Space-based ADS-B: Global Data for Enhanced Surveillance, Innovation and Analytics

Aireon has deployed the first global air traffic surveillance system using a space-based Automatic Dependent Surveillance Broadcast (ADS-B) network that meets the strict, real-time Air Traffic Service (ATS) surveillance requirements for separation services, anywhere in the world.

ADS-B is an air traffic surveillance technology that relies on the aircraft broadcasting their identity, a precise Global Positioning System (GPS) position and other information derived from onboard systems. The data is broadcast every half-second from the aircraft and is used by Air Traffic Controllers (ATCs) to identify and separate aircraft in near-real time.

ATS surveillance is clearly defined by the International Civil Aviation Organization (ICAO) but, put simply, it's the ability to reliably, and in near-real-time detect key flight attributes such as position, level and intent.

Space-based ADS-B provides full, continuous global air traffic surveillance, whereas before, 70 percent of the world had no access to ATS surveillance information (i.e. the oceans, polar regions, mountainous regions, jungles, deserts). This significantly improves Air Traffic Management (ATM) safety, efficiency, predictability and capacity, while reducing overall infrastructure costs.
Since 2011, Aireon has partnered with investors and regulators from around the world to develop this unique service. Prior to launching, just 30 percent of the earth’s airspace was monitored by real-time surveillance. This posed obvious safety risks and inefficiencies across the global flight market.

In partnership with leading Air Navigation Service Providers (ANSPs) from around the world, like NAV CANADA, the Irish Aviation Authority (IAA), Enav, NATS and Naviair, as well as Iridium Communications, Aireon is providing a global, real-time, space-based air traffic surveillance system available to all aviation stakeholders. Aireon’s investors have invested in excess of US$350 million in equity funding.

After years of research and development, the system went live in April 2019 and immediately offered the highest fidelity data available to the industry. Aireon received official approval by the European Aviation Safety Agency (EASA), making it the first-ever certified provider of aircraft surveillance-as-a-service. As Aireon continues to publish standards and performance metrics, the Aireon service is consistently outperforming the established benchmarks in some of the world’s largest and busiest airspaces.

Aireon’s launch signaled that the aviation industry is joining the rest of the 21st century, where real-time connectivity is relied upon for doing business.

The backbone of Aireon’s technology resides on the Iridium constellation of satellites that delivers exciting new innovations and opportunities, while ensuring continued high performance and reliability far into the future.

Iridium hosts specially-designed ADS-B receivers on each of its 66 low-latency Low Earth Orbit (LEO) satellites that make it uniquely suited to meet the technical demands of global air traffic surveillance and tracking. The LEO satellites orbit approximately 485 miles above the earth, an altitude that allows the aircraft signals to be received in space without any additional equipment or changes to the existing aircraft avionics.

Each Iridium satellite is linked to four others—two in the same orbital plane and one in each adjacent plane—creating a dynamic mesh network that routes traffic among satellites to ensure a continuous connection, everywhere on the planet. This unique configuration will allow services using the Iridium network to continue to remain unaffected by natural disasters, including hurricanes, tsunamis and earthquakes that can cripple terrestrial infrastructure.

Due to its orbital cross-linked configuration, Iridium is the only satellite constellation with the capability and reach to enable 100 percent global air traffic surveillance, including oceanic and polar regions, without the need for ground stations. The intersatellite communications links enable real-time delivery information to ATC to support aircraft separation services. No other system, existing or planned, enables such an opportunity for aviation stakeholders.
THE BENEFITS

Improving Safety
The Aireon service provides enhanced operational safety for 100 percent of ADS-B equipped aircraft in real time. Aireon has seen a sharp increase in safety benefits through customers’ operational improvements and global benchmarks.

