



Network centric operations - courtesy of SES Networks



Delivering hybrid solutions to government users

SES Networks, part of SES, provides managed connectivity services to customers across a variety of markets, including telecommunications, energy, mining, maritime, government. The company utilises its fleet of more than 50 geostationary satellites and the medium Earth orbit (MEO) O3b satellite constellation to deliver services to where they're needed most. Robert Heron, Senior Manager, Market Development Governments and Institutions, SES Networks, opines on the state of the government and military market segments, and the role its medium Earth orbit (MEO) constellations has to play.

Question: SES Networks was formed at the same time as SES Video during a restructure at SES to enable the company to better serve its vertical markets. Which segments fall under SES Networks' remit, and what's your assessment of the markets right now?

Robert Heron: SES Networks provides global managed data services for a variety of sectors, including the fixed data, mobility, and government markets. These include important areas like telecommunications, maritime, aeronautical and energy, as well as governments and institutions across the world. These markets are very dynamic,

and we're doing very well in these areas. We feel this validates our strategy and differentiates the capabilities we're investing in.

The group's portfolio also includes GovSat, which is a 50/50 public private partnership (PPP) between SES and the Luxembourg government. In addition, SES Government Solutions, a wholly-owned subsidiary of SES, is exclusively focused on serving the US Department of Defense (DoD) needs.

The government market is growing whilst also becoming more and more network-centric in terms of the applications that need to be served. SES Networks delivers a whole suite

of applications and managed network services for government verticals, including terrestrial, maritime, airborne, border control, intelligence, surveillance and reconnaissance (ISR), civil protection, disaster response, e-government applications, etc. There are huge opportunities in these areas.

Our capabilities are enhanced by the fact that we have the industry's only multi-orbit, multi-band fleet combining medium Earth orbit (MEO) and geostationary orbit (GEO) satellites. Today, we have government customers from more than 30 countries around the globe, and they trust our capabilities and our experience. As a group, we

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Robert Heron, Senior Manager, Market Development Governments and Institutions, SES Networks

have more than three decades of experience in delivering satellite communications services to governments.

Question: Satellite is playing a growing role within governments and defence groups the world over as demand for always-on, reliable, secure connectivity is at an all-time high. What are the challenges in delivering connectivity to these segments?

Robert Heron: Governments are under pressure to reduce budgets despite the

need to transport more and more data around the world. We're seeing increased demand for throughput, and this is being driven by the growing number and diversity of network platforms. It's been projected that, by 2025, global governments will require at least 78Gbps of data. There's also increased demand for end-to-end services, and only those private sector players who have the necessary capabilities to provide these services will be able to meet this demand.

SES factors all these future needs of governments and institutions into the

design of its future capabilities. We believe we have the flexibility, knowledge and experience to meet the needs of our government customers. We expect global governments to continue to demand a higher degree of resilience, diversity, robustness and ever-increasing capacity from the systems and services which they obtain.

Question: What role can high throughput satellite (HTS) MEO networks play in meeting government bandwidth requirements today? What advantages do they offer over GEO networks?

Robert Heron: Our GEO satellites and MEO constellation complement each other and can basically power any application imaginable. They operate together across the orbits, and as we move forward, we're going to see more and more value created by optimizing the routing of traffic between GEO and MEO. Hybrid GEO and MEO solutions are going to be really important to us in the future, especially for military clients who need to constantly maintain the lowest cost carrier with very high data rates and reliability.

MEO satellites are ideal for latency-sensitive applications and can provide services with performance that is on par with fibre. It's better than fibre in some instances because the jitter on our MEO networks is better than many fibre networks. Depending on the geometry of the network, our MEO constellation can provide less than the average



O3b MEO antennas - photo courtesy of SES Networks



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150ms. A single O3b MEO satellite beam can provide high enough bandwidth to establish reliable connectivity between multiple locations, on land, in the air, or at sea. This includes things like tactical operations centres for the military, no matter where they are, and enables uninterrupted, real-time, delivery of high definition video for terrestrial and airborne ISR platforms, access to secure networks, gigabyte-size file transfers, and so on. What that means is that connectivity to remote locations can be just as good as it is to headquarters. We're offering high-bandwidth, highly reliable communications to any location, at any time.

