SES

INSIGHT PAPER

REIMAGINE YOUR SUCCESS STORY

Redefining network services with O3b mPOWER

O3b mPOWER


The O3b mPOWER system is the
future of high-throughput, low-latency,
satellite-based network services.

EXECUTIVE SUMMARY

Responding to increasing volumes of network traffic, changing traffic patterns, and a growing need to deliver fast, low-latency connectivity to the very edges of the global internet, SES has invested in a ground-breaking, second-generation MEO satellite system—O3b mPOWER—which builds on the proven commercial success of its first-generation MEO constellation.

Starting with a review of current trends and requirements in global networks, this paper goes on to explain how O3b mPOWER responds to those requirements. With application examples across a range of industries, the text and technical illustrations demonstrate how working with SES and O3b mPOWER enables service providers, commercial enterprises, and government entities to reimagine their success.

O3b mPOWER represents a step change in capabilities for satellite-based networking. With unrivalled scale, the system can provision throughputs up to multiple gigabits per second per service, and as reliance on cloud and edge computing grows, O3b mPOWER creates opportunities to offer a diverse range of scalable network services previously unachievable over satellite.

By drawing on O3b mPOWER's unprecedented flexibility, network operators are able to control and optimise their services, directing traffic to the ground facility of their choice and dynamically adapting forward/return ratios to meet demand.

Superior performance is guaranteed through low end-to-end latency and high availability, backed up by stringent Service Level Agreements (SLAs). O3b mPOWER supports latency-sensitive applications for businesses and government agencies, ensuring a fibre-like experience for end users.

Carrier Ethernet MEF certification enables O3b mPOWER to seamlessly interoperate with telecom, cellular, and cloud networks using industry-wide standards. With Software-Defined Wide Area Networking (SD-WAN), the system allows intelligent diversity, security, and application data steering over MEO, GEO, or terrestrial links, delivering enhanced resilience and optimal performance.

SES is able to leverage years of successful commercial satellite operation in medium earth non-geostationary orbits (MEO NGSO). O3b mPOWER is the next evolution of SES's MEO-based solutions, driving advanced technology, increased capacity, and unmatched flexibility to give customers the confidence to implement their network growth and resilience strategies.

THE NETWORK CHALLENGE

Ever-increasing user mobility and a surging demand for global connectivity are creating new challenges for businesses and governments while rapidly increasing the volume of data being transmitted via satellite-enabled networks.

Organisations increasingly need to interconnect all corners of their networks, including locations where terrestrial communications infrastructure is poor or non-existent, or where it is economically infeasible. Balancing constantly changing cloud and edge computing workloads and configurations is a fundamental consideration for efficient network operations; while many tasks are carried out at a centralised cloud location, requiring dedicated low-latency connections to cloud service providers, some compute capability is essential at the network edge to support critical applications and minimise data traffic congestion.

There is also a demand for end-to-end managed network solutions, serving enterprise end customers who wish to buy a complete connectivity package in the same way they would purchase network services from a purely terrestrial provider. But given that the outer endpoints of these managed networks may now be located in the most inaccessible places on Earth, it is essential that all parts of the network, whether terrestrial or satellite, are seamlessly integrated together.

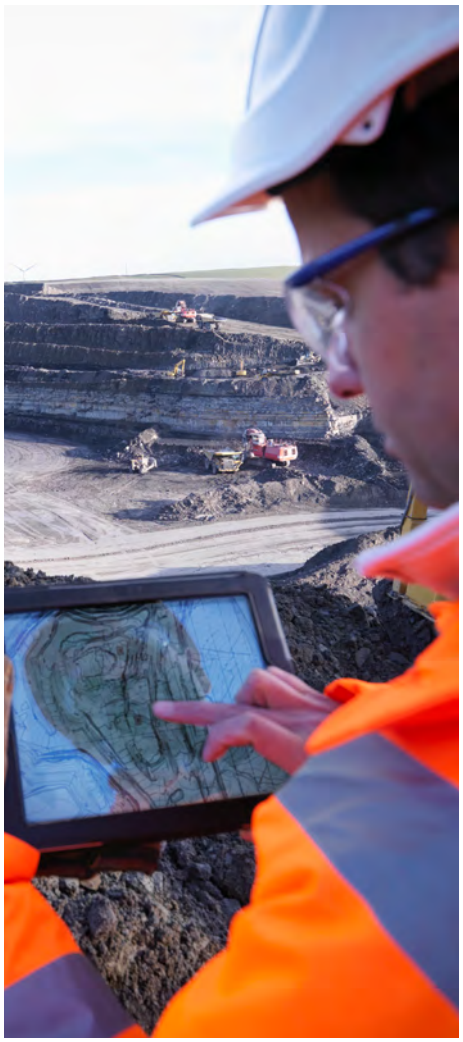
5G networks are coming online and offer bandwidth rates an order of magnitude higher than current 4G levels. Mobile Network Operators (MNOs) already use satellite links for backhaul in areas where terrestrial networks are absent or have insufficient capacity—with 5G, there will be a need for satellite support that can handle the coming quantum leap in aggregated traffic volumes.

Meeting these calls for ubiquitous, high-performance connectivity constitutes both a major revenue opportunity for businesses and a strategic necessity for government institutions. While traditional satellite solutions are evolving to increase throughput, they cannot meet the latency and performance advantages of MEO. Even low Earth orbit (LEO) systems, some of which are under development, have business models that are based on as-yet unproven technologies and are likely to experience substantial commercial risks. These LEO-based services will also be forced to launch very large constellations to achieve adequate coverage.

Therefore, for all sectors, there is a clear need for a new, high-capacity satellite system with a proven pedigree and future-proof capabilities. O3b mPOWER has been specifically engineered to address this need.

