

Revolutionary GEO Satellite Optical Data Relay Service

Space Compass: Uniting the Universe
16 October 2024

Executive Summary:

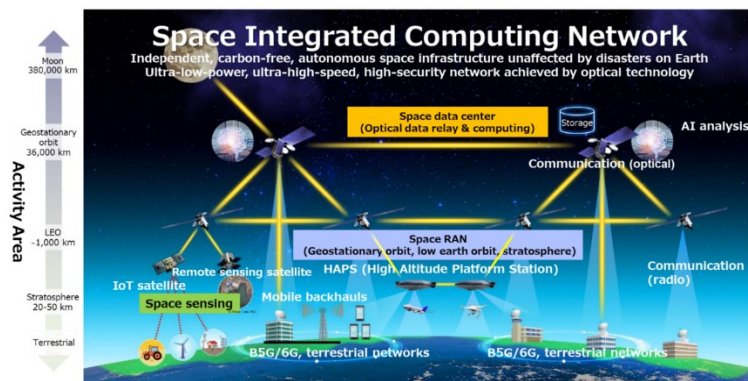
In critical government and military operations, every second counts. Space Compass is fielding a space-based architecture enabling data rates of up to 10 Gbps. At this speed support to critical missions from space can be transformed, enabling delivery of imagery and other data in seconds vice hours or days. This paper examines how this architecture works and discusses the impact it will have on several key use cases.

Introduction:

Space Compass optical data relay service provides an ability to speed data movement, improve secure operations and enable higher capacity than ever before. Space Compass is a joint venture between the world-renowned telecommunications provider NTT and one of the world's largest and most reliable satellite communications companies, The Sky Perfect JSAT Group. Together, they formed Space Compass to make full use of their long-cultivated expertise in satellite operations and optical communications technologies to provide the world's first integrated space computing network.

Space Integrated Computing Network:

Space Compass has leveraged the extensive past performance of JSAT and NTT to design a high-capacity communications and computing infrastructure in space. Our optical data relay service leverages this infrastructure to transmit data at high speed from geostationary satellites to the ground. Our optical approach means speeds and capacities are extraordinarily high, and together with our GEO architecture, mitigates limitations in existing legacy architectures. Legacy architectures use slower communications with less capacity and operate when in line of sight of ground stations, all of which limit performance.



Key benefits of the Space Compass Optical Data Relay Service include:

- Immediate delivery:
Get real-time observation data from space faster than ever.
- Secure Data Transfer:
Our optical communications technology prevents jamming, interception and detection, ensuring your data is secure.
- Ultra-High-Speed Up to 10Gbps:
More data, more detail, better decisions. Our Ultra-High-Speed communication allows for extensive latency-free data transfer.

Why GEO? How does GEO enhance your mission?

Earth observation satellites are vital for both military and civilian missions. However, current architectures hinder the full potential of Earth observation satellites.

- Satellites must downlink data to line of site of ground stations.
- Less than 30% of the Earth's surface is land so downlink options are limited.
- This causes delays, as satellites must remain over a ground station long enough to download data.

The Space Compass architecture is always visible to EO satellites and always visible to ground stations resulting in always available access and Ultra-High-Speed data transfer.

Without GEO:

- Long delays in receipt of critical **LEO** EO data
- Decisions being made in absence of best information



With One GEO:

- Complete coverage of the INDOPACOM AOR
- Real Time data to entire region
- Much faster data to rest of world



With Two GEO:

- Complete global coverage
- Real Time data to all mission areas



How Does Space Compass solve current challenges?

