Competitive prices and growing reliability mean many militaries around the world are opting for commercial SATCOM systems or a combination of solutions over owning their own satellites.

By Ulduz Larki

 Satellite development and usage has traditionally been led by governments, but in the past ten years the private sector has become increasingly prominent within this arena.

‘Commercial companies saw the opportunity within SATCOM, particularly with broadband high-capacity satellite communications,’ said Ken Peterman, president of government systems at Viasat. ‘Companies were implementing development techniques; they were investing billions of dollars. There was competition, and there was a race to market with coverage,’ he added.

The attraction to commercial SATCOM systems has been increasing for several reasons. Commercial operators provide military customers with a flexible and ‘easy-to-engage’ contribution to complement their government-provided systems. They can also provide services in a much shorter timescale than military solutions.

David Bair, executive VP of government services at Eutelsat, said: ‘A small number of operators, including Eutelsat, can respond to military needs on a global basis, with solutions that suit multiple communications requirements from inflight and maritime connectivity to welfare services.’

Advantage spotting

Although there has been a big shift in interest towards commercial solutions, this does not mean that militaries no longer focus on their own SATCOM.

An example of the EUTELSAT 9B, which was launched last year. This satellite is the host for the inaugural data relay payload for the European Data Relay System. (Image: Eutelsat)
solutions. Paul Millington, head of the UK & US at Airbus Defence and Space’s secure communications business, explained that most military customers have increased core military SATCOM capacities for critical operations. ‘They often use commercial SATCOM for their day-to-day operations that do not require the same level of security and reliability.’

Peterman said that more military customers are turning to commercial SATCOM simply because it is ‘better’. When using it, militaries avoid development costs, particularly as companies build global constellations with high capacity and technology at their own expense. He added: ‘Think of it as a highway, and on it, there’s a toll road. Do you really want to build your own highway and spend millions of dollars so that when you want to drive on it, it’s always available? Or, alternatively, do you want to pay a toll and only do so when you actually drive on the road?’

However, financial savings are not the only motivation. According to Peterman, military customers get the chance to ‘test and drive’ the SATCOM before committing to it. This, he explained, results in a low-risk situation for the customer.

Millington pointed out that military customers are asking for more dynamic, flexible, assured connectivity solutions rather than a particular bearer. He said that often this has moved the complexity from questions about the performance of a particular satellite to ones about how a diverse set of SATCOM and terrestrial links are managed to provide the assured secure connectivity that the user needs.

One requirement upon which all companies agree is the resilience of the SATCOM solution. Military customers are primarily concerned with increasing cyber and RF jamming threats. Bair said: ‘While military SATCOM customers are as demanding as other types of customers, maintaining an extremely high level of security in our operations is the main requirement.’

According to Peterman, SATCOM solutions need to have anti-jam functionality so that the customer is protected from different adversaries that could potentially try to disrupt the service. He said that commercial SATCOM enables the military customer to buy an active cyber defence because there is enough richness in capacity to inspect every packet of information flowing across the network to ensure that it is legitimate and safe. ‘It allows us to take real-time action against attempts to attack the network with malware or other cyber attacks.

A spokesperson from Hughes Defense agreed with this, noting that there is a growing interest in the company’s protected communications solutions. The company added that there are long-term plans within the DoD to address this issue, but said that if users need to operate SATCOM without detection from the opposition, the company has unique solutions that are generating a lot of interest within its customer base.

The spokesperson added: ‘We have advanced modern technology that can enhance the waveform, regardless of frequency band, to make it very difficult to detect or intercept. At Hughes, we have a very large pool of engineering experts that can take our customers’ requirements and turn them into reality.’ The spokesperson pointed out that by using commercial SATCOM, military customers can leverage the higher-throughput data rates on the latest satellites. Other benefits, the company explained, are that commercial solutions add resilience, allow flexible mobility-enabling technology and more interoperability of ground equipment and modems.

Philip Harlow, president and chief operating officer for satellite operator XSTAR, said: ‘For military customers, commercial providers can quickly and easily provide bandwidth when government SATCOM is not available, but when discussing military customers, it really comes down to focus.’