THE O3b mPOWER SOLUTION

Unrivalled scale. Unprecedented flexibility. Superior performance. O3b mPOWER introduces a new era of cloud-scale satellite internet and managed network services to drive business growth and achieve mission success.



O3b mPOWER is an integrated communications system with fully synchronised spacecraft and ground resources. Power levels, throughput, and frequency allocation are dynamically controlled to optimise service delivery, empowering network operators to generate earnings and drive efficiency in ways previously unheard of in the satellite industry.

Designed to incorporate high-volume digital payloads, SES's latest-generation MEO satellites form the core of the O3b mPOWER system. Each spacecraft can cast virtually countless electronically steerable beams, directed and switched in near real time to deploy uncontended services at throughputs ranging from 50Mbps to multiple gigabits per second per service. Orbiting at an 8,000km MEO altitude enables the constellation to guarantee low-latency data transfer with coverage between ±50° latitude—serving 96% of the world's population.

O3b mPOWER's Customer Edge Terminals (CETs) are essential building blocks of the system's ground infrastructure. Available in a wide variety of form factors, these CETs support both fixed and mobile operations, managed networking, and edge compute capabilities. The system is compatible with both steerable phased-array terminals and conventional mechanically steered parabolic antennas. Combined with managed and customer-located gateways and the ability to interface with flexible network topologies, traffic can be directed seamlessly across all end points of an organisation.

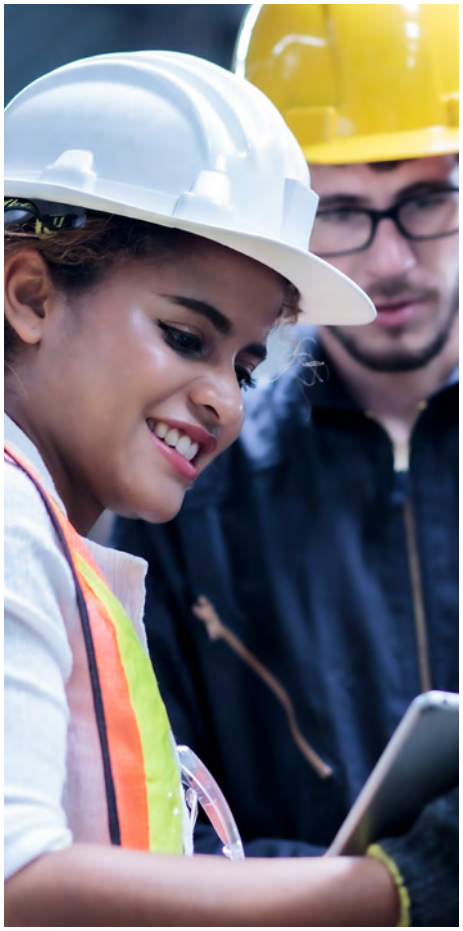
As the only satellite-enabled service provider with Carrier Ethernet MEF certification, SES can ensure interoperability with telcos, MNOs, and cloud services with the same Layer-2/Layer-3 interconnection capabilities and SLAs used industry-wide. Together with the company's adoption of the Open Networks Automation Platform (ONAP), these standards make integration with O3b mPOWER seamless, predictable, and efficient.

With intelligent SD-WAN, O3b mPOWER is equipped to offer multi-orbit resilience and coverage. By leveraging SES's GEO satellites, MEO links benefit from both a reliable backup and extended connectivity to high-latitude locations. SD-WAN automates routing by using Deep Packet Inspection (DPI) to determine the application type, and then steers data over GEO, MEO, or terrestrial links for optimum network performance.

The proven success of the existing O3b MEO constellation provides a trusted foundation for O3b mPOWER. Operating in NGSO since 2014, O3bMEO comprehensively serves the global communications needs of governments, network providers, and large enterprises. Using the entire commercial Ka frequency band, O3b mPOWER advances the throughput capabilities of its predecessor to deliver a more fibre-like satellite data experience with minimal operational and business risk.

The O3b mPOWER solution—

UNRIVALLED SCALE



A unique value proposition for service capacity in satellite networks.

O3b mPOWER is the only satellite communications system that can scale, reliably and dynamically, to deliver thousands of dedicated managed services ranging from 50Mbps to gigabit-level data rates per service. The scale of O3b mPOWER, combined with the flexibility and granularity with which throughput can be provisioned, creates new opportunities to offer high-capacity network services over satellite.

As the reliance on cloud and edge compute applications grows, O3b mPOWER provides the scale to maximise application performance anywhere organisations operate. The system enables network operators to allocate private connections just one hop away from cloud service providers, improving cloud application performance regardless of end-user location. Throughput can scale in real time to multiple gigabits per second, making O3b mPOWER ideally suited to cloud workloads and giving end users the advantages in productivity, cost effectiveness, and operational agility that cloudification allows.

Internet of Things (IoT) applications such as autonomous operations and smart factories are predicted to continue to grow substantially. For 5G networks, this will lead to not only a huge increase in data rates, but also challenges in meeting capacity density demands in areas with significant concentrations of connected devices. O3b mPOWER supports backhaul infrastructure needs by delivering multi-gigabit bandwidth exactly when and where required, whether at high-density cell sites in conjunction with fibre and terrestrial wireless, or in remote regions that lack a viable terrestrial option.

Indeed, servicing remote locations is a requirement for many organisations. By ensuring a rapid extension of backbone networks, O3b mPOWER is a key enabler for entering new markets simply, quickly, and robustly. The system has the capacity required to meet large-scale end-user demand, and the application of MEF standards for Quality of Service (QoS) promotes a seamless integration into existing infrastructure, allowing the network edge to be extended to anywhere it is needed.

For government networks, O3b mPOWER is mission ready. Provisioning uncontended data streams at gigabit speeds means that critical operations can be supported and optimised both today and in the future.