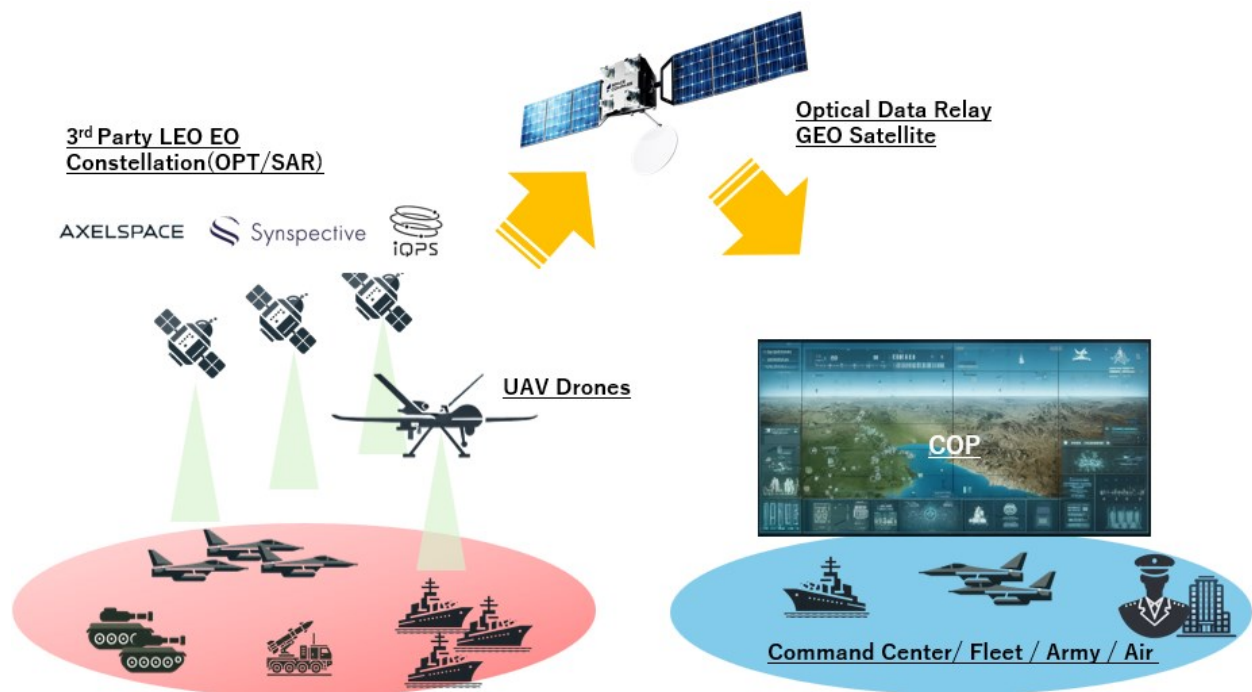
Defense & Intelligence:

The resurgence of great power competition has amplified the need for enhanced deterrence and operational readiness. In this evolving geopolitical landscape, the speed and accuracy of intelligence are critical for maintaining strategic advantages. Current systems often face delays in relaying satellite or UAV imagery and other critical data, leading to outdated or less effective intelligence in fast-evolving situations.

The **Space Compass Optical Data Relay** addresses these challenges by significantly reducing the time it takes for satellite and UAV data to reach key decision-makers. Our system creates a near-real-time communication bridge between ground-based command centers and unmanned assets in both air and space. This setup ensures near-instantaneous data transfer, allowing for timely and actionable intelligence to support national security and defense operations.

By enabling seamless command, control, and monitoring across vast distances, our Optical Data Relay empowers defense and intelligence operations with the real-time situational awareness needed to make faster, more informed right decisions.

Maritime Security, Disaster response and Indication warning for wildfire are similar use cases solved with same system architecture.



Space Domain Awareness:

With over 10,000 active satellites in orbit, the threat from anti-satellite weapons (ASATs) and malicious satellites, including "killer" satellites, has become a pressing concern. The ability to rapidly detect, monitor, and analyze these threats in near-real-time is essential for maintaining space domain awareness (SDA) and ensuring the safety of vital space assets.

SDA satellites are tasked with detecting and tracking potential threats in space, such as malicious objects, and transmitting that data to ground stations for analysis. However, the process of downlinking this critical data via radio frequency (RF) is hindered by regulatory constraints. These include the need to acquire licenses based on the satellite's location, the downlink station's position, and the specific bandwidth used. As a result, achieving near-real-time data transfer from SDA satellites to the ground is a significant challenge.

The **Space Compass Optical Data Relay** addresses this issue by leveraging optical communication, which operates license-free. By enabling secure, high-speed data transfer between SDA satellites and our data relay satellites via optical communication, we bypass the regulatory hurdles associated with RF transmissions. The relay satellite then uses licensed RF downlinking to transmit data to ground stations, ensuring compliance with existing regulations while maintaining near-real-time data transmission.

This system ensures that critical SDA data is relayed quickly and efficiently, enabling timely responses to emerging threats in space.

