**Application Note**

# ENHANCING CLOUD CAPABILITIES FOR GLOBAL ISR MISSIONS

In national defence, search and rescue, maritime surveillance, and border security operations, data is the very core of mission success.

To ensure information superiority during a mission, Intelligence, Surveillance, and Reconnaissance (ISR) teams are leveraging cloud-enabled Internet of Things (IoT), and increasingly adopting artificial intelligence (AI) applications across assets—on the ground, in the air, and at sea. According to Research and Markets, the global government cloud market is projected to grow by $24.4 billion over the next five years, at a compound annual growth rate (CAGR) of 13.6%.[1]

As expectations grow for cloud computing to transform operational architectures and military information systems, and as cloud capabilities and network performance improve, ISR technology is rapidly improving too. Equipped with an increasing number of high-fidelity sensors, modern airborne ISR assets can carry out a wider variety of tasks with a reduced need for human intervention. In fact, Unmanned Aerial Vehicles (UAVs) allow many ISR missions to be conducted without any humans on board. These platforms can fly for over 24 hours—across continents and oceans—and generate terabytes of data in a single sortie.

Cloud-enabled data processing, analysis, and dissemination systems integrate intelligence products from multiple disparate sources into a common environment. And turn them into actionable information—available in near real time to multiple local and global teams across the entire theatre of operations. This amplifies shared situational awareness, enables predictive analytics, and reduces decision-making timeframes, empowering highly effective missions at the tactical edge. And, in many cases, saving lives.

SES

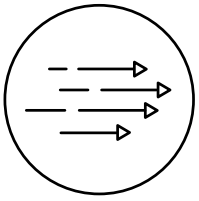
1 Global Industry Analysts Inc, "Government Cloud - Market Analysis, Trends, and Forecasts," Research and Markets (2020).

# CREATING THE CLOUD-OPTIMISED MISSION ENVIRONMENT

The ultimate goal of global integrated ISR operations is to enhance security and defence mission capabilities while reducing the risk to personnel. With the ability to gather, process, and integrate multi-sensor, multi-domain intelligence data, you can decrease the number of surveillance missions to execute, and deploy fewer teams at forward operating bases. Reducing the number of sorties over a target area not only saves fuel, but also lowers airborne asset lifecycle costs, reduces pilot fatigue, and increases the probability of early positive identification (PID) of a critical subject or situation. Yet, as the volume of data generated on ISR missions rapidly increases, current Processing, Exploitation, and Dissemination (PED) capabilities are struggling to match the scale and pace required to keep up. This underscores the need for robust cloud-enabled connectivity across integrated ISR operations.

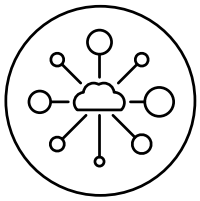
## Enabling real-time data sharing across the intelligence chain

During military missions, information superiority over adversaries holds tremendous value. Data from ISR assets often needs to be analysed and actioned by multiple teams in near real time. Latency limitations during such missions cause delays in information sharing, adversely impacting time-sensitive operations and decision-making processes. Low-latency networks are key to mission success.



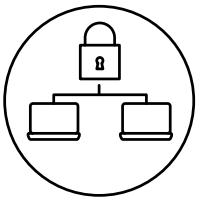
## Maximising network performance for dynamic missions

Long-range, strategic manned and UAV operations are highly complex and dynamic in nature, sometimes taking place over large geographical areas. For these missions to be successful, they require high-throughput capabilities from start to finish—no matter the distance covered. Since fixed beam locations could easily be out-flown if a mission were to take a different direction, satellite networks need to provide beam pointing flexibility as well as mission tracking via beam following to support long-range airborne missions.



## Optimising multi-sensor off-boarding capabilities on ISR assets

Multi-sensor ISR assets allow for multiple mission objectives to be satisfied in a single sortie. Data gathered by signals intelligence (SIGINT) systems on a UAV can be supported by additional intel—such as 4K video feeds and radar images of the source location. The composite intel "picture" is invaluable, and is often used to tip and queue other airborne assets or mission teams. Satellite networks used for these multi-sensor ISR missions must be able to dynamically and reliably provide the required high-throughput return link capabilities.



