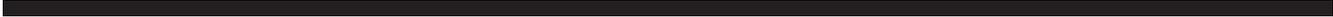


LEO RISING

Mark Rigolle, CEO of LeoSat Enterprises speaks exclusively with *SatellitePro ME* about how LEO orbits are changing the future of communications and mobility



LEO satellites orbit the earth much closer than GEO satellites, making them much more effective for communications and mobility applications.



Today the world is increasingly data-driven, cloud-based and transnational, creating ever-growing demand to move large quantities of data quickly and securely around the globe. In the last 10 years data usage has exploded, with more data created in the past two years than in the entire previous history of the human race. Industry pundits determine that by the year 2020, about 1.7MB of new information will be created every second for every human being on the planet.

The availability of data, a new generation of technologies such as IoT and M2M, and a cultural shift toward data-driven decision-making and automation are continuing to drive our dependency on Big Data and fast and resilient communications networks. Bandwidth requirements are also rising with

the demand for always-on connectivity, and businesses are increasingly looking at how technology and connectivity can improve operational efficiency.

The question is: how can satellite networks start to become truly relevant in this wave towards increased dependency on Big Data and cyber security?

Mark Rigolle, CEO of LeoSat, says: "It is true to say that satellite has up until now been viewed as a last resort or gap filler for data transport, as traditional satellite networks operating in geostationary orbit (GEO) suffer from high latency and typically provide little throughput. While only annoying for voice and video applications, for data communication it is truly a limiting factor in reaching the desired performance or simply

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MARK RIGOLLE, CEO, LeoSat Enterprises



a showstopper for certain applications to work. So, whilst GEO remains strong in video, true data-driven applications such as 4G and 5G backhaul, remote management and enterprise connectivity require a fundamentally different satellite architecture that can solve the issues of latency, throughput, reach, mobility and security.”

Latency Changes Everything

Network latency is defined as how much time it takes for a packet of data to get from one designated point to another. Ideally, in the world of data, latency needs to be as close to zero as possible in order to create a smooth user experience. For satellite networks, the closer you get to Earth, the less latency there is.

“With LEO satellites orbiting the Earth at around 1,500km – that’s 25 times closer than GEO satellites (36,000km) and five times closer than MEO satellites (8,000km), the case for using LEO for data networking becomes compelling. These low Earth orbit (LEO) satellites bring latencies down from 500+ms to only 20ms or so, and importantly they can now measure up to the latencies typical for terrestrial infrastructure,” says Rigolle.

In addition to the issue of latency, as we move to a more data-centric world the traditional satellite architecture of ‘bent pipe’ is very much showing its limitations. Bent pipe means that whatever is transmitted to a satellite needs to come down straight away.

Rigolle explains: “While this has worked well to connect our continents back in the 60s and 70s, and still works well for DTH video applications, it does not work well for data. Using that type of technology for data requires the use of many Earth stations with antennas that are connected to terrestrial infrastructure to carry traffic to its final destination and/or beyond the reach of the satellite. This is suboptimal, to say the least, and comes with a great amount of expense and operational requirements.”

So, while LEO as such will solve latency issues typically associated with satellite, the real game-changer for data will be achieved by stepping away from traditional bent pipe and taking satellites to the next level, to spatial networking, according to him.

“One such system in development is LeoSat, consisting of a constellation of 78 satellites which form a fully redundant mesh network interconnected through laser links. This creates an optical backbone in space which is about 1.5 times faster than fibre. Data can be transferred from satellite to satellite without having to come down to Earth, as is required in a bent pipe system. This way, traffic can be sent from where it originates all the way across the globe to where it needs to terminate without touching anything on the ground until it reaches its destination. As obvious as this architecture may sound from a networking perspective, up until now it has not been available for high-speed data in the satellite industry.

“In addition, traditional satellite design only allows for modulation of data in RF, posing limitations for integration with terrestrial networks. In order for satellites to be seamlessly interoperable with terrestrial networks, either MPLS or IP, the satellites need to support full duplex and they also need to have routing and switching capabilities, similar to their terrestrial counterparts. With on-board processing (OBP) and MPLS networking as integrated features of the new LEO systems, they will be able to operate as a full duplex, spatial extension to terrestrial networks that can carry traffic to any place on earth, from pole to pole and from land to sea,” explains Rigolle.

With LEO bringing all these advantages to the satellite market, allowing satellites to go beyond their traditional role of gap-filler, LEO systems will actually start to become a technology of choice for data communications.

New Opportunities for Multiple Market Segments

What can a new LEO data network offer? In sectors such as oil & gas, maritime, telecommunications, multinational enterprise and government services, LEO systems can solve essential communications and connectivity issues and meet the ever-growing demand to move large quantities of data quickly and securely around the world.

Rigolle says: “For a typical Fortune 1000 company, just a 10% increase in data accessibility will result in more than \$65 million additional net income.