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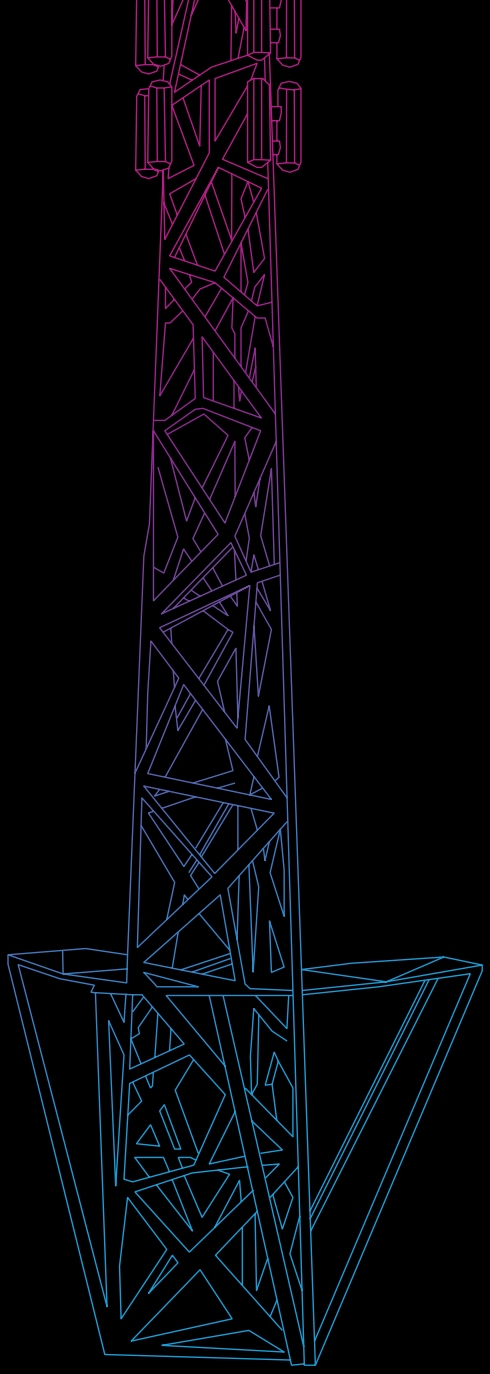


Industry focus—

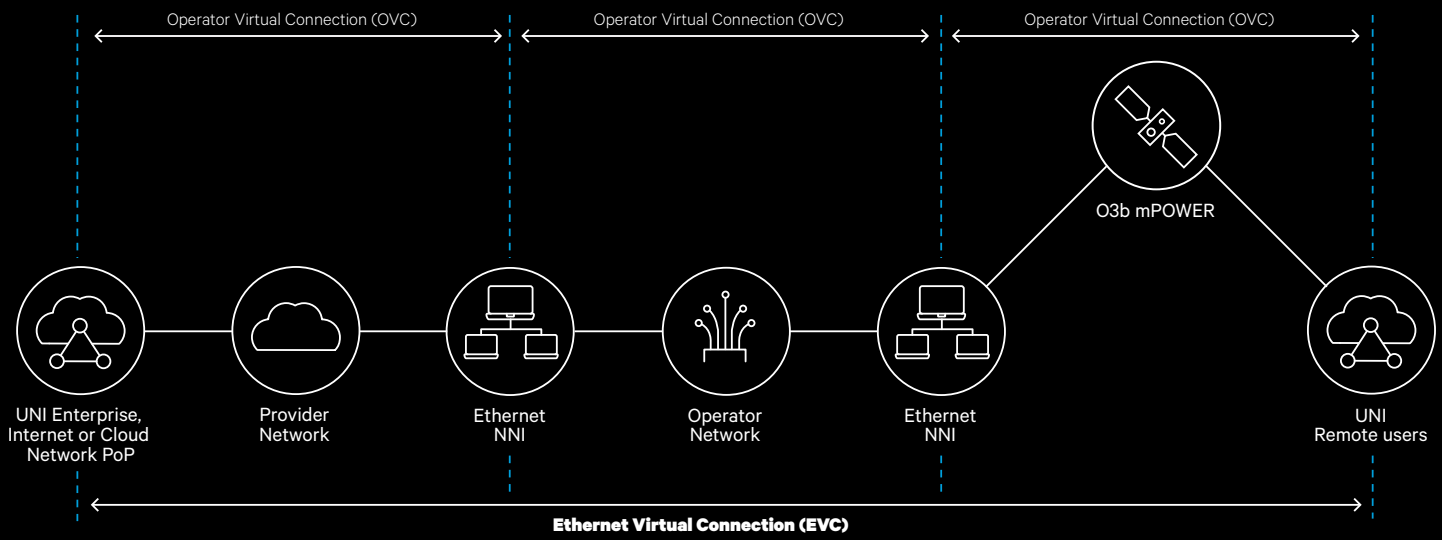
CARRIER ETHERNET

O3b mPOWER offers a fibre-like Carrier Ethernet E-LINE service with MEF certification, eliminating the operational risk of complex proprietary network integration. MEF specifies Operator Virtual Connection (OVC) services with a standard External Network-to-Network Interface (ENNI), allowing network operators to apply O3b mPOWER services anywhere in their systems. Most commonly used as a backbone extension service, O3b mPOWER rapidly pushes WAN extension out beyond the fibre network edge into markets where terrestrial links are either unachievable or unreliable.

Efficient, transparent network management is assured through O3b mPOWER's Adaptive Resource Control (ARC). ARC is an innovative cloud-based software capability that dynamically synchronises space and ground resources, utilising real-time data to optimise network services and deliver premium user experiences with maximum efficiency. Through an intuitive customer portal, ARC allows precise monitoring of service performance against O3b mPOWER's rigorous SLAs, covering throughput, latency, and availability.

