

SESAAR		Initial							LOC	
NAV11.2		Implement precision approach procedures using GBAS CAT II/III based on GPS L1 and/or GALILEO E1								
REG	ASP	MIL	APO	USE	INT	IND	NM	MET	AIS	USP

## Subject matter and scope

In current ILS Cat II/III operations there is a need to protect the ILS critical and sensitive areas which result in restricted ground movements and extra spacing margins between aircraft in order to accommodate the longer runway occupancy times (ROT) through the need to protect the larger ILS sensitive area. At capacity constrained airports this may lead to flights being diverted or even cancelled. In addition, this is typically also associated with longer flight times, i.e. more fuel being used.

This objective proposes the use of GBAS which has limited (GBAS Local Object Consideration Areas) or no protection areas, usually located outside aircraft movement areas. This allows the reduction of runway occupancy times in low visibility conditions resulting in reduced spacing between arrival aircraft. The amount of runway throughput gained depends on wake turbulence separation and any other additional spacing needs. With a proper siting of the GBAS ground equipment (compliant with the GBAS Local Object Consideration Areas), there's no need for critical/sensitive areas.

Use of GBAS CAT II/III enables:

- a) flexible approaches; synergistic with RNAV/RNP, PA where ILS cannot due to geography, signal stability (immune to signal bends inherent in ILS);
- b) complement ILS at airports with multiple RWYs during LVP;
- c) the rationalization of some ILS thus reducing operation and maintenance costs and optimizing spectrum;
- d) PA at aerodromes without SBAS coverage or where PA performances cannot be achieved with SBAS.

Benefits of using GBAS CATII/III in Low Visibility Conditions include improved resilience of airport capacity with fewer flight cancellations due to LVP in force. GBAS CATII/III will enable runway ends which are not ILS CATII/III equipped to be used for CATII/III operations as long as the runway is CATII/III qualified. This will have positive effects on gaseous emissions, i.e. less CO2.

This objective adds GALILEO single frequency operations to the basic GAST D functionality to improve availability. It is an intermediate step to achieve full Dual Frequency Multi-Constellation (DFMC) GBAS.

**NOTE:** The benefits mentioned are obviously only gained if a sufficient number of aircraft are equipped; therefore, an action should be included to promote airborne equipage, monitor aircraft equipage rate and assess incentives.

**NOTE FOR MILITARY AUTHORITIES:** It is the responsibility of each Military Authority to review this Objective IN ITS ENTIRETY and address each of the SLoAs that the Military Authority considers RELEVANT for itself. This has to be done on top and above of the review of "MIL" SLoAs which identify actions EXCLUSIVE to MIL Authorities.

## Applicability Area(s) & Timescale(s)

<b>Applicability Area</b> (Not yet defined)				
<b>Timescales:</b>	<b>From:</b>	<b>By:</b>	<b>Applicable to:</b>	
IOC used for Analytics functioning only - not for implementation planning	01/07/2022			
FOC used for Analytics functioning only - not for implementation planning		31/12/2030		

## References

### European ATM Master Plan

OI step -	<a href="#">[AO-0505-A]-Improve Low Visibility Operation using GBAS Cat II/III based on GPS L1</a>					
Enablers -	A/C-02a	A/C-56a	CTE-N01 NAV03.2	CTE-N07	CTE-N07b	
Legend:	WXYZ-001	Covered by SLoA(s) in this objective	WXYZ-002 zzz	Covered by SLoA(s) in another objective Objective covering the enabler	WXYZ-003	Not covered in the Implementation Plan

### Applicable legislation

None
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### Essential Operational Changes

<b>NAV11.2</b>	<b>Implement precision approach procedures using GBAS CAT II/III based on GPS L1 and/or GALILEO E1</b>
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CNS Infrastructure and Services

**SESAR Solution**

#55 - Precision approaches using GBAS CATII/III

**ICAO GANP - ASBUs**

NAVS-B1/1	Extended GBAS
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**Deployment Programme**

- none -	
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**European Plan for Aviation Safety**

RMT.0682	Implementation of the regulatory needs of the SESAR common projects
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**Operating Environments**

Airport	
Terminal Airspace	

**Stakeholder Lines of Action (SLoAs)**

SLoA ref.	Title	From	By
NAV11.2-REG01	Apply ICAO material to local national regulatory activities		
NAV11.2-ASP01	Install GBAS CAT II/III ground equipment		
NAV11.2-ASP02	Design and Publish GBAS CAT II/III precision approach procedures		
NAV11.2-ASP03	Ensure the conformity assessment of GBAS CAT II/III ground equipment		
NAV11.2-USE01	Equip aircraft with systems approved for GBAS CAT II/III		
NAV11.2-USE02	Get airworthiness certification and operational approval		
NAV11.2-INT01	Develop material for certification of GBAS ground facilities		

Description of finalised and deleted SLoAs is available on the eATM Portal @ [https://www.eatmportal.eu/working/depl/essip\\_objectives](https://www.eatmportal.eu/working/depl/essip_objectives)

