# FREQUENTLY ASKED QUESTIONS

## WHO IS AIREON?

Aireon is providing the first ever, 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 air traffic separation services, anywhere in the world.

## WHAT IS THE COMPANY STRUCTURE OF AIREON?

Aireon is a privately held, U.S.-based, limited liability company (LLC).

## DOES AIREON HAVE INVESTORS?

Yes. Aireon's investors are made up of the world's leading air navigation authorities and a leading satellite communications company. NAV CANADA (Canada's air traffic service provider), NATS (UK air traffic services provider), Enav (Italy's air traffic service provider), the Irish Aviation Authority (IAA) and Naviair (Danish air traffic service provider), as well as Iridium Communications all stand behind Aireon and Aireon's truly transformational service.

## HOW MUCH HAVE THE AIREON INVESTORS CONTRIBUTED?

NAV CANADA, NATS, Enav, the Irish Aviation Authority, Naviair and Iridium Communications have invested in excess of US$350 million in equity funding.

## WHAT IS THE PERCENTAGE OF OWNERSHIP BETWEEN THE AIREON INVESTORS?

Upon completion of Aireon's hosting fee payments to Iridium, a portion of Iridium's interest will be redeemed for a payment from Aireon of US$120 million to finalize the ownership interests. Upon this redemption, NAV CANADA will hold approximately 45 percent ownership, Enav and NATS will each hold approximately 11 percent, and each IAA and Naviair will hold approximately 5 percent ownership, with approximately 22 percent being retained by Iridium.

## WHO IS NAV CANADA?

NAV CANADA is Canada's Air Navigation Service Provider (ANSP) managing 3.3 million flights a year for 40,000 customers in over 18 million square kilometers – one of the largest ANSPs by total Instrument Flight Rules (IFR) flight hours. NAV CANADA's airspace stretches from the Pacific West coast to the East coast of Newfoundland and out to the center of the North Atlantic, the world's busiest oceanic airspace with some 1,200 flights crossing to and from the European continent daily. It also stretches from the busy U.S-Canada border with major international airports to the North Pole where aircraft fly polar routes to reach Asia.

## WHO IS NATS?

NATS is the UK's leading provider of air traffic control services. Each year NATS handles 2.6 million flights and 250 million passengers in UK airspace. In addition to providing services to 13 UK airports and managing all upper airspace in the UK, NATS provides services around the world spanning Europe, the Middle East, Asia and North America.

## WHO ARE AIREON'S CUSTOMERS?

Aireon has signed Data Service Agreements (DSAs) with 11 aviation organizations, making up 28 countries. These include NAV CANADA, NATS, Enav, IAA, Naviair, DC-ANSP (Curacao), Air Traffic Navigational Services Co. Ltd (South Africa), The Civil Aviation Authority of Singapore, Seychelles Civil Aviation Authority, ISAVIA (Iceland) and Aerial Navigation Safety in Africa and Madagascar (ASECNA - Western Africa and Madagascar).

In reference to other aviation stakeholders, Aireon and FlightAware announced a partnership in September 2016. Together, they created a product called GlobalBeacon. GlobalBeacon is a first of its kind product and a turnkey solution for airlines to be in compliance with the International Civil Aviation Organization (ICAO) Global Aeronautical Distress

Safety System (GADSS). GlobalBeacon enables airlines of all sizes to proactively position themselves to respond in the event of an emergency.

In addition to GlobalBeacon, FlightAware also integrates Aireon space-based ADS-B data into their other services and flight tracking tools. FlightAware also has distributor partnerships for the re-selling of space-based ADS-B with SITAONAIR FlightTracker solution, Rockwell Collins' ARINCDirect and IBM's WSI Fusion. At this time, approximately 100 airlines are already signed up to receive space-based ADS-B through these partnerships.

### DOES AIREON HAVE RESELLERS?

Yes. Aireon has an agreement with FlightAware to sell space-based ADS-B data to aircraft operators and aviation service providers. Through this agreement, Aireon space-based ADS-B is available in FlightAware's platform, which includes a suite of web applications, APIs, as well as data reports and analytics. FlightAware also has reselling partnerships with industry leaders like SITAONAIR, Collins Aerospace and IBM to make space-based ADS-B data accessible to their airline customers.

Aireon also has a contract with Airbus to integrate space-based ADS-B into their AirSense product. AirSense will combine Aireon data with Airbus assets to offer analytics services.

Concept of operations and testing agreements have also been executed with leading air traffic management systems integrators, Thales, IDS, SITAONAIR (for Air Traffic Control services), Atech, Adacel and Leonardo.

## AIREON NETWORK & INFRASTRUCTURE FAQ

### HOW DOES SPACE-BASED ADS-B WORK?

Since ADS-B is automatic, compliant aircraft will automatically send ADS-B position data (messages), which will be received by the Aireon Hosted Payloads (AHPs) in space. Once received, the AHP will send the data via satellite-to-satellite communication and then down to the Aireon Teleport Network (TPN). From there, the message is sent to the Aireon Hosted Payload Operations Center where it is then transferred to Aireon Processing and Distribution system (APD). Once processed at APD, the message is delivered to its final destination, known as an SDP or Service Delivery Point, which is usually an ANSP that has subscribed to the Aireon service.

### WHAT MAKES SPACE-BASED ADS-B DIFFERENT?

Space-based ADS-B bypasses the limitations of ground-based systems and provides an operational, global, space-based air traffic surveillance solution to all aviation stakeholders.

### WHAT AIRCRAFT CAN USE THE AIREON SYSTEM?

The Aireon system is optimized to detect commercial aircraft with a functioning ADS-B OUT 1090MHz transponder and a typical power output of 125W or greater. Aircraft with transponders that do not meet these requirements may not be fully monitored by the Aireon system.