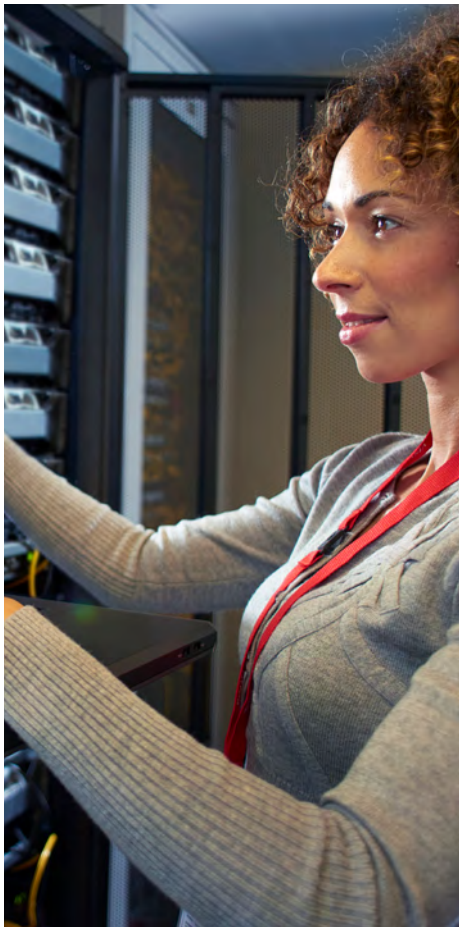
SD-WAN adds another layer of control by granting network operators increased resiliency and security through application awareness, link bonding, and automatic failover. SD-WAN also affords deep insights into end-user application usage for optimising network utilisation.

With O3b mPOWER's Carrier Ethernet, telcos, MNOs, and service providers have the tools to effortlessly extend their services with bandwidths previously only available over fibre.



The O3b mPOWER solution—

UNPRECEDENTED FLEXIBILITY



Network operators can now break free from the limitations of conventional satellite services, exercising greater control over how and where services are provisioned.

O3b mPOWER provides the flexibility to route traffic anywhere, with gateways selected according to network requirements. In many cases, the appropriate solution is an established SES internet access gateway, but O3b mPOWER's phased-array antennas can configure beams for gateway or CET use anywhere, offering a previously unavailable level of freedom in choosing gateway locations.

O3b mPOWER's traffic steering agility helps organisations meet their networking obligations and targets. These may include compliance with regulations requiring traffic to remain within a country or geographical region. Data streams can also be routed to preferred locations, selected to optimise overall network and application performance.

In networks with multiple dispersed locations connected to data centres or central facilities, O3b mPOWER enables traffic steering to be optimised on a demand basis. Any endpoint can have its traffic allocation adjusted in a matter of minutes as data transfer requirements change.

The forward/return ratio for previous generations of satellites is largely fixed by the design of the satellite itself. O3b mPOWER, by contrast, allows unparalleled flexibility in forward and return path allocation, providing the tools to match directional throughput to application conditions. This is a game-changer for sectors such as Intelligence, Surveillance and Reconnaissance (ISR), where return-path throughput predominates, and cruise lines, where passenger content uploads grow exponentially year after year and increasingly contribute to a positive guest experience.

Because O3b mPOWER offers full dynamic control of resource utilisation, network operators can now craft new service models for end customers. Go-to-market strategies can include bandwidth-on-demand, consumption-based packages, and dynamic bandwidth pools, creating differentiated services designed around user needs.

Short-term connectivity can also be deployed, such as for disaster response. In locations where ground-based infrastructure has been damaged or destroyed, mobile or transportable O3b mPOWER CETs can be combined with temporary cellular networks to implement communications services for emergency responders. Other temporary network scenarios include additional mobile backhaul capacity for large-scale events such as music festivals, temporary comms services to address outages following severe weather events, or timebound projects such as prospecting in remote areas.

