

# EGNOS and GALILEO for AVIATION



High Precision, Low Investment





European skies are becoming increasingly congested, as are Europe's major airports. With air traffic continuing to grow, there is increasing pressure for small and regional airports to be safely accessible at all times - which cannot be achieved by relying solely on non-precision approaches.

Air Traffic Management (ATM) needs to evolve from the costly and inflexible ground based infrastructures of today towards more advanced systems based on new technology.

EGNOS, the **European Geostationary Navigation Overlay Service**, offers enhanced vertical precision and integrity, improving accessibility, efficiency, and safety to operators, pilots and airports across Europe.

EGNOS, the **European Satellite Based Augmentation System (SBAS)**, was certified for civil aviation in March 2011. Available in 2022, EGNOS V3 will augment both Galileo and GPS and provide users with a more robust solution and better performance.

## Accessibility

Increased accuracy and integrity means the decision height can be decreased to as low as 200 ft, depending on local geography.

With an EGNOS procedure, even small and medium-sized airports and heliports remain accessible in poor weather conditions. Plus, the lower decision height provided by EGNOS may open up approach paths to runway ends previously inaccessible due to local obstacles.

Publishing EGNOS procedures can:

- Offer airports a competitive edge over those only offering non-precision approaches.

- Significantly enhance the effectiveness of helicopter emergency medical services by increasing the accessibility of heliports.

## Sustainability

In many cases, EGNOS reduces aviation's environmental impact. It enables curved approaches and continuous descent paths, reducing both noise and emissions. For helicopters, EGNOS allows approach procedures to be developed from any direction, and at steeper approach angles than classic fixed wing procedures, creating the possibility to avoid densely populated areas.

### LPV-200: The Facts

LPV-200 utilises EGNOS to deliver accurate information on an aircraft's approach.

LPV-200 based approaches:

- Allow lateral and angular vertical guidance without the need for visual contact with the ground until a Decision Height of down to only 200 feet above the runway.
- Are operationally equivalent to ILS CAT I, no need for expensive ground infrastructure.

- Are free of charge within the service coverage area, no upgrade to an airport's ground infrastructure or to existing certified EGNOS receivers is required.
- Increase capacity and reduction of both ATC and pilot workloads.
- Increase airspace capacity to airports, particularly the small and regional airports.

Pilots can now land an aircraft more efficiently and safely, especially in bad weather conditions, thus reducing delays, diversions and cancellations.



## Efficiency

EGNOS provides a cost effective alternative to ILS CAT I, offering similar performance without the need for infrastructure installation and maintenance.

With EGNOS, a lower decision height can also considerably reduce costly delays, diversions and cancellations. This can even allow other ground navaids to be phased out, possibly reducing landing fees.

All that is needed is an on-board EGNOS certified receiver, trained crew, an adapted approach procedure for the runway, and corresponding flight management system functions.

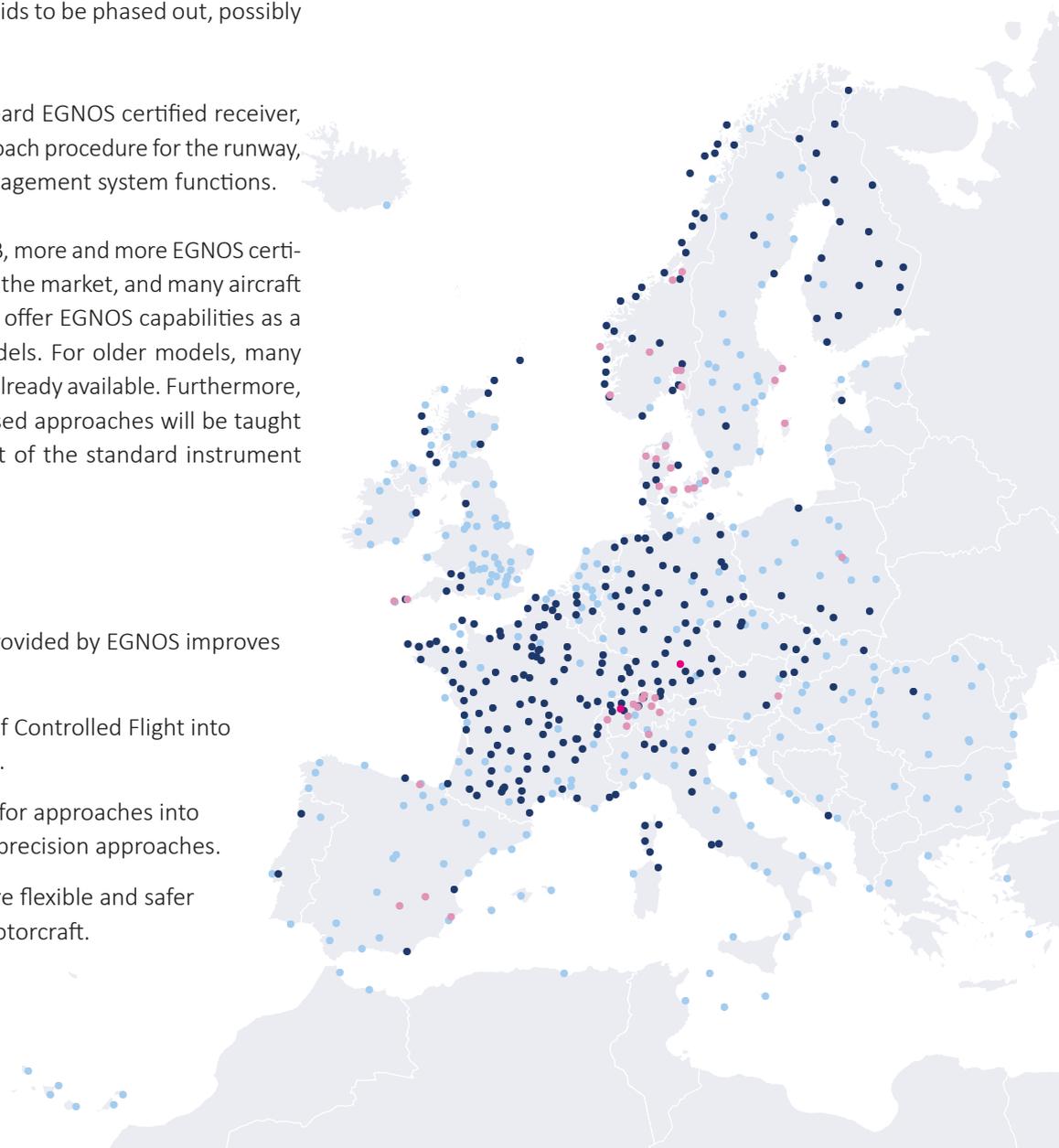
With the introduction of ADS-B, more and more EGNOS certified receivers are available on the market, and many aircraft and rotorcraft manufacturers offer EGNOS capabilities as a standard fit in their new models. For older models, many retrofit and STC solutions are already available. Furthermore, in the near future EGNOS based approaches will be taught to new pilot students as part of the standard instrument rating training.

