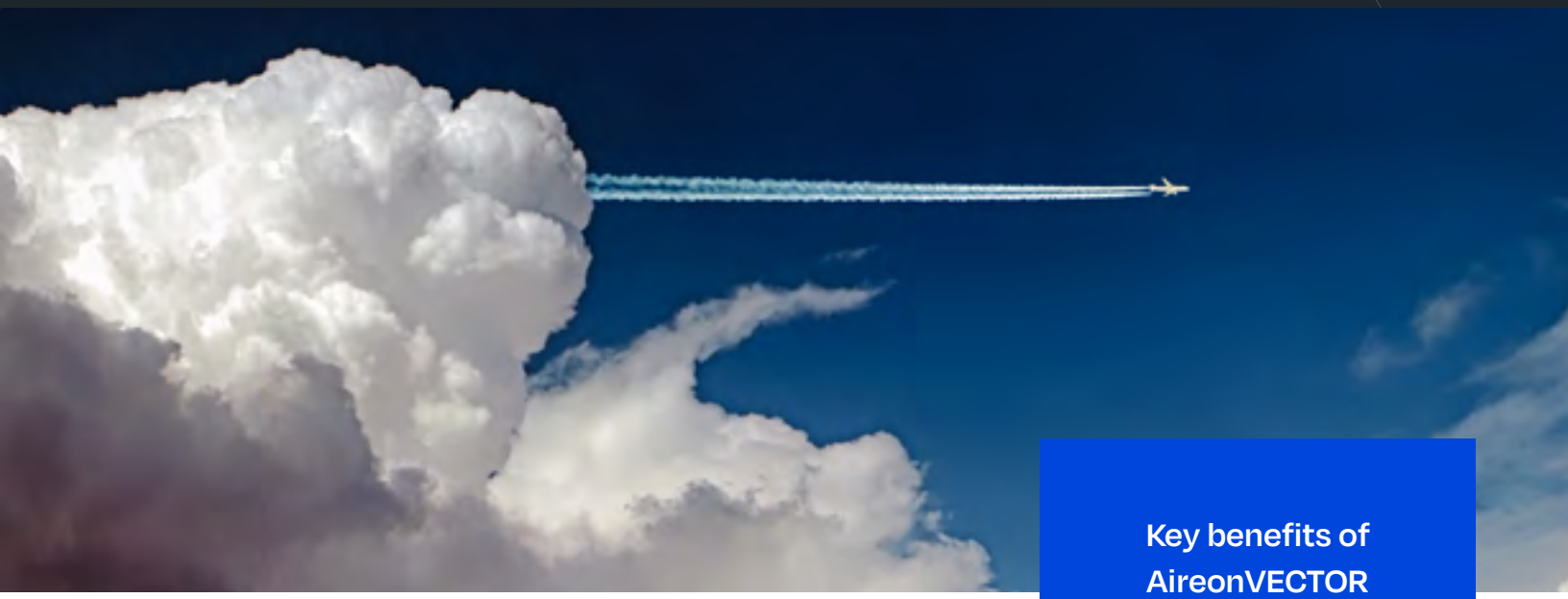
AireonVECTOR™

Identify and mitigate the impact of GPS interference in aviation



AireonVECTOR (Validation & Enhanced Calculation of Tactical Operational Routing) leverages Aireon's global, real-time, space-based ADS-B data to pinpoint the location of aircraft independent of the GPS signal. With a proprietary algorithm, it delivers valuable insights for aircraft operators, ANSPs, and other aviation stakeholders, enhancing safety and situational awareness across the industry.

The Aireon algorithm uses two data points: First, the aircraft-calculated ADS-B position that relies on GPS; and second, an Aireon proprietary "reference position," which relies on space-based Time Difference of Arrival (TDOA) techniques and aircraft kinematics. Most of the time, those two data points are the same. However, in regions of GPS interference, Aireon can see the "reference position" diverge from the reported position, which indicates a degradation in the GPS signal, suggesting a possible spoofing or jamming event.

Satellite Wide Area Multilateration enabled by multiple payloads

The Time Difference of Arrival (TDOA) measurements, which come from the simultaneous detection of ADS-B transmissions on multiple payloads, are used by a Satellite Wide Area Multilateration (SWAM) application that enables Aireon to continue

Key benefits of AireonVECTOR

GPS-independent tracking
for aircraft using satellite data, even without a GPS signal

Interference detection
identifying GPS jamming and spoofing in real time

Gap-free flight paths
reconstructing full flight profiles in disrupted regions

Flexible access
via dashboards and data feeds

100% global coverage
for surveillance anywhere, anytime

tracking aircraft even when they are unable to broadcast their GPS position, using only their transmitted 24-bit aircraft address and the time of reception at the Aireon Hosted Payloads onboard the Iridium satellites.

This solution leverages traditional multilateration techniques used by terrestrial systems but applied via satellite. This is possible due to both the Iridium constellation, with its significant overlapping satellite coverage, and Iridium's ability to accurately track the position and timing of each satellite (on the order of hundreds of nanoseconds), which is shared with Aireon.

Tailored Access

The AireonVECTOR suite is designed to be accessible for the operational needs and timing of a range of aviation stakeholders — ANSPs, airlines, airports, safety organizations, defense and national intelligence agencies, and others. From a real-time alerting framework, to dashboard tools for monitoring trends in a region, to streaming data to fill in gaps in routes, AireonVECTOR has a solution to fit.

As the only global provider of space-based ADS-B data, Aireon is the only company that can provide the accuracy, reliability, and consistency needed to derive these valuable operational data points for aviation stakeholders to stay apprised in real-time of changes in the GPS signal reliability.

AireonVECTOR products

Advanced tools for GPS interference detection, aircraft tracking, and flight path reconstruction

AireonVECTOR Flight: A GPS-independent position track that produces a "truth position" of the aircraft. This position is calculated using the timing of ADS-B transmissions received by Aireon's satellite network, providing an accurate, independent location even when GPS data is unavailable or unreliable.

STREAM powered by VECTOR: AireonVECTOR enhances AireonSTREAM™ by providing superior flight tracks even in the presence of high interference by combining ADS-B messages received directly via Aireon's satellite network with AireonVECTOR's calculated aircraft positions.

AireonVECTOR Monitor: Leveraging a cloud-based user interface and a COTS visualization tool, AireonVECTOR Monitor provides proactive, detailed, real-time airspace data and alerts for ANSPs, planners, and analysts, allowing the users to perform detailed analytics into the sources and impacts of signal interference. The solution ensures continuous global coverage, leveraging every tracked aircraft as a GPS sensor, and is able to track GPS incidents for trend reporting and post-event analysis.

AireonVECTOR Map: Turns aircraft into a distributed sensing network, detecting GNSS interference, spoofing, and jamming with precision—hourly and globally.
Built on Aireon's unmatched space-based ADS-B infrastructure, VECTOR Map delivers standardized geospatial intelligence to support smarter route planning, pattern-of-life analysis, and situational awareness—even in remote and oceanic regions.