## Ensuring network resilience and security

ISR missions run a high risk of having communication systems jammed or intercepted by adversaries. Adopting a resilient network ensures these risks can be mitigated, and missions can be carried out effectively. Having a very flexible satellite beam pattern to include very narrow beams, beam following, changeable frequencies, and multiple ground stations vastly enhances network resiliency.

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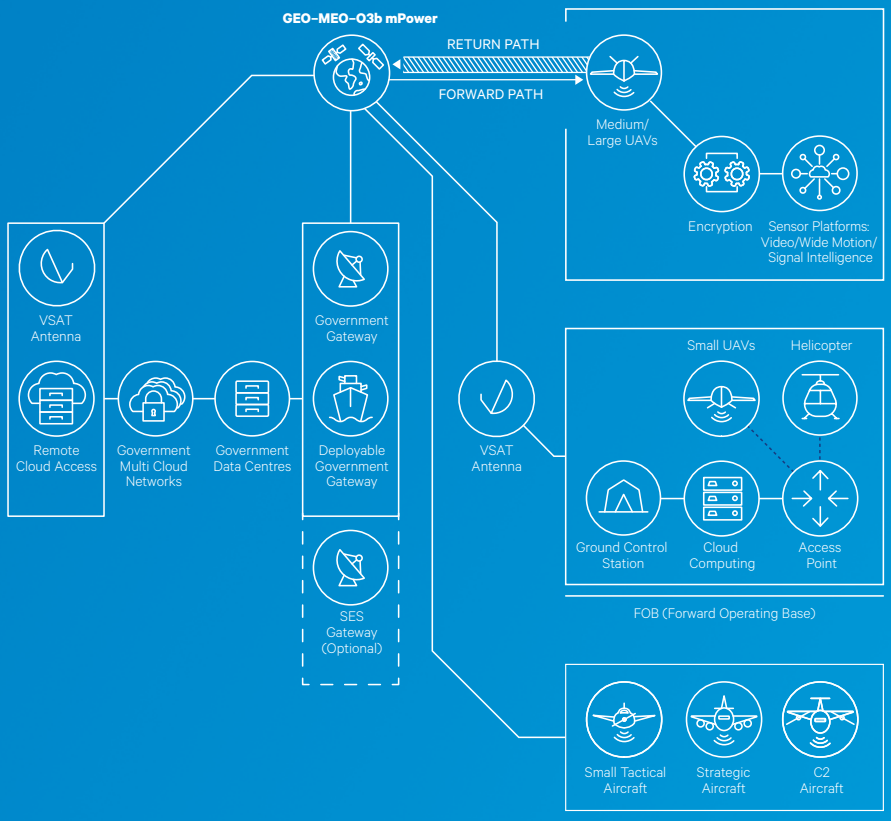
# HOW SES ENABLES THE CLOUD FOR GLOBAL INTEGRATED ISR

As the only satellite-enabled network services provider with a commercially proven and fully operational multi-orbit fleet, we are uniquely positioned to meet the growing cloud connectivity needs of ISR operations—no matter where they take place. Through Medium Earth Orbit (MEO) or Geostationary Earth Orbit (GEO) links—or a roaming combination of the two—we ensure multiple ISR assets and the distributed common ground system can access a secure connection to the cloud in line with large bandwidth requirements.

Our satellite fleet and global terrestrial network allow us to drive connectivity to multiple cloud platforms, and reach government-owned sovereign gateways across the globe. This includes remote deployable cloud access nodes to augment fixed cloud access sites. The SES network can also provide access to transnational cloud access points supporting multi-national coalition operations, further enhancing unified mission success.

As ISR operations grow increasingly dependent on cloud applications, and cloud-enabled storage, access, and integration of massive amounts of multi-domain data, our network services resolve key cloud connectivity challenges—allowing ISR teams to access the full potential of the cloud to deliver on mission objectives.




**1** Airborne ISR multi-sensor operations
**O3b mPOWER**

- Very high throughput (up to 100Mbps) flexible return link rates for diverse platform sizes
- Dynamic bandwidth and power allocation in real time for quick response capability (QRC) surges and multiple fleet operations
- Capacity for multiple intelligence (MULTI-INT) sensor operations

**2** Edge cloud access
**MEO Reachback**

- Low latency allows for cloud computing at the edge
- High bandwidth (up to 500Mbps) enables multi-sensor simultaneous streaming and raw data processing

**Line of Sight (LOS) Link**

**3** Mission resilience and global coverage
**GEO/MEO**

- Primary, alternate, contingency, and emergency (PACE) multi-orbit failover and traffic split capabilities
- Efficient bandwidth usage allows for higher ISR data density
- Global coverage for command and control (C2) and redeployment connectivity

With a commercially proven and fully operational multi-orbit fleet, we are uniquely positioned to meet the growing cloud connectivity needs of ISR operations.