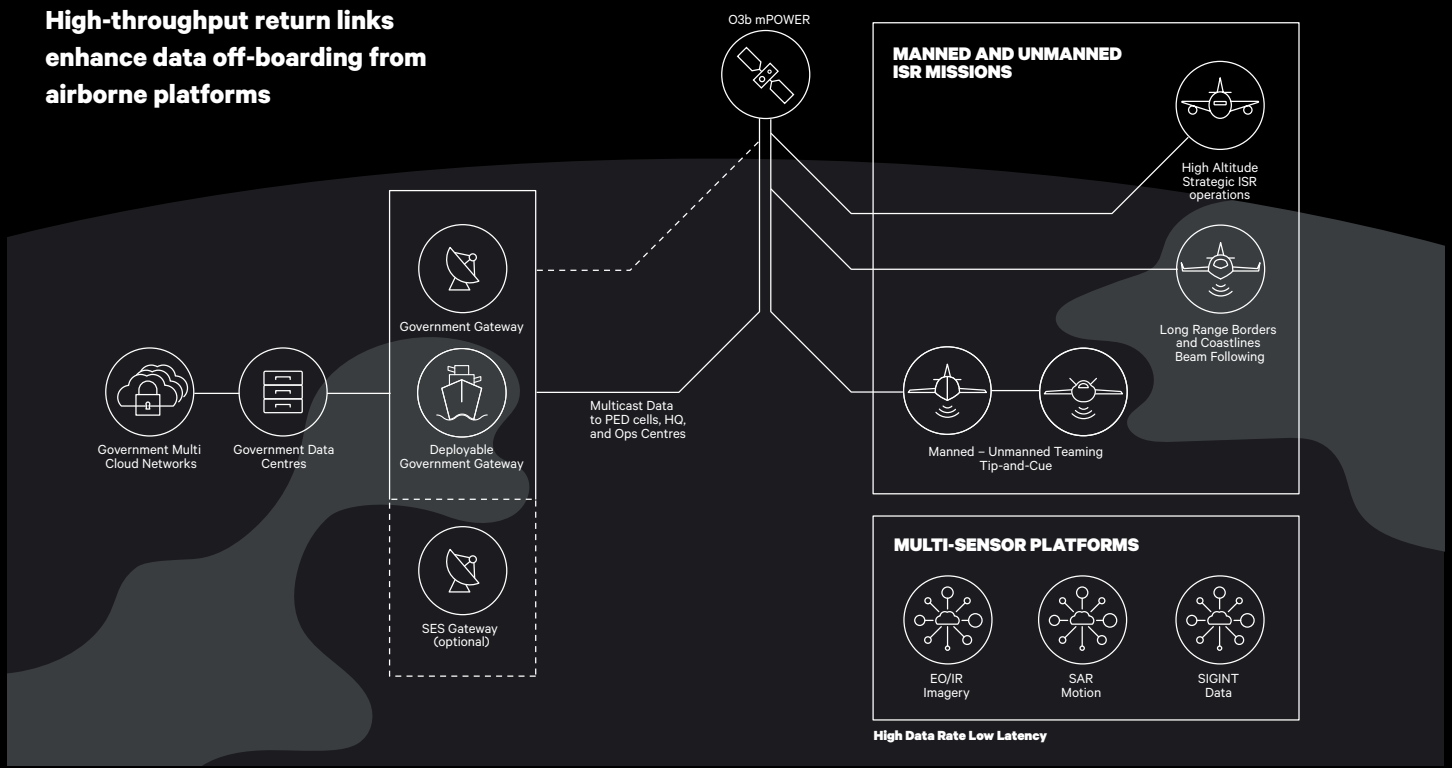
Industry focus—

ISR MISSIONS

Multi-sensor airborne platforms, both manned and unmanned, are vital to today's intelligence, surveillance, and reconnaissance missions, accomplishing a wide range of operational objectives ideally in a single sortie. ISR assets gather a massive range and volume of data on each flight, driving the need for high-throughput data streams with a return-path capacity of tens to hundreds of megabits per second. Latency is clearly critical during operations, both for real-time data analysis and screen-to-stick operator reaction times, and ISR networks also require global coverage with built-in security and robustness to counter jamming and data interception.

O3b mPOWER represents a transformative opportunity for ISR applications. With its innovative satellite and terminal technologies, O3b mPOWER delivers uncontended network connections to remote command and analysis centres. The combination of narrow spot beams, private ground stations, beam following, and waveform transparency ensures superior levels of network security and resilience, while SES's multi-orbit solutions maintain connectivity at all latitudes. Fibre-like data rates and reduced latency, together with the flexible allocation of forward and return link data ratios, provide a high-performance cornerstone for enhanced intelligence capabilities and vastly improved mission success rates.

High-throughput return links enhance data off-boarding from airborne platforms



The O3b mPOWER solution—

SUPERIOR PERFORMANCE

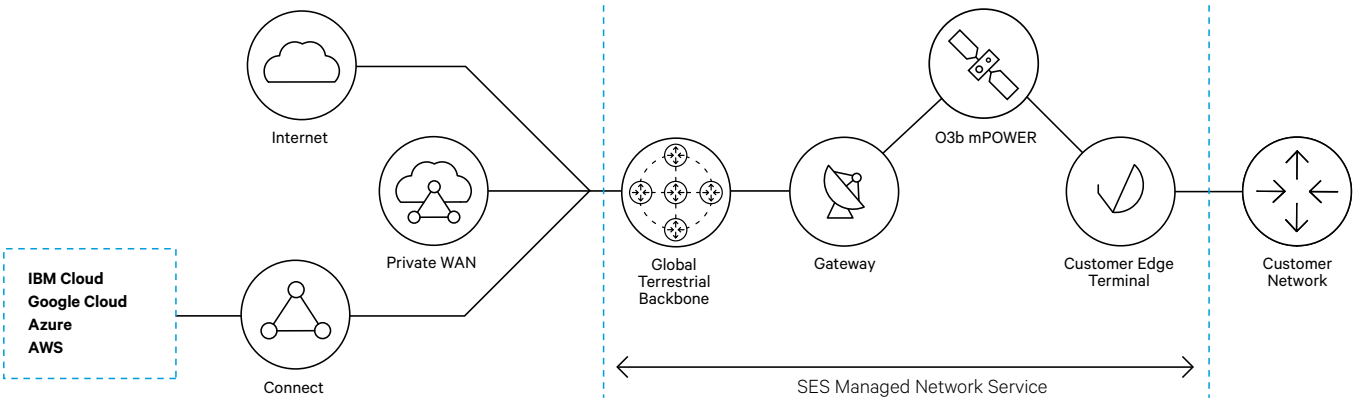
Delivering SLA-backed, best-in-class connectivity over satellite

O3b mPOWER has been engineered with end-user performance requirements as the leading driver. With latency levels matching the QoE of many terrestrial fibre networks, the system can support a wide range of latency-sensitive services, including video conferencing, VoIP calls, and cloud-based business applications. Enterprise Resource Planning (ERP) is a key example of business-critical software, usually hosted in the cloud, at third-party server sites, or on-premise within the organisation. O3b mPOWER is able to facilitate ERP stability by maintaining latency well within ERP performance requirements. Energy companies, international organisations, and manufact-uring corporations are therefore equipped to run business processes with real-time information transfer at all end points, whether centrally located, at remote sites, or offshore.