EGNOS enables the implementation of safe approach procedures specifically designed for helicopters. For example, EGNOS enables safer approaches to hospitals.

## Safety

Increased vertical accuracy provided by EGNOS improves safety by:

- Reducing the occurrence of Controlled Flight into Terrain by as much as 75%.
- Acting as a backup system for approaches into airports that already offer precision approaches.
- Allowing the design of more flexible and safer approach procedures for rotorcraft.



### EGNOS-based approach procedures

- Planned airport
- Operational airport
- Planned heliport
- Operational heliport



## How does EGNOS work?

EGNOS, the European Geostationary Navigation Overlay Service, uses geostationary satellites and a network of ground stations to increase the accuracy of existing satellite positioning signals while providing a crucial ‘integrity message’ that informs users in the event of signal problems.

The EGNOS reference stations pick up signals from GPS satellites, which are processed in Mission Control Centres (MCC). The accuracy of the original signals is determined and confounding factors are corrected.

This data is then incorporated into EGNOS signals and sent to its three geostationary satellites. The satellites relay these signals back to users on the ground, providing greater positioning accuracy than would be achieved through GPS alone.

European regulations favour a move towards PBN (Performance Based Navigation), including a European Commission proposal to require RNP APCH with vertical guidance (i.e. LPV) procedures at all IREs without PA by 2020 and at all IREs with PA by 2024, along with making PBN a part of regular crew training – among others. In Europe, compliance with these regulations will be facilitated by the wide availability of EGNOS-enabled receivers already available today.

The EGNOS signal may be used for approaches using a certified receiver, FMS and SBAS procedure. The EGNOS signal is free and is here to stay. EGNOS has been certified for civil aviation since 2011 and its geographic reach has – and continues to be – extended.

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EGNOS can provide accessibility, cost and safety savings in a single, proven solution, by delivering high precision with a low investment.

## Galileo Initial Services

Galileo is the European Satellite-Based Navigation System providing a highly accurate, guaranteed global positioning service. Galileo, run by civil authorities, provides users with a complementary Global Navigation Satellite System (GNSS). Since the declaration of the Initial Services in December 2016, users around the world can now be guided using the positioning, navigation and timing information provided by Galileo’s global satellite constellation.

Whether in the air, at sea, in the mountains or desert, Galileo’s Search and Rescue (SAR) service’s improved precision and faster detection time dramatically improves the ability to locate a user in distress from up to three hours to just ten minutes. In other words, by expediting the emergency response process, Galileo saves more lives. Galileo’s effectiveness will only increase with the addition of the Galileo Return Link Service, which sends a confirmation message back to the beacon acknowledging that the emergency signal was received.

## GSA: linking space to user needs

The GSA is the European Union Agency in charge of managing operations and service provision of Galileo and EGNOS, ensuring that European citizens get the most out of Europe’s satellite navigation programmes in terms of innovation, competitiveness, economic growth, and benefit to users.

As Europe’s link between space technology and user needs, GSA keeps users at the centre of Galileo and EGNOS.