

# Pentagon Eyes Deals With Satellite Industry To Fill Demand for Drone Communications

**BY SANDRA I. ERWIN**

A group of Pentagon officials was given three months to come up with a plan to boost the supply of satellite bandwidth that is needed to support the military's growing fleet of unmanned aerial vehicles.

The order came from Undersecretary of Defense for Acquisition, Technology and Logistics Frank Kendall. The challenge he laid out is twofold: Find ways for the Pentagon to capitalize on lower-cost commercial satellite communications technology. And figure out whether this technology can satisfy unique military demands such as protecting UAV data links from hackers.

"Kendall has given us a 90-day window to come up with a notional framework for how the Defense Department is going to provision satcom into the future," said Charles Beames, principal deputy assistant secretary of defense for space and intelligence.

Worries about soaring bandwidth demand at a time of shrinking budgets have prompted a reexamination of how the Pentagon buys satcom hardware and services, Beames said last month at the Satellite 2013 industry trade show in Washington, D.C.

The bandwidth crunch caused by UAVs — which require connectivity for their command and control, and to stream live video — has been a frequent topic of discussion in industry circles for years. The issue gained more urgency in 2009 after then-Defense Secretary Robert Gates terminated the "transformational satellite" program, or TSAT, that was intended to provide encrypted wideband communications. The void left by TSAT has been filled mostly by commercial alternatives. Defense officials had hoped the Pentagon would fund new military satellites to support burgeoning UAV operations, but exorbitant price tags and budget cuts have stalled those efforts.

Most military UAVs currently are operated by commercial satcom links, and their data, too, is transmitted via nonmilitary satellites. Industry experts believe that the cost of retrofitting the entire UAV fleet to military satcom would be prohibitively high. Pentagon officials are considering alternatives that are based on commercial technology, and would allow the aircraft to keep using their existing terminals.

A more commercial approach to secure satcom could open the door for industry to offer suggestions, Beames said. "It's creating an opportunity for people with great ideas

to have them introduced into the conversation and be considered," he said. "A lot of people have cautioned me that a comprehensive framework has been attempted many times in the past" but one never materialized. Budget cuts have proved to be the catalyst for taking action, he said.

Satellite providers do not believe the Pentagon has much of a choice. Military spacecraft currently supply 60 percent of the Defense Department's satcom demand. With no plans to build new constellations for at least a decade, the military will become more dependent on commercial bandwidth. The military constellations that are currently being built — the Advanced-Extremely High Frequency, the Wideband Global Satcom and Mobile User Objective System — will not be enough to support future requirements for mobile communications and UAVs, said Charles H. Cynamon, a retired Air Force colonel and now senior director of Hughes Network Systems LLC.

Besides a shortage of military satellite capacity, the Pentagon has to face the fact that there are no terminals being produced to convert UAVs from commercial to military satellite links, Cynamon said in an interview. The high cost of military satcom terminals also is a problem, he said. A \$2 million secure satcom terminal might be justifiable for a \$100 million UAV such as the Air Force Global Hawk, but not a \$4 million Predator.

Cynamon suggested the Pentagon ought to rethink its bandwidth allocation policies. The Air Force, for instance, buys Predator and Reaper aircraft with Ku-band commercial satcom connectivity. But when project managers purchase the platform, they don't buy the satellite time. That leaves the problem for someone else to solve. During the past decade, the military has not had to include satellite time in its regular budget and shifted it to war funding requests. "Platform owners don't necessarily have a blank check, but they don't foot the bill," Cynamon said. The Air Force will bring UAVs to the fight, but it is up to war commanders to secure funding for the satcom that will allow the UAVs to fly and broadcast live video.

The way the Defense Department apportioned bandwidth also makes it difficult to increase capacity, said Richard M. Lober, vice president and general manager of Hughes' defense and intelligence division.

Commercial suppliers have perfected the efficiency of their networks so more services can be provided with less satellite bandwidth, he said.

A military WGS satellite, for example, is capable of 4 gigabits of capacity. By comparison, a commercial high-throughput satellite like Hughes' Jupiter Echo 17 provides more than 100 gigabits. Hughes expects to sign up 1 million to 2 million users on that satellite. The Defense Department has to satisfy only 10,000 to 20,000 users, but the way it allocates bandwidth is hugely inefficient, Lober said. The bandwidth and the power on a military satellite is assigned to one user at a time. A company like Hughes will take a 100-gigabit satellite with a million users and pack them into time and frequency slots so they can get high-speed broadband services at low prices. When a military commander requests WGS bandwidth, once it's assigned to him, he has it around the clock, whether he is using it or not.