These MEO satellites are also naturally jam-resistant because they utilize small beams and are constantly moving across the sky, making any kind of intrusion difficult. For our forthcoming next generation MEO satellite

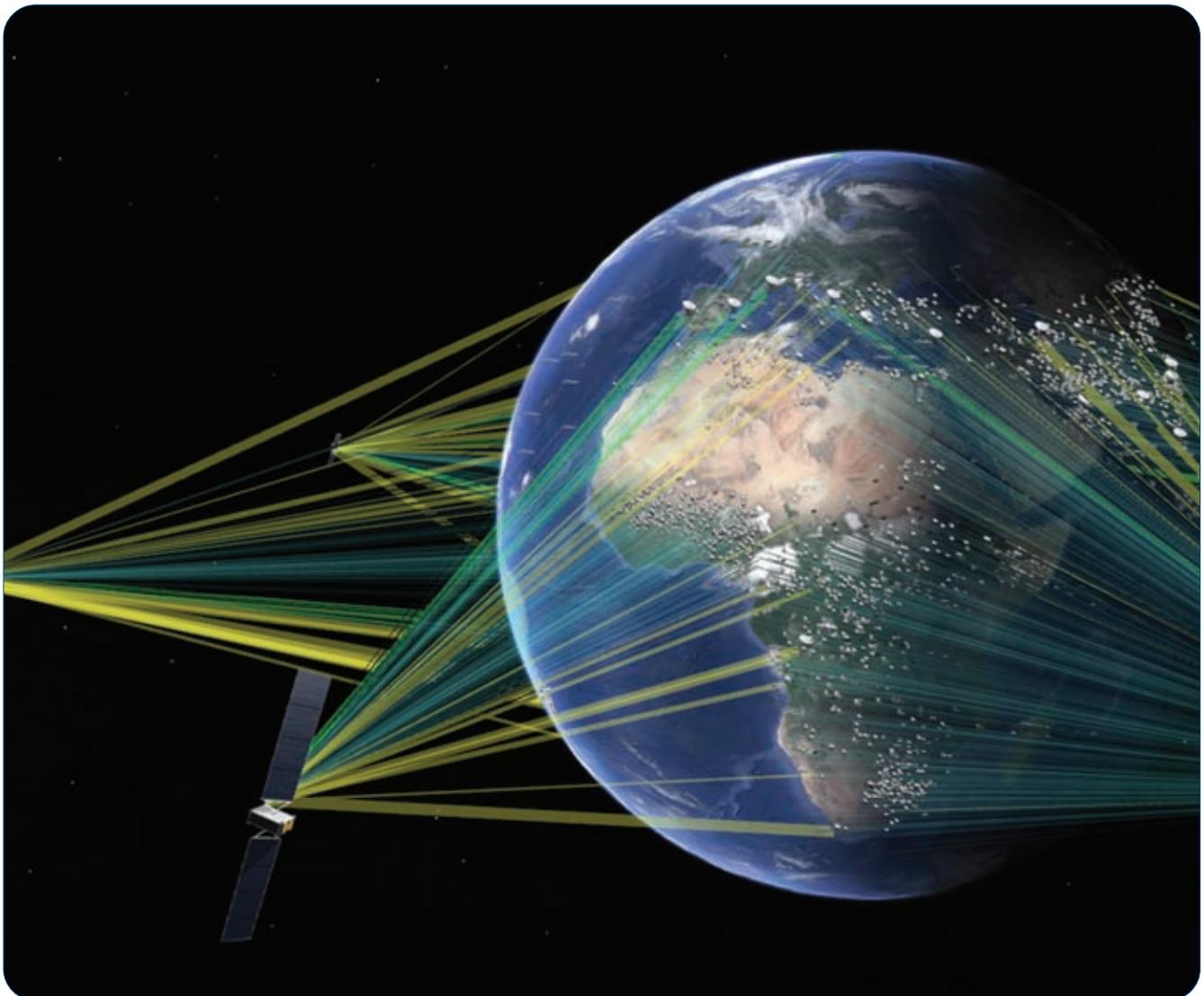
communications system, called O3b mPOWER, the situation improves even more, and jamming those networks will become far harder still. MEO also enables the use of high-tech cloud-based applications, which is particularly important for remote locations.