### DO AIRCRAFT NEED ADDITIONAL AVIONICS OR EQUIPAGE FOR THE AIREON SYSTEM TO WORK?

No. International mandates already require the vast majority of aircraft to transmit their location using ADS-B. ADS-B is the backbone of the United States' Next Generation Air Transport System (NextGen), with approximately 650 ground station

transceivers deployed throughout the United States to provide near-nationwide ADS-B coverage. By 2020, the FAA has mandated ADS-B equipment for all aircraft flying above 10,000 feet, within a 30-nm radius of Class B airports at any altitude or within Class C airspace.

## BEFORE AIREON, HOW MUCH OF THE GLOBE WAS COVERED BY SURVEILLANCE SYSTEMS?

Before Aireon, 70 percent of the world had no access to ATS surveillance information. Remote, oceanic, polar regions, mountainous regions, jungles and deserts had little to no air traffic surveillance. This was not just a tremendous inefficiency, but had safety, financial and environmental consequences.

## HOW IS AIREON UTILIZING THIS EXISTING TECHNOLOGY FOR A NEXT GENERATION SERVICE?

Instead of utilizing traditional radio receiver towers on the ground, which have coverage limitations, like oceans, remote areas and inhospitable terrains, Aireon has redesigned them into flexible and highly effective space-grade receivers on Iridium's second generation satellite constellation, Iridium NEXT. This allows for global, real-time air traffic surveillance using the same ADS-B signal that aircraft already transmit, but without the limitations ground-based receivers have.

## WHAT IS IRIDIUM NEXT?

Iridium NEXT is hosting the Aireon system. It is the only satellite constellation with the capability and reach to enable global air traffic surveillance. This is all due to its orbital configuration. Iridium NEXT's low-latency, 66 cross-linked Low Earth Orbit (LEO) satellites make it uniquely suited to meet the technical demands of global air traffic surveillance and tracking. The LEO satellites will orbit approximately 485 miles above the earth and each satellite will be linked to four others, creating a dynamic network to ensure continuous availability, everywhere on the planet.

The configuration provides complete global coverage, including oceanic and polar regions, without the need for ground stations. The LEO altitude allows the aircraft signals to be received in space without any additional equipment or changes to the existing aircraft avionics. The intersatellite communications links will enable real-time delivery of information to ATC to support aircraft separation services. No other system, existing or planned, will enable such an opportunity for aviation stakeholders.

## WHAT IS AIREON ALERT?

Aireon ALERT is a free service that is filling a critical need, ensuring ANSPs, aircraft operators, regulators and search and rescue organizations have the most accurate aircraft position data available when responding to an incident in remote or oceanic airspace. Aireon ALERT uses global space-based ADS-B data provided by Aireon, and is operated by the IAA. Aireon ALERT will go live in May 2019.

The service is only available to commercial aircraft operators, ANSPs, regulators and search and rescue organizations who may at some point need to know the last known position of an aircraft in an uncertainty phase, alert phase or distress phase. The service is not designed for private pilots and the General Aviation (GA) community, who are reminded that they should escalate all requests for uncertainty, alert or distress actions with the appropriate ANSP and mandatory State authority in accordance with current procedures. Use of the Aireon ALERT service by persons who want to know the last position of an aircraft, but are not directly related to or responsible for the aircraft in focus, can compromise the timely delivery of the service.

Pre-registration is already open and can be accessed here: https://aireonalert.com/

## WHAT IS GLOBALBEACON?

GlobalBeacon is a fee-based product developed by Aireon and FlightAware that allows aircraft operators to continuously track their fleet movements. This capability will help airline and operator compliance with existing and upcoming International Civil Aviation Organization (ICAO) Global Aeronautical Distress Safety System (GADSS) standards outside of surveilled airspace. By combining FlightAware's web interface, algorithms and airline flight information with Aireon's space-based ADS-B network, GlobalBeacon provides aircraft operators with a minute-by-minute aircraft tracking dashboard that features configurable alerts, offering immediate notification of abnormal events. Airline Operations Centers can proactively monitor their fleet and identify deviations from its intended flight path, abnormal flight situations or a sudden loss of position data and activate an alert of a distressed status when the situation occurs.

# TECHNICAL FAQ

## WHAT MAKES ADS-B AUTOMATIC?

ADS-B is automatic because no work is required from the pilot or Air Traffic Controller (ATC)

## WHAT MAKES ADS-B DEPENDENT?

ADS-B is dependent because it relies on on-board avionics to provide real-time position information to other parties.

## WHAT IS IN AN ADS-B MESSAGE?

Each ADS-B position report includes:

- Flight Identification (flight number, registration, tail number)
- ICAO 24-bit Aircraft Address (globally unique aircraft code)
- Position (latitude/longitude)
- Position integrity/accuracy (GPS horizontal protection limit)
- Barometric and Geometric Altitudes
- Vertical Rate (rate of climb/descent)
- Track Angle and Ground Speed (velocity)
- Emergency indication (when emergency code selected)

## WHAT ARE THE FUTURE IMPLICATIONS OF SPACE-BASED ADS-B?

In addition to improving safety and efficiency of air travel, space-based ADS-B holds vast potential for technical innovation because of its robust and comprehensive data. For the first time, one data set is available for ATC, supporting global air traffic analysis, airspace and air route design, capacity and resource planning, predictability analysis for arrivals and departures and fleet optimization.

Additionally, a study completed by Purdue University has predicted that space-based ADS-B has significant environmental benefits.  The study estimates that between 2030 and 2040, approximately 14.3 million metric tons of C02 will be prevented, globally. For context, this can be compared to removing approximately 300,000 cars from U.S. roads per year.