive down cost and probably be more effective."

One example comes from Intelsat, which has introduced the FlexMove for Government managed service solution to



Space and Missile Systems Center's WGS-10 (Wideband Global SATCOM) encapsulated satellite mated with a Delta IV launch vehicle. The WGS constellation of SATCOM satellites operate in geostationary orbit.

meet the comms-at-the-pause and comms-on-the-move connectivity needs of land-mobile operations.

"It came down to flexibility," Micha said. "Some government customers want what they want, want it all the time that they want it, and are willing to pay for that. There are other customers who want capability, but they don't need it all the time. They just need to be able to access it when they need it."

A subscription-based approach to SATCOM could help to answer that call for an as-needed capability. In this model, satellite services could be tailored to meet specific mission requirements.

"If they're working in a high-threat environment like nuclear command and control, for example, they need an always-there capability," Micha said. Those who don't need that persistent connectivity, whose missions, for example, call for terminal-by-terminal capabilities, could leverage the as-a-service approach to meet that need.

Such an approach could help the military better manage its SATCOM expenditures, effectively empowering commanders to only pay for what they need, when they need it. Perhaps even more significantly, the service-based purchasing model would ease the operational burden.

"Warfighters have a lot to do and a lot to worry about," Micha said. "What they shouldn't have to worry about is all the infrastructure that's needed to conduct their mission. With managed services, all the headaches are removed from the warfighter by having the satellite network provisioned and managed for them so that they can just conduct their mission."

Commercial providers promise to handle much of that heavy lifting on a subscription basis.

"We have state-of-the-art, high-throughput satellites, and we're

launching new software-defined satellites that are at the cutting edge of satellite technology," Micha said. "Along with the technology, we give them a total connectivity package—high range, both low cost and flexible cost, a varying number of terminals, and the managed services that let them do their mission and not worry about the rest."

All these changes, in turn, are driving military leaders to take a fresh look at the ways in which SATCOM strategies are implemented. In particular, Dean pointed to the need to revamp technical capabilities in support of SATCOM, including the automation of operational processes.

Without such enhancements, "it'd be like putting new windshield wipers on a busted-down truck with no engine or wheels," he said. "We're relying heavily on the operational community as part of this plan to go through their resource allocation process, their mission management process, and how they do things today, and then modernize that to match the new reality of the enterprise model."