Governments and institutions are increasingly turning towards the capabilities provided by our MEO system. In the US alone, SES Government Solutions (SES GS) is servicing 50 DoD customers who avail themselves of the full range of our capabilities, both on GEO and MEO. Earlier this year, SES GS was awarded a Blanket Purchase Agreement which enables the US DoD to access O3b MEO services worldwide and includes managed services on high throughput satellites, broadband services, gateway services, monitoring and control services, access to satellite terminals, field service representatives, and

training and terrestrial backhaul. MEO has already made the cost of high throughput satellite capabilities attractive for government customers, and our forthcoming networks will do that even more so. We already deliver multi-Gbps HTS MEO capacity to dozens of sites worldwide.

Question: There are a lot of low Earth orbit (LEO) constellations on the cards right now. What's your assessment of these plans, and how will they compare with SES Networks' MEO constellation?

Robert Heron: Firstly, it's important to highlight that our O3b MEO fleet is a fully-operational system which is successfully delivering fibre-like services to millions around the world. Our MEO constellation is already a proven concept with a proven economic model. The next generation of O3b MEO satellites, O3b mPOWER, is the only



O3b mPOWER - photo courtesy of SES Networks



SES multi-orbit fleet - photo courtesy of SES Networks

fully-funded non-geostationary satellite system today. That means that it is definitely going to materialize.

Future LEO constellations have quite some challenges, including high initial manufacturing and launch costs, the complexities and risks of trying to deploy so many satellites so close to one another, and complex and expensive ground hardware. If and when these LEO satellites are launched, they'll be much closer to the Earth, so their coverage is also limited; that's why so many more LEO satellites are needed to provide the same coverage as MEO satellites. We're talking about hundreds if not thousands of satellites. To give you an example: O3b mPOWER will provide global coverage with only seven high-powered satellites. The increased proximity to Earth of LEO satellites also means that the ability to connect to both the customer and a gateway with the same satellite is much lower, which means a much more complex hub network, which will add latency. In addition, the handover between hundreds or thousands of satellites with no data loss, as we already achieve with O3b, is very challenging.

Most applications can run as well on existing MEO as on future LEO. In most cases, users won't really notice the

difference, except maybe highly-interactive areas like gaming.

Upcoming LEO networks will have to prove that they're financially and technologically viable. There are, of course, already some LEO networks such as Iridium, Globalstar and Orbcomm, which primarily serve low data rates applications such as voice. However, the coming wave of LEO satellites will be targeting completely different applications, which will be extremely challenging to say the least.

The expectations around LEO are very high, but it remains to be seen whether they'll be able to live up to those expectations.

Question: Let's talk about O3b mPOWER, the next generation of MEO satellites. How will these satellites enhance SES Networks' capabilities, and what can you tell us about progress to date?

Robert Heron: The O3b mPOWER satellite communications system has arisen from our vision for the enhancement and growth of our MEO network, where we are scaling a proven concept. It also responds to the data-centric needs of our customers. It's basically a new industry benchmark, these are fully-configurable, fully-digital satellites. The initial seven satellites of

the O3b mPOWER system will be launched in 2021. Each of these satellites provides more than 4,000 beams, which are completely configurable and have many interesting characteristics.

This fleet is scalable to provide multi-Tbps of global capacity. It's a highly flexible, highly advanced system, with the capability to enable sophisticated applications. The beam-forming capabilities of these satellites provide advanced features which are of particular interest to governments and military groups. These beams can be reconfigured very rapidly to expand or shrink coverage. The beam-forming flexibility will also enable government users to securely and autonomously manage beam capacity and location to support secure operations on air, land and sea. It's a very exciting time for the satellite industry right now. I've been in the industry for a very long time, but I've never seen the pace of change of technology happening as rapidly as now, both in space and on the ground. The capabilities that we and others are bringing to fruition are really astonishing. I think the rate of change is going to continue for many years to come, and the benefits of that for users, such as lower costs and greater capabilities, are incredible. ■