Lober said industry executives have for years tried to persuade the Defense Department to adopt modern techniques for allocating bandwidth. Defense officials recently have become more interested in learning how commercial techniques can help the government save money.

The military's newest satcom constellation, the WGS, is regarded as a temporary filler for TSAT. But most WGS users still use outdated terminals that do not make optimum use of the available bandwidth, said Cynamon. Australia and Canada are buying WGS capacity but they have invested in new terminals that take a sliver of bandwidth and virtually triple or quadruple it just by managing more efficiently.

In the Defense Department, he said, the "mindset is changing ... but old habits are hard to break." There is still mistrust of commercial satcom in some circles, he said, where the technology is perceived to be insufficiently secure or reliable.

Vendors expect the Pentagon soon will publish a solicitation for industry ideas on how to provide protected communications in "contested environments," which is military-speak for areas where enemies could jam U.S. satellite signals.

Cynamon said there is broad consensus that satcom technology such as waveforms and modems could be incorporated into existing Ku-band terminals in UAVs to shield them from electronic attacks.

Another concern for the Defense Depart-



**Aerion Satellite concept** HARRIS

ment is the massive bandwidth demand of spy drones such as Global Hawk, which are “resource hogs,” Cynamon said. The Air Force two years ago had planned to connect Global Hawk with WGS military Ka band. That idea was later scuttled because of concerns that the Global Hawk — with a requirement of 138 to 274 megabits per second — would drain the WGS capacity. “They would need dedicated apertures on WGS,” said Cynamon. “And there are only 10 apertures for military Ka per satellite. You would tie up one or two apertures for each Global Hawk you are trying to support.”

Companies such as Hughes are confident that commercial technology is the answer to the Pentagon’s bandwidth troubles. But executives cautioned that it will not be easy to retrofit military hardware.

Most UAVs are chock full of proprietary components and software that are incompatible with any outside piece of equipment, said Lober. “What we are seeing in commercial industry is a variety

of modem and radio manufacturers and different antenna manufacturers that can plug and play,” he said. Each military UAV model typically is bought from a single vendor. Breaking apart existing interfaces between radios and antennas could create legal problems for satcom providers because the components are intellectual property that is owned by the UAV manufacturer.

It will be up to the Defense Department to weigh the pros and cons of a commercial approach, said Lober. The pressure to boost satellite capacity will intensify in the next several years as more UAVs move to satellite-based links. Many of the current small UAV fleets rely on line-of-sight ground-based communications. Satellite connectivity is a must when they need to reach longer distances — beyond 100 miles — or when there are mountains that block the line of sight.

Analysts have projected that over the next decade, the Defense Department will pour \$37 billion to \$40 billion into new UAVs. That compares to \$30 billion spent during the past 10 years.

Kensing Quock, chief engineer for the satellite gateway program at the Defense Information Systems Agency, said his agency is pressed to supply satcom around the world. “Africa is becoming a very hot area that we need to support,” he said. “Pacific Command is also becoming a hot area.” The quandary for DISA, he said, is “how do we support all these different users, using different bands, with different communications systems, going to different gateways?”

Whereas the military has been concentrated in the Middle East and in Afghanistan during the past decade, it is now expanding into other regions, which complicates DISA’s job. “Bandwidth portability is a huge topic of discussion,” said Quock. “How can we buy bandwidth in one area and when we go somewhere else move it around? That’s a challenge with multiple vendors and satellite providers.”

DISA is developing a procurement plan to buy bandwidth in the most efficient way, said Quock.

Despite a desire to capture a piece of the Pentagon’s nearly \$1 billion in annual

purchases of commercial bandwidth, some industry executives remain skeptical about the defense market. One problem is that the Defense Department does not give industry long-term deals that make the investment worthwhile.

"Most of what we do in industry is optimized for broadcast TV. We are bloody good at that. ... Those are the guys who buy capacity from us for 10 to 15 years. They plan way in advance. They know the requirements," said Philip Harlow, president and chief operating officer of XTAR LLC. "We don't have a dialogue like that on UAVs," he said during a panel discussion at the Satellite 2013 exposition.