SES is further improving cloud performance through close collaboration with major partners such as Microsoft, Amazon, and IBM. Several SES gateways have been installed within Microsoft Azure data centres, specifically to maximise cloud application performance and make available a wide range of Azure-based network functions, analytics applications, and cloud-access capabilities to end-users. With ground-infrastructure latency greatly reduced, coupled with the natural low latency of MEO altitudes, O3b mPOWER places network operators and end users even closer to their enterprise cloud content. This contrasts starkly with LEO constellations, where each satellite's limited Earth view will require an extensive ground network or complex, capacity-absorbing inter-satellite links (ISLs), imposing significant end-to-end latency penalties and jitter-inducing multi-hops as a result.

Service availability is a crucial parameter for network performance, particularly in cases of Infrastructure as a Service (IaaS) or Software as a Service (SaaS) cloud applications, government missions, and monitoring of critical operations through IoT analytics. With resiliency designed into its spacecraft and ground architecture, O3b mPOWER offers up to 99.5% uptime, reducing service degradation and enabling organisations to sustain business continuity.

Claims of superior performance are, of course, meaningless if not backed up. Covering throughput, latency, and availability, O3b mPOWER commits to the industry's most robust and comprehensive SLAs, with compliance assurance monitoring available via the SES self-service portal. By leveraging the guaranteed performance that O3b mPOWER offers, telcos, MNOs, and service providers can confidently deliver more assurance to end users across a broad set of industries.



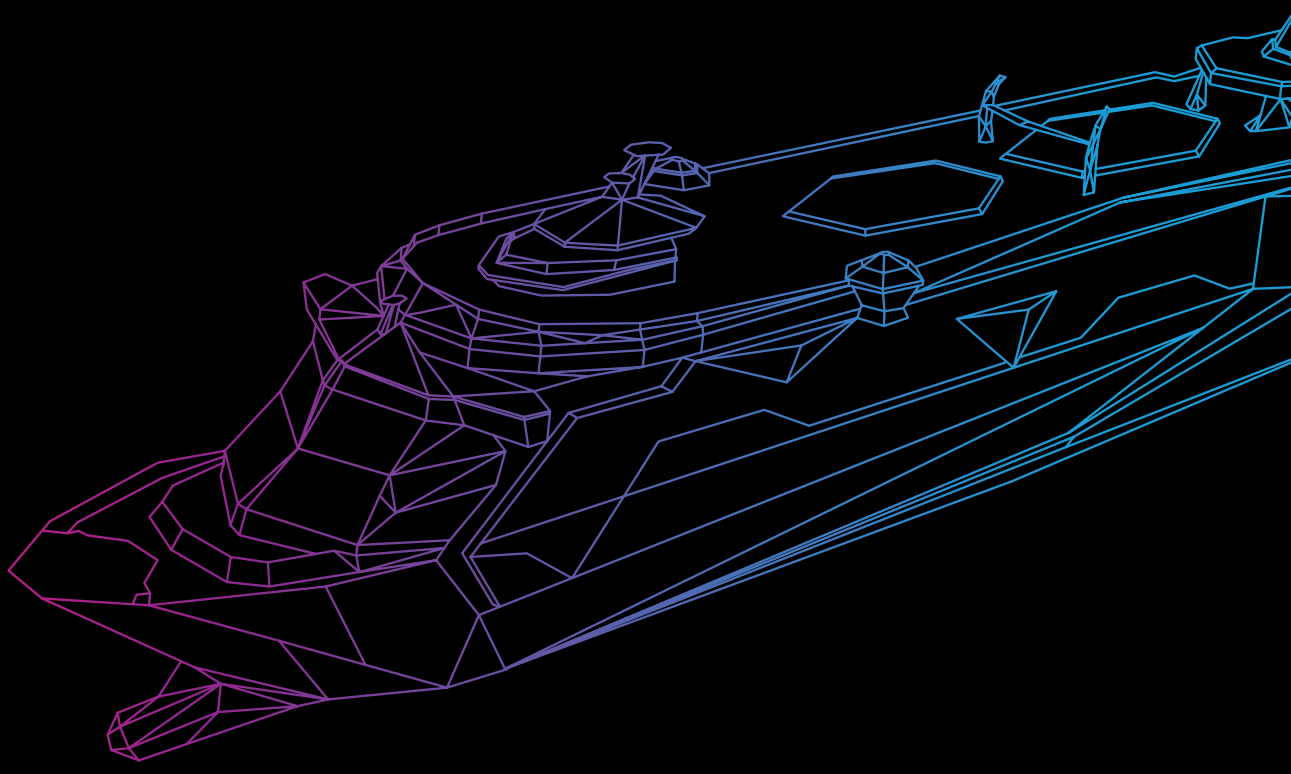
Industry focus—

CRUISE LINES

As cruise operators look to offer an enhanced and personalised experience for their guests, high-quality connectivity at sea plays an integral role in enabling that experience. Requirements have evolved from providing basic internet access and email to today's passenger expectation of a full broadband service for social media, streaming, and remote business applications. Combined with cloud-enabled edge intelligence for ship operations and similar broadband needs for crew welfare, today's digitalised cruise liners present a demanding prospect for satellite networks.

O3b mPOWER meets and exceeds these demands by delivering a fully flexible connectivity solution, empowering cruise operators to take total control of their shipborne networks. Throughput for both forward and return paths can be allocated on a per-ship, per-fleet, or per-zone basis, with parameters managed via an SES self-service portal. For example, in port, a concentration of ships may require a high-throughput pool to be assigned to the area, but the data load for individual docked vessels may be lower due to the reduced number of passengers aboard. When each ship embarks, its throughput can be increased as demand grows, with continued coverage provided over regional and global itineraries through dynamic beam tracking and gateway switching.