**Customer considerations**

According to Harlow, there are some large commercial satellite companies that provide services to both commercial and military customers. He noted that this can potentially cause conflict. Commercial providers offer strong and innovative services to the military, but it is imperative that the military receives priority all the time. This, he said, applies to bandwidth, as well as internal development and innovation to meet military customers’ requirements.
Millington pointed out that such preferences are very much based on individual requirements of nations or users, stating that ‘one size does not fit all’. He said: ‘Airbus has a unique heritage of building, tailoring and working with the customers to answer their specific questions and offer something which truly meets their requirements.’

Peterman foresees that the military will increasingly take advantage of private sector investments. He said: ‘I think that military customers will buy short-term leases, just like on your cell phone. That’s because they want to be able to move to better satellite networks as they become available.’

While there seems to be many arguments supporting the advantages of commercial SATCOM solutions, Hughes Defense pointed to a potential downfall: ‘The disadvantage really is how the government currently procures satellite services, which has been the approach for several decades now. With that said, it does seem that government and military users are keen on moving towards the cellular/mobile service model – buying megabits, not megahertz – with a managed service component.’

Playing host
While there is a growing demand for commercial SATCOM, companies also predict that in the future there will be greater numbers of hosted payloads. Hughes Defense said it has seen ‘an increase in hosted payloads since it’s a cost-effective alternative to building your own satellite’.

The company explained that establishing one’s own satellite is an expensive venture in the commercial area. If a military customer can accomplish its needs with a partnership and a hosted payload on another satellite, it might be a more effective decision and use of funds.

Millington agreed that hosted payloads are an economically attractive option, but said that while there has been a lot of discussion about it, there are relatively few in existence. ‘It can be difficult to align the schedule and risk characteristics of different missions. If the host is a communications payload, there is also the added complexity of frequency and orbital fillings.’

Harlow said that XTAR is a great believer in the hosted payload model, but agreed that the use of the concept is not particularly widespread yet due to a lack of familiarity with the business and the operational models that accompany it. He added: ‘We, on the other hand, have been doing this for over a decade already, so we are very comfortable with it. We know how it works and we know how to make money using hosted payloads, so for us it makes sense. I have no doubt this will catch on with more enthusiasm in the coming years.’

Bair pointed out that Eutelsat also has experience in hosted payloads for multiple partners. Launched last year, the EUTELSAT 9B satellite is the host for the inaugural data relay payload for the European Data Relay System being implemented through a public-private partnership between the European Space Agency and Airbus Defence and Space. Additionally, the European Geostationary Navigation Overlay Service payload will be hosted on the EUTELSAT 5 West B satellite, scheduled to launch in late 2018.

‘We also fly a Wide Area Augmentation System for the Federal Aviation Administration in the US on our EUTELSAT 117 West B satellite, and have been selected to be able to bid on a number of other USG programmes through the HoPS [Hosted Payload Solutions] initiative,’ he said.

Bair stressed that while Eutelsat has established a means of operating that matches the requirements of the hosted entities, it has made sure that it does not limit its own capabilities. He told DB that a hosted payload offers convenience and cost effectiveness for both entities and is a solution that Eutelsat is actively offering to partners.

Success stories
Services provided by individual companies can accommodate vastly different requirements. Harlow said that its biggest success over the past five years had been breaking through into the airborne and mobile markets. He explained that previously, X-band was thought of in the same way that C-band was, with large antennas, fixed sites and static infrastructure programmes, but ‘what we have done is uncover the true sweet spot for X-band – use for mobile applications. We got our first airborne contract almost five years ago and everyone was pleasantly surprised with how efficient X-band was with the small terminals on board the aircraft.’

XTAR can provide high throughput into antennas that otherwise might be thought of as Ka-band. Harlow said that the company does this efficiently – at quadrature

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phase shift keying or higher modulation - so the technical advantage over every other frequency band is 'remarkable'. He added: 'It's astonishing to me that anyone uses any different frequency band for mobile or airborne applications.'