## High-throughput return link capabilities

With fibre-like MEO throughput capabilities, we enable granular bandwidth increments of up to 100Mbps, and higher, on return links for multi-sensor airborne missions, allowing aggregated data—from SIGINT, electro-optical/infrared (EO/IR), wide-area motion imagery (WAMI), and other video and imaging systems—to be relayed back to the cloud and processing centres. High-bandwidth connectivity also reduces the amount of computing required on airborne platforms, ensuring power, weight, and fuel can be optimised for long-distance and long-term sorties.

## A low-latency solution

Low-latency and high-throughput connectivity ensure large amounts of complex data can be offloaded from ISR assets, and made accessible to multiple intel teams in real time—both locally and globally. The inherent low-latency architecture of our MEO satellite network is best suited for latency-sensitive applications.

## Dynamic bandwidth allocation

Our O3b mPOWER constellation supports flexible forward to return link data ratios, enabling mission planners to adapt capacity to support the bandwidth requirements of multiple sensors on multiple aircraft. The system also enables dynamic bandwidth and power allocation, allowing users to modify connectivity parameters in line with changes in mission operations. Capacity can be activated to bring sensors online, reconfigured inflight, or re-assigned from one location to the other, as requirements evolve. Surges and QRC missions can be easily supported by these dynamic network capabilities, and data can be routed to existing cloud access nodes or to new nodes, as mission needs dictate.

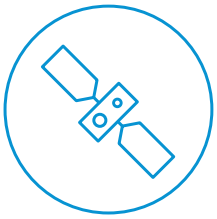
## Global coverage

We provide MEO high-capacity coverage over the full 360° range of longitudes, and to ±50° latitude, offering unparalleled connectivity services in mission-critical areas of operation—especially over well-known global areas of conflict. For mission operations at higher latitudes, coverage via our GEO fleet provides a roaming link.

## Intelligent multi-orbit resiliency

Due to the motion of the MEO satellites and the use of narrow spot beams, our MEO solution is inherently interception- and jamming-resistant, reducing risk of disruption in communications systems during an ISR mission. With seamless integration between our GEO and MEO solutions for mission roaming in higher latitudes, we are able to significantly expand failover resilience, not just across different platforms, but satellite orbits as well.

# O3b mPOWER AND THE FUTURE OF CLOUD-OPTIMISED ISR MISSIONS



The O3b mPOWER satellite network communications system will bring greater system flexibility, performance, land scale to enhance future ISR missions.

Building on our market-proven, first-generation MEO capabilities, the O3b mPOWER satellite network communications system will bring greater system flexibility, performance, and scale to enhance ISR missions in the future. Advanced throughput capabilities of over 100Mbps will enable highly efficient multi-sensor manned and UAV missions, where large volumes of data can be offloaded to the cloud and multi-cast to various sites for quicker decision making. Satellite phased arrays enable high-throughput capabilities, even when using smaller and lighter airborne terminals that aren't able to meet mission performance requirements on typical GEO satellites. And the O3b mPOWER system's jamming and interception resistance capabilities, together with the ability to land traffic at government-owned gateways, ensure maximum information security during an ISR mission.

O3b mPOWER is the only satellite system designed from the ground up to deliver cloud services—with terabit-level system scale, low-latency performance, and high availability. It is the only non-geostationary orbit (NGSO) solution based on commercially and operationally proven technology. While low earth orbit (LEO) and GEO HTS solutions fall short of the scale and performance required for the cloud, O3b mPOWER enables a new generation of cloud-scale services and applications.

In global integrated ISR operations, information shapes the outcome of national or international security and defence missions. Our current MEO constellation, together with our GEO fleet and O3b mPOWER system, enhances cloud capabilities to ensure information is available to the right people at the right time—no matter where they are.

To learn more about our cloud-optimised solutions, please visit www.ses.com/networks/cloud

Request a quote today

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