By leveraging the intrinsic low latency of MEO constellations, O3b mPOWER allows near real-time access to high-quality internet, enterprise VPN, and cloud data centre gateways. Video calls and latency-critical enterprise applications can be supported with fibre-like performance, giving an outstanding Quality of Experience (QoE) for guests, crew, and operations personnel.



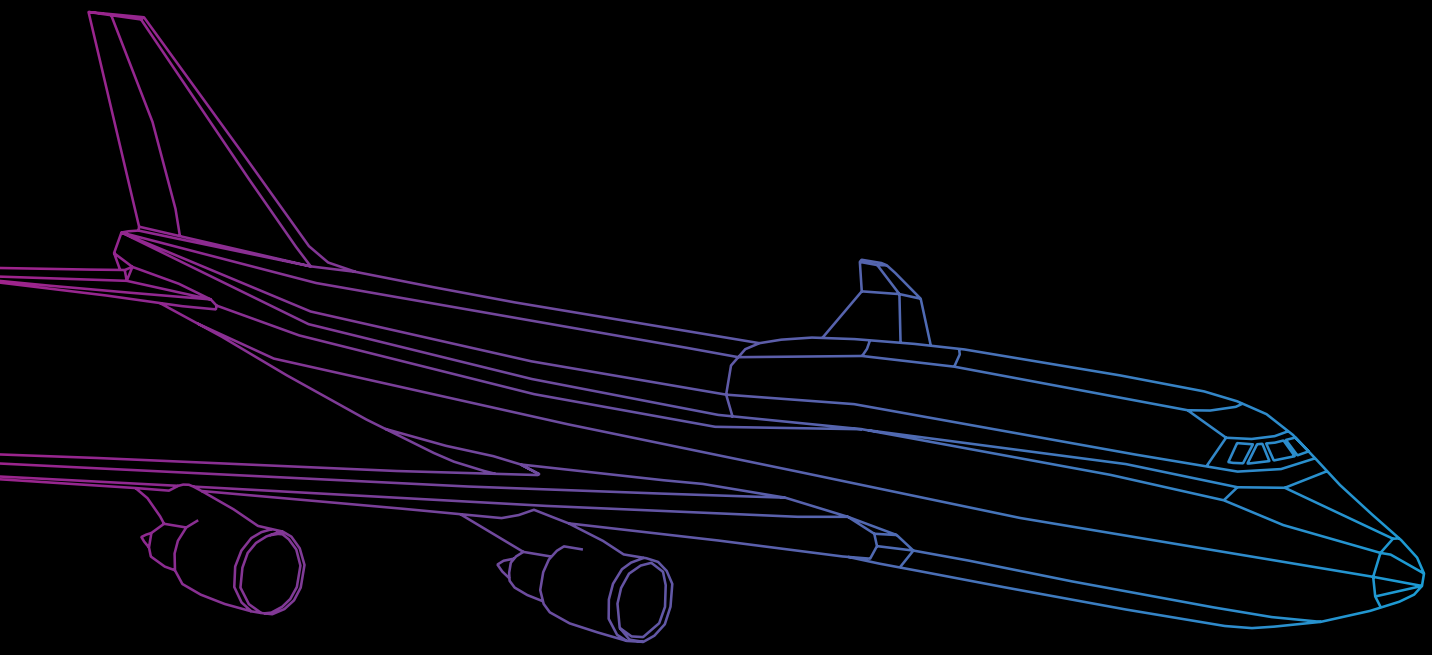
Industry focus—

AERO

Air travellers increasingly consider In-Flight Connectivity (IFC) an essential service, expecting access to the same applications and services they enjoy on the ground. The aviation industry has long relied on SES for the coverage and capacity needed to keep passengers entertained and productive throughout their flights. O3b mPOWER addresses the growing challenges of providing IFC amid ever-increasing demands for high-performance internet access, both in the cabin and on the flight deck.

As part of SES's multi-orbit satcom solutions, O3b mPOWER offers scalable, low-latency performance complemented by high-throughput GEO coverage. Leisure airline passengers can stream, shop, and post in the air, while business travellers receive the performance they require for cloud-based enterprise and videoconferencing applications—wherever their travels take them. For flight operations, O3b mPOWER enables smart-plane technologies, including real-time transfer of large quantities of sensor data to support predictive maintenance and dynamic flight-path optimisation.

O3b mPOWER allows throughput to be allocated dynamically among airline fleets, providing the most efficient use of overall capacity. Beams can be shifted in near real time to follow aircraft in the event of unexpected flight diversions and rerouting. Additional throughput can be assigned to busier routes or during peak traffic periods, while less-travelled flight paths can be more cost-effectively served by allotting capacity only as needed. O3b mPOWER's unique flexibility in connectivity provisioning equips airlines and partners to control, develop, and optimise their in-flight services.