The Hughes Defense spokesperson noted that one of its most popular products was the Hughes HeloSat Solution, which offers a low-cost beyond-line-of-sight communications system for rotary-wing platforms. 'Years ago, we solved a major problem for SATCOM on rotary platforms - transmitting to and from the aircraft through the rotor blades with zero packet loss. With HeloSat, we took it not one, but a couple of steps further. We now have a low-cost, easy-on/easy-off installation package that doesn't require altering the aircraft nor re-certifying it for airworthiness.'

The company explained that another outstanding issue that it has previously solved for its customers is outfitting helicopters to have 360° of inflight connectivity. Previously, operators would lose line of sight with the satellite due to signal blockage from either the rotor base or the fuselage, so the pilot would need to fly and manoeuvre on that basis. However, 'with HeloSat, pilots no longer need to fly with that in mind as our dual terminal architecture stays locked onto the signal regardless of aircraft manoeuvring, which is critical for ISR missions,' the company said.

Millington pointed out: 'We are, of course, seeing trends from militaries for the ability to be able to communicate on the move, with operations on the modern battlefield requiring secure, effective and reliable broadband communications to pass situational awareness, command and control and ISR to units on the move.

'Our XEBRA service has just successfully completed trials for both a commns-on-the-move and commns-on-the-pause service. XEBRA will allow recce forces without line-of-sight communications to pass and receive situational awareness and ISR.'

**Anticipating trends**

While these companies are seeing success with their existing services, Peterman from ViaSat predicts more success with its upcoming solution, Vasat-3. This ultra-high capacity satellite platform - comprising three ViaSat-3-class satellites and a ground network infrastructure - utilises cloud technology and can deliver more than 1,000Gbps/1Tbps of network capacity per satellite, enabling high-speed internet and video streaming 'at scale'.

Peterman said: 'There is absolutely no doubt in my mind that the most popular SATCOM solution for military customers will be Vasat-3-class satellites... This gives the military customers real-time secure access to the cloud wherever they are and they've never had that before, so that's an extremely attractive capability, and I think military customers are going to jump on the Vasat-3 constellation the moment it is available.'

In order to meet military customer requirements, companies have to be able to anticipate and understand the needs of the defence sector. Peterman said that ViaSat think the military increasingly wants to be able to operate on multiple networks, rather than sticking to one provider. 'This gives you the ability to hide in plain sight and gives the customer resilience because an adversary will find it hard to find out which network the military customer is on.'

According to Millington, Airbus integrates and manages services utilising highly resilient military satellites to all types and frequency bands available on commercial satellites. He said: 'In the same way, we offer the "on-the-ground user" a range of options - from military kit to commercial off-the-shelf [products] - to form a complete and coherent solution.'

With alternative approaches to meeting military requirements, Bair of Eutelsat said that innovation is the most critical element for satellite operators when trying to anticipate customer requirements and translate them into services. 'There has to be a solid two-way information flow to help let customers know what services and technologies are available and help satellite operators understand requirements in order to shape their own developments.'

XTAR is currently in the throes of designing its replacement spacecraft. With its current satellites designed to fly until mid-2021, the company is deciding its next steps, while meeting military customer needs. Harlow said: 'We've been in extensive dialogue with the DoD about what they think they need and what technology and features they would benefit from, so we're taking that into account and building the business case.'

He continued: 'If you've ever talked to a military commander about what he needs from his SATCOM provider, it looks like this: "I want it superfast, always available, never negatively impacted by rain or other atmospheric situations, or degraded due to jamming or interference, and I want it to work with a dish the size of my cell phone. Oh, and by the way, it has to be commoditised and inexpensive so we can compete it to get the best value."

Harlow added that this is a difficult business case to close, but that some of the technology has matured since it launched in 2005, which will potentially make it easier. 'Whatever combination of technologies and capability we decide to go with in the end, the DoD is going to have access to a more capable, more resilient, more jam-resistant satellite than is currently flying and they're going to be thrilled with its performance.'