Enhancing Efficiency
Aireon allows customers to plan and fly more optimal routes, which decreases fuel consumption and creates consumer value in the form of lower prices. With Aireon, procedural routes—which have long been the industry’s solution to flying through previously-unsurveilled regions—will become a thing of the past. Currently, operators in the North Atlantic region are increasingly allowed to fly more flexible routes to optimize their flight paths.

Delivering Global Value
Aireon delivers value to its customers on a global scale. Already, Aireon has enabled partners like Airbus and FlightAware to deliver data to aircraft operator customers and continue to actively expand. Additionally, the industry has already begun to take advantage of Aireon’s commercial products—Global Beacon, Aireon ALERT—to create a more transparent, efficient and safe global airspace. As a growing and diverse range of customers continue to show that Aireon’s data is applicable to a variety of challenges, there is new demand among some of the world’s largest aviation stakeholders to power innovation through a space-based ADS-B platform.

INNOVATIVE APPROACH TO ATM

Global Air Traffic Surveillance
Space-based ADS-B extends the same ADS-B technology currently received on ground-based receivers to space. Aireon’s high performance payloads, hosted on the Iridium LEO satellite constellation, receive aircraft ADS-B messages with an exact level of precision and security, and relays them to ATCs in real time. With significant overlap and redundancy built in the Iridium constellation, the Aireon system provides a safety-of-life service to the aviation industry.

As a turn-key surveillance solution, space-based ADS-B allows for cost-effective, seamless and rapid implementation to meet future capacity needs and support compliance with regulatory requirements. Additionally, by providing surveillance in remote regions, Aireon can provide new routes and a multitude of benefits to all aviation stakeholders.

GlobalBeacon
GlobalBeacon is a first of its kind product from Aireon and FlightAware that provides the most cost-effective and easy-to-deploy solution for the International Civil Aviation Organization (ICAO) Global Aeronautical Distress Safety System (GADSS).

Since November 2018, airlines and aircraft operators are expected to track their fleet anywhere in the world at a frequency of one position every 15 minutes during normal operations. By 2021, they will need to automatically receive positions once-per-minute for aircraft in distress.

By combining FlightAware’s data processing platform and web-interface with Aireon’s space-based ADS-B network, GlobalBeacon transcends borders and Flight Information Regions (FIRs) and provides 100 percent global coverage, including over deserts, polar airspace and oceanic regions. With GlobalBeacon, airlines and aircraft operators can exceed GADSS standards and recommended practices for flight tracking.

Aireon ALERT
Aireon Aircraft Locating and Emergency Response Tracking (ALERT) is the aviation industry’s first and only free emergency aircraft location service. ANSPs, aircraft operators, regulators and search and rescue organizations in need of crucial aircraft location data can rely on Aireon ALERT to help provide an ADS-B OUT 1090MHz equipped aircraft’s most recently known position in an emergency situation. As a free service, Aireon ALERT fills a critical need, ensuring search and rescue personnel have the most accurate aircraft position data available when responding to an incident, regardless of global location. Aireon ALERT utilizes Aireon’s space-based ADS-B data and is operated by the Irish Aviation Authority (IAA).
Aireon continues to rapidly grow its customer base and expand the possibilities of use for its data. This growth is driven by the fact that Aireon provides the first-ever global set of historic and real-time ATC-grade data on aircraft movements. This technology has the potential to transform the way they approach safety, efficiency, separation services and overall customer experience.

Aireon’s services empower partnering organizations in the aviation industry in an understandable and readable format, as well as deliver derived information from the data. This capability provides partners with the only independent, certified, surveillance-quality, aircraft position data with global coverage. Partners gain full transparency into the Aireon-owned ADS-B system to guarantee traceability of highly accurate, highly reliable flight position information, which reduces the need to manage multiple, disparate data sources.

This data now goes beyond ATS surveillance and Aireon’s partners can utilize this unparalleled and unprecedented information to support their business and safety processes. Through advanced data fusion methodologies and the integration of Aireon’s data with other contextual data, Aireon presents the only ATS surveillance-quality and complete flight position source available.