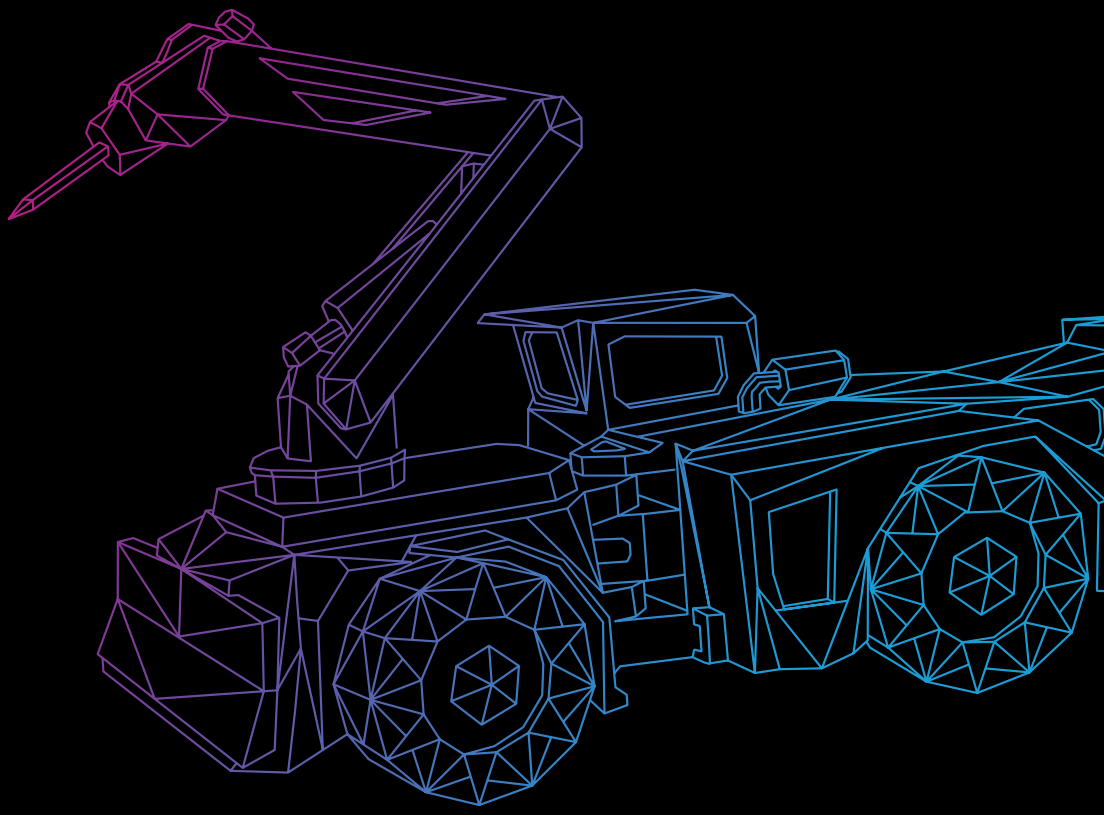
Industry focus—

ENERGY

The need for reduced operating costs, increased safety, stringent environmental protection, and 24-hour crew connectivity is driving the digitalisation of the energy sector. But digitalisation places huge demands on networks, with high-volume data exchanges between drilling sites, control rooms, and enterprise WANs. One critical traffic type is Operational Technology (OT) information. OT data consists of IoT sensor feedback providing remote analytics for production optimisation and safety anomaly detection. Other data requirements include ERP, videoconferencing for crew collaboration and welfare, and network extensions to dispersed locations.

Many applications are latency sensitive, with a clear connection between latency and operating costs. If essential data cannot be transmitted back to base in real time, then energy companies are forced to locate additional resources and complexity on their platforms. For many years, SES's O3b MEO system has delivered high-performance, low-latency satellite data services to offshore and onshore rigs and mobile platforms. O3b mPOWER builds on that success with more flexible coverage and higher data rates.

O3b mPOWER can serve each platform within a region with multi-gigabit throughputs, dynamically allocated so that even mobile installations can remain connected. With its certified installation and operations programme, SES enables provider partners to deliver an end-to-end managed data service, affording energy-sector customers the opportunity to reap the rewards of the digital oil field.



REIMAGINE YOUR SUCCESS STORY

O3b mPOWER is changing the concept of satellite connectivity by enabling flexible, high-performance networks at scale.

SES introduces a paradigm shift in satellite telecommunications. The O3b mPOWER system delivers the speed of fibre, with the reach that only satellite-enabled networks can provide. As the only satcom solution with such trailblazing capabilities, O3b mPOWER's unique offering opens a world of new applications and services.

O3b mPOWER benefits from the demonstrated achievements of O3b MEO, which already sets the standard for low-latency satellite connectivity. Engineered as a logical development of its forerunner, O3b mPOWER combines pioneering spacecraft with next-generation ground infrastructure and leading-edge management and dynamic control software. Incorporating open-standards networking ensures that O3b mPOWER can be easily integrated into any Ethernet operational environment. The result is a communications system that is both more efficient and more versatile than ever before, with future-facing technologies that are ready to meet the challenges of cloud integration, IoT, and 5G. As part of SES's multi-orbit, multi-band solutions, O3b mPOWER affords the opportunity for enterprises to accelerate their business, and governments to realise their communications and security objectives.

By harnessing O3b mPOWER's unrivalled scale, unprecedented flexibility, and superior performance, all industries are empowered to construct global networks that deliver an exceptional quality of experience to both today's and tomorrow's end users.

TECHNICAL SPECIFICATIONS

Item	Specification	
Ethernet		
Uncontended throughput per service	50Mbps to 1Gbps+, CIR with MIR	
Latency	150ms Round Trip Time (RTT)	
Availability	99.5%	
Ethernet		
Standards	Layer-2 Carrier Ethernet E-LINE or	InterAS Option A for Layer-3 VPN integration
Service attributes	MEF 51 OVC/ENNI/UNI	
Testing and measurement	QoS and CoS traffic management 02.3ag connectivity fault measurement	Y.1731 delay, jitter and loss measurement Y.1564 service activation testing
Network Management		
Integration protocol	ONAP	
Network optimisation software	ARC	
Routing automation architecture	Intelligent SD-WAN	
Satellite technology		
Orbit altitude	8,000km	
Earth coverage	±50° latitude, near-polar coverage via GEO backup	
Beam base ground diameter	250km	
Frequency band	Commercial Ka (Ku and C via GEO backup)	
Spectrum availability	2.5GHz	
Ground technology		
Ground terminal compatibility	Electronically steered phased-array or conventional mechanically steered parabolic	
Terminal sizes	1.2m 2.4m Sub-1m integrated mobility under development	

Find out how we can help you achieve your global communications goals at ses.com/O3b-mPOWER.

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For more information about SES, visit www.ses.com

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