**Expected Performance Benefits**

<b>Safety:</b>	Safety of approach, landing and guided-take-off operations based on GBAS CAT III L1 (GAST-D and D+) are as safe as operations based on ILS CAT III assuming the identified safety requirements are met. GBAS improves safety in the segment of avoiding a scenario of false LOC or Glide beam capture.
<b>Capacity:</b>	GBAS has limited (GBAS Local Object Consideration Areas) or no protection areas, usually located outside aircraft movement areas. This allows the reduction of runway occupancy times in low visibility conditions resulting in reduced spacing between arrival aircraft. The amount of runway throughput gained depends on wake turbulence separation and any other additional spacing needs.
<b>Operational Efficiency:</b>	Fewer flights will be cancelled or diverted saving the Airspace User (Main and Regional airliners) associated costs. To be noted that cancellations also affect the subsequent legs planned with those aircraft. Business Aviation see minimal benefits as they fly infrequently to capacity constrained airports during LVP. Avoiding the loss of runway capacity will reduce the level of delay and avoid the associated costs. A key issue is the impact of the primary delays on the subsequent legs to be performed by those aircraft which try to absorb the delay where possible. Higher glide slopes than those possible with ILS, 3.2° even in CAT II/III weather conditions.
<b>Cost Efficiency:</b>	One GBAS station can provide approaches for multiple runway end as well as multiple approaches per runway end. The GBAS station in the long term is much more cost efficient than the ILS in terms of less maintenance and flight inspection required.
<b>Environment:</b>	The environmental benefits come from the saving of jet fuel due to the resilience of the system in keeping its capacity even in Low Visibility Operations. Fuel savings results in direct reductions in CO2 emissions. For single runway operations there is also a direct benefit in term of local air quality by having less aircraft queuing on the runway for departure conditions. Noise abatement potentially due to higher glide slope and 2nd runway aiming point.
<b>Security:</b>	-

**Detailed SLoA Descriptions**

NAV11.2-REG01	Apply ICAO material to local national regulatory activities	From:	By:
		-	-
<b>Action by:</b>	<b>State Authorities</b>		

<b>NAV11.2</b>	<b>Implement precision approach procedures using GBAS CAT II/III based on GPS L1 and/or GALILEO E1</b>		
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<b>Description &amp; purpose:</b>	Publish national regulatory material for GBAS CAT II/III procedures based on ICAO standards. (to be developed)		
<b>Supporting material(s):</b>	EUROCAE - ED-114B - MOPS For Global Navigation Satellite Ground Based Augmentation System Ground Equipment to support Precision Approach and Landing 09/2019 Url : <a href="https://eshop.eurocae.net/eurocae-documents-and-reports/ed-114b/">https://eshop.eurocae.net/eurocae-documents-and-reports/ed-114b/</a>		
<b>Finalisation criteria:</b>	1 - National regulatory material for GBAS CAT II/III procedures based on ICAO standards. (to be developed).		
<b>NAV11.2-ASP01</b>	<b>Install GBAS CAT II/III ground equipment</b>	From: -	By: -
<b>Action by:</b>	<b>ANS Providers</b>		
<b>Description &amp; purpose:</b>	Procure and install GBAS CAT II/III ground equipment to support the precision approach procedures based on GBAS CAT II/III. Perform siting and site feasibility study. Integrate GBAS CAT II/III ground equipment in ATC (& airport) infrastructure. Verify performance of installed GBAS CAT II/III ground equipment (ground testing, flight testing). Develop maintenance and training material.		
<b>ATM Master Plan relationship:</b>	<a href="#">[CTE-N07]-Ground Based Augmentation System (GBAS)</a> <a href="#">[CTE-N07b]-GBAS Cat II/III based on Single-Constellation / Single-Frequency GNSS (GPS L1)</a>		
<b>Finalisation criteria:</b>	1 - GBAS CAT II/III is procured, installed and flight tested.		
<b>NAV11.2-ASP02</b>	<b>Design and Publish GBAS CAT II/III precision approach procedures</b>	From: -	By: -
<b>Action by:</b>	<b>ANS Providers</b>		
<b>Description &amp; purpose:</b>	Develop GBAS CAT II/III precision approach procedures at instrument runways. This action includes the following tasks: - Identify runways where GBAS CAT II/III should be introduced; - Design GBAS CAT II/III procedures; - Provide Final Approach Segment (FAS) data for GBAS CAT II/III ground equipment (in EUROCAE ED-114B FAS data file format) - Publish GBAS CAT II/III procedures in national AIPs.		
<b>Finalisation criteria:</b>	1 - GBAS CAT II/III precision approach procedures have been implemented in accordance with guidance material and published in the National AIP, and are in operational use.		
<b>NAV11.2-ASP03</b>	<b>Ensure the conformity assessment of GBAS CAT II/III ground equipment</b>	From: -	By: -
<b>Action by:</b>	<b>ANS Providers</b>		
<b>Description &amp; purpose:</b>	Before putting the ground equipment into service, the ANSP shall ensure that the equipment has been subject to a declaration or certification process confirming the compliance with the appropriate regulatory requirements.		
<b>ATM Master Plan relationship:</b>	<a href="#">[CTE-N07]-Ground Based Augmentation System (GBAS)</a> <a href="#">[STD-026]-ED-114B, MOPS for GBAS ground systems to support precision approach and landing (CATIII)</a>		
<b>Finalisation criteria:</b>	1 - The appropriate declarations or certificates have been issues.		
<b>NAV11.2-USE01</b>	<b>Equip aircraft with systems approved for GBAS CAT II/III</b>	From: -	By: -
<b>Action by:</b>	<b>Airspace Users</b>		
<b>Description &amp; purpose:</b>	Fit the aircraft with suitably approved equipment GBAS CAT II/III equipment compliant to EASA AMC XX-YY.		
<b>ATM Master Plan relationship:</b>	<a href="