GROUND BASED AUGMENTATION SYSTEM (GBAS)

The next landing system, enabling flexible and environmental friendly approach paths and providing for landing rate resilience during all-weather operations.

What is GBAS?

The Ground Based Augmentation System (GBAS) is an airport-based precision approach landing system that augments the Standard Positioning Service (SPS) provided by the Global Positioning System (GPS)[1] to ensure enhanced level of service in support of all phases of approach and landing in all weather conditions. GBAS is an alternative to the current Instrument Landing System (ILS) system and the little used Microwave Landing System (MLS).

Currently, ICAO compliant GBAS Category I operations are implemented in four Western European airports: Bremen, Malaga, Frankfurt and Zurich; furthermore, Norway has a regional implementation called SCATI. The SESAR Programme is validating the development of GBAS to support low-visibility operations (the so-called Category II/III operations).

Please visit www.flyGLS.net for more information on GBAS implementation worldwide.

GBAS technology

- GBAS provides a cost-effective solution with a single station supporting all runway ends at an airport.
- Upgradeable to CAT III, GBAS enables schedule reliability in all-weather conditions.
- GBAS has a significantly reduced protection area compared to ILS, increasing the flexibility of ground movements specially during low-visibility conditions.
- The GBAS maintenance costs are much lower than for ILS primarily due to reduced flight inspection requirements.
- GBAS provides flexibility and can enable multiple approach paths to a single runway end, allowing developments of advanced concepts such as increased glides slopes, multiple runway touchdown points and curved approaches.

GBAS advanced operations benefits

The GBAS advanced procedures based on increased glides slopes, adaptive runway aiming point, curved procedures and their combinations potentially provide for:

- Fewer noise concerns in the vicinity of airports due to flexible and efficient arrival paths.
- Reduced runway occupancy times and a lower risk of wake vortex problems.
- Landing rate resilience during adverse weather by using GBAS (due to limited protection areas).

1. *Certain implementations also support GLONASS - The Russian Global Positioning Service- and could be potentially enhanced to augment other constellations in the future.*

EUROCONTROL's contribution

The Navigation Unit is contributing to GBAS by:

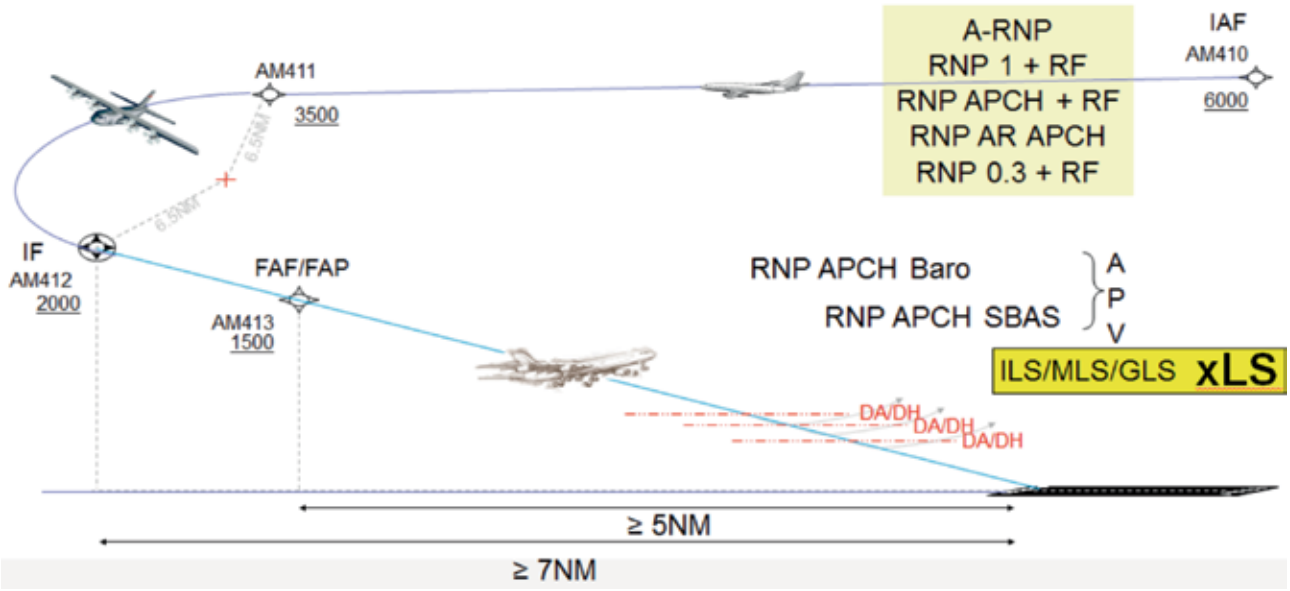
- managing the Landing and Take-Off Task Force (LATO), a recognised European GBAS expert group.
- co-chairing with the FAA, the International GBAS Working Group (IGWG), the worldwide exchange forum on GBAS technical and operational aspects.
- actively contributing to standardisation fora (ICAO, EUROCAE, RTCA) on GBAS CAT III including Multi Constellation and Multi Frequency aspects.
- providing operational and safety assessments to support GBAS operations.
- leading the validation of optimised low-visibility operations using GBAS.
- supporting GBAS signal data collection, analysis and validation with the Pegasus tool.
- collaborating with main European partners under the SESAR framework to GBAS related work-packages.
- supporting relevant spectrum and ionospheric monitoring activities.
- providing training and awareness in all GBAS related aspects.
- in cooperation with EUROCONTROL Airport Unit, leading the GBAS advanced operations concept development.

For registration to LATO and IGWG, please go to the EUROCONTROL OneSky platform:
http://onesky2.eurocontrol.int
Team "GBAS Issues and LATO Task Force".

Quick win

GBAS curved approaches – PBN transitioning to xLS (including GLS)

The flexibility that PBN provides in airspace design and the precise guidance of GBAS in harmony should enable optimised arrival procedures in terms of safety, fuel efficiency and environment in all weather conditions.



PBN transition to GBAS - Some of the open questions:

- Assessing the barometric to geometric vertical transition and associated crew procedures.
- Assessing the minimum acceptable straight in final approach segment acceptable by normal line pilots.
- Is a straight leg prior to FAP necessary for the aircraft to ensure successful capture of final segment?
- The crew procedures and workload for arming modes once aligned on Final Approach – impact on the roll out of the last RF leg.
- Where will the FAP be and will the aircraft be turning onto it.
- The impact of FAS length impact on the GLS guidance laws.
- Assessment of performance of descending/sloping RF turns.

Frankfurt Airport Case

GBAS CAT I has been used operationally in Frankfurt Airport since September 2014.

Fraport has introduced GBAS approach procedures with dual glide path angles:

- The standard 3° glide path to be used by heavy aircraft.
- The 3.2° glide path to be used by for medium category aircraft.

EUROCONTROL Headquarters
Rue de la Fusée 96
1130 Brussels, Belgium

www.eurocontrol.int