The government has for years been aware of the industry's wish list, he said. It includes multiyear contracts, having the Pentagon as an "anchor customer" and greater use of hosted payloads. A hosted payload is piece of hardware — a sensor or communications receiver — that would be owned by the government but operated from a commercial spacecraft. "All these are great things," said Harlow. "But unless we have the will within the Pentagon, the budget line item and the single point of authority within the Defense Department, we are going to keep doing what we're doing."

The UAV debate comes down to a simple point, he said. The aircraft were designed with commercial Ku band on board, and a changeover to military Ka band is going to be expensive and time consuming. Commercial satcom cannot be replaced for at least 10 years, he said. "Let's figure out how to buy commercial bandwidth in the most cost effective manner," said Harlow. "We are ready to have that conversation."

William Gattle, vice president of aerospace systems at Harris Corp., said the space industry's confidence in the government market was rattled in 2012 when the National Geospatial Intelligence Agency slashed a projected 10-year \$7 billion deal to buy satellite imagery from GeoEye and DigitalGlobe. The cutbacks led to the merger of the two companies as there was not enough work to support two firms.

"That was a lesson for industry," Gattle told National Defense. "They pulled out of that deal. ... That sent a pretty strong shock-wave into the marketplace."

Companies are hesitant to risk huge investments in technology for government customers unless they know there will be long-term work, he said. "We are willing to build it and take the risk, but we do need some level of commitment," Gattle said. "Somebody has to pay to build the infrastructure."

Harris is betting on the hosted payload market, and has teamed with a joint venture



**Global Hawk unmanned aerial vehicle** AIR FORCE

between Iridium and NAV CANADA to provide air-traffic management services. The project, called Aireon, is the largest hosted payload effort to date, said Gattle. Harris receivers will be hosted on the Iridium NEXT satellite constellation under a five-year contract.

Hosted payloads is one trend in the space industry that has been much talked about but has yet to gain traction, Gattle said. On average, five hosted payloads per year have been launched for the last 20 years worldwide. After Iridium begins to deploy its NEXT constellation, the number will rise to 20 or 30 per year, he said. The market remains untapped, however. "We average 20 geo-satellite launches per year, and only a quarter of them are getting hosted payloads."

Adopting new technology is not as easy as people might think, especially in the government sector, said Gattle. There are no contracting mechanisms for hosted payloads, and the government is skittish about relinquishing control. "It's not a panacea but it can work in specific pockets," Gattle said. He noted the Air Force is expected to begin to solicit industry bids for future hosted-payloads projects.

The cost savings from using hosted payloads can be significant, he said. A communications system can be had for \$2 million, whereas it costs \$2 billion to build a military satellite. "But the government is not used to sharing," he said. "The government is used to being in charge. They're the ones everyone relied on to pay for this."

The space industry, meanwhile, doesn't need Uncle Sam as much as it did in the past, Gattle said. "Owners and operators look at the defense market and say, 'It's too hard ... You're asking me to pay attention to this, and I already have a business.'"

Tip Osterthaler, president and CEO of

SES Government Solutions, a provider of global satcom, said the Defense Department's contracting and business practices make the military market unattractive for industry.

"The only mechanism that the Defense Department has to procure commercial satellite infrastructure is through short-term, spot-market purchases — the most costly and inefficient method to fulfill critical needs," Osterthaler wrote in an article titled, "Seven Ways to Make the Department of Defense a Better Buyer of Commercial Satcom."

Commercial operators can provide protected military communications, either through dedicated hosted payloads or by investing in protection features while building new satellites, he said. One example is the Civil Reserve Air Fleet, which covers the marginal investment required to add protection features to commercial satellites while not committing to the entire project.

"This could be a highly cost-effective method for expanding the pool of protected communications capability, especially for supporting UAV operations in the future, without having to procure specialized government satellites," said Osterthaler.

A frequent industry gripe is that two different offices of the Pentagon handle the administration of military and commercial satellite capacity. "The commercial industry needs a single office where commercial and military satellite capabilities come together," he said. DISA procures most commercial capacity, while the Air Force Space and Missile Systems Center purchases space-related equipment. "Although DISA and SMC are cooperating more now than they ever have in the past," said Osterthaler, "there is still no way to seamlessly allocate military requirements between commercial and military assets." **ND**

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