

CASE STUDY



UTILIZING SPACE-BASED ADS-B TO OPTIMIZE AIR TRAFFIC SURVEILLANCE LAYERS

Enav is the Italian Air Navigation Service Provider (ANSP), managing air navigation services like air traffic control in Italian sky including 45 Control Towers and four Area Control Centers (ACCs) across its national territory. Enav also handles more than 1.8 million flights per year, with peaks that can reach 6,200 flights per day over an airspace of 751,742 square kilometers.

CURRENT AIR TRAFFIC SURVEILLANCE

Current air traffic surveillance in Italy is comprised of:

For the approach, within main airports and Terminal Maneuvering Areas (TMAs):

- n. 19 Primary Radar (PSR)/Secondary Surveillance Radar (SSR) radars, the 19 SSR feed also en-route surveillance system
- n. one transportable PSR/SSR radar

For En-Route:

- n. nine PRS/SSR radars
- n. 22 SSR radar (three dedicated solely to en-route, 19 shared with the approach)
- n. one transportable SSR radar
- n. 14 Automatic Dependent Surveillance-Broadcast (ADS-B) Ground Stations

For Surface:

- n. 10 SMR radar
- n. three MLAT systems

Due to the mountainous and remote terrain of the Italian region, where the Alps and the Apennines act as natural barriers, Enav is required to have a significant ground-based infrastructure to safely accommodate the traffic with low separation minima.

Rotating radars, often located in remote areas, are expensive to maintain; they require additional costs associated with ensuring the security of the sites and technology as well as the consistent maintenance of the hardware. With many radars interrogating the same target, spectrum in Europe is also becoming a serious issue that might eventually result in constraints and safety issues.

FUTURE PLANS FOR SPACE-BASED ADS-B

Once Aireon's space-based ADS-B service is operational in 2018, the data will be merged with the legacy, ground-based surveillance systems. This will allow Enav to optimize multiple surveillance layers. The space-based ADS-B data, coming from Italian and neighboring airspace, will be distributed to all involved air traffic entities through our operational ground-to-ground communication network (E-NET).

Enav will then have an independent and redundant source of surveillance, to mitigate issues that may arise with existing ground structure surveillance systems such as ground based ADS-B sensors, rotating radars or telecommunications lines.

Space-based ADS-B data, related to the BlueMed Functional Airspace Block (FAB), and the complete Middle East area have been reaching the Rome ACC since May 2017, and a detailed verification and validation is currently ongoing, comparing AireonSM data to ground-based ADS-B and SSRs. Enav is also testing the integration into its Air Traffic Management (ATM) multitrapper fusors, such as ATM Surveillance Tracker and Server (ARTAS), an open-source system developed by EUROCONTROL and made available to all its members, and Phoenix, a commercial product developed by Deutsche Flugsicherung (DFS).

In the next five years, Enav will deploy multiple, cooperative, dependent and semi-dependent surveillance layers providing primary and contingency coverage, through the integration of different technologies, such as secondary Radars Mode S, surface radars, multilateration (MLAT), wide area multilateration (WAM) and ADS-B. Deploying multiple surveillance layers is important to the operation of any ANSP and adds confidence in the ability of the system to track and control aircraft safely and efficiently, with further improvements in the services offered to airlines. Additionally, dual use of military radars and exchanges of cross-borders surveillance data across Pan-European Network Services (PENS), the European IP network, will be considered.

In this context, the high availability of space-based ADS-B will allow Enav to optimize and rationalize existing surveillance layers (ground

ADS-B/WAM and new Mode-S radars); legacy surveillance systems, in particular en-route primary radars, which might be decommissioned at their end of life, rather than being replaced; and legacy mode A/C interrogations will be dismissed.

Furthermore, space-based ADS-B will provide the opportunity to instantly deploy a common layer of air traffic surveillance covering the whole BlueMed FAB Mediterranean area.

Space-based ADS-B will provide a great opportunity to provide low-cost coverage for low traffic airports, without any physical, local deployment in place. This would perfectly fit within the Remote Tower Operation concept, which Enav is currently validating at selected airports.

For this process to take place effectively the following key items are needed:

- ▶ The upcoming European ADS-B mandate and its implementation due dates for the airspace users to equip;
- ▶ The success of the Single European Sky initiative for a surveillance performance and interoperability requirements (SPI) implementing rule for interoperability;
- ▶ The Single European Sky ATM Research (SESAR) Deployment Manager Common Project 2 activities and its potential financial incentives to equip fleets with state of art ADS-B OUT transponders;
- ▶ A rationalization of legacy radars, with significant reduction of interrogations and so 1090Mhz usage, which currently negatively impact all systems working on this frequency, specifically in high Radio Frequency (RF)-density areas.

Overall, Enav is expecting substantial benefits from space-based ADS-B, including improved operational efficiency, enhanced safety and the ability to reduce overall costs associated with the current ground-based surveillance infrastructure.