The key attributes of a system in low Earth orbit can be used for a number of applications, for example to provide 4G and 5G satellite backhaul to the cellular industry, give banks secure networks with their foreign offices, provide enormous uploading bandwidth required for oil & gas exploration, or allow internet access to passengers on cruise ships. LEO will not only provide a competitive advantage in the existing satellite services market, it will help to expand these markets by enabling new opportunities through previously unavailable levels of performance with true worldwide reach.”

The oil & gas industry needs connectivity solutions with low latency and high throughput to improve productivity and on-shore/off-shore collaboration. Increasingly, modern rigs produce enormous amounts of data reviewed in near real time. Existing satellite networks cannot handle the bandwidth and speed requirements to move this amount of data quickly. The low latency and high throughput global data network in LEO will enable voice, video and cloud-based enterprise applications for digital oilfield communication, driving efficiencies and ensuring optimised connectivity.

As cellular protocols become more and more sophisticated and cellular use accelerates, there is an ever-increasing need to transport cellular signal for long distances at high speeds, in high volumes and in its native form.

Rigolle adds: "These growing backhaul needs are not being met by current terrestrial networks, and existing and planned satellite networks are too slow and the bandwidth too limited. For existing and emerging market telecom operators, LEO offers significant advantages as its latency, timing and transport are in compliance with the network standards of the newer 4G, 5G and LTE cellular systems. And with the continued growth in internet use, streaming media, smartphone use, mobile apps and the Internet of Things, the low latency of the LEO systems will become increasingly an attractive alternative to the high latency of GEO systems."

In the finance industry and in particular the trading sector, banks, hedge funds, trading firms and financial services companies are always looking for the latest technologies and innovations to stay ahead of the competition. With exchange technology and big data at the forefront as key differentiators for success, companies are looking to address the challenges of latency management and network connectivity. Low Earth orbit communications satellites with inter-satellite links can achieve lower latency and stronger end-to-end security compared to traditional terrestrial solutions used today, he explains.

When it comes to maritime, operators face significant problems getting adequate broadband networks to interlink ships



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to each other and to a main office, and to serve the ever-increasing data and internet needs of passengers and crew. On cruise lines, passengers are demanding more and more bandwidth to power consumer devices and for internet access.

“Existing satellite systems, most of which can only illuminate limited portions of the Earth from GEO or MEO orbits, cannot satisfy these needs. A LEO system with interconnected satellites can bring ships on-net, regardless of their global position, just as if they were a local network node, enabling operators to leverage the new smart ships digital infrastructure where cloud-based operations will improve efficiency, operational effectiveness and safety, as well as providing new business opportunities.

“The military and government sector

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relies on a number of key attributes when it comes to communications networks. Critical operations require bandwidth-intensive applications, near real-time command and control, and advanced sensor capabilities. The proximity LEO satellites have to the Earth translates into lower latencies and better data rates. Security and resilience are also key attributes, and with a constellation of inter-connected satellites, data can travel from end to end across a single encrypted network, bypassing terrestrial infrastructure,” explains Rigolle.

LeoSat – A New Communications Paradigm

There are a number of new LEO systems in development which will have a positive impact on data communications. Each of these forthcoming systems, be it OneWeb, SpaceX, Boeing or Telesat, brings different capabilities and opportunities for broadband communications.

“Our system, LeoSat, is focused solely on the business market and is being developed by Thales Alenia Space, a company with

unmatched expertise in designing and manufacturing low and medium Earth orbit constellations such as Iridium Next and O3B. The 78-satellite LeoSat constellation, effectively an MPLS network of routers in space, provides customers with very high throughput, low latency and highly secure communications between any two or more locations on Earth, independent of existing terrestrial networks.

This is achieved through deploying optical inter-satellite links (ISLs) between satellites, who in turn support symmetric connectivity to a ground antenna with speeds of up to 1.6Gbps and even 5.2Gbps where needed. Contrary to bent-pipe HTS solutions, gateways are not a prerequisite for LeoSat to operate its network.

“For customers, this unique use of technology allows for premise-to-premise connections with no terrestrial touch point in between, and sets a new bar for high-speed networks. In addition, data security is assured as data stays on LeoSat’s physically separated satellite network for the entire

route, making it much less susceptible to monitoring, hacking or even disruption. Start of the launch of the constellation is expected in 2020,” says Rigolle.

In the Middle East, it is clear that there are a lot of opportunities for growth in the data and mobility markets. From government applications to corporate networks, from cellular data solutions to the maritime sector: all markets present the need for faster secure communications in the MENA region.

“In this light, we are seeing a growing trend whereby FSS operators, looking to complement and expand their capabilities, are partnering with LEO satellite operators to provide combined GEO/LEO data services that cannot be supported by GEO alone. This trend (SES/O3B, Intelsat/OneWeb) is set to continue, and I am delighted to see that multiple FSS operators are in discussion with LeoSat as they see the value in partnering with us to offer the market enterprise-grade, low latency, extremely high-speed and secure data services worldwide,” concludes Rigolle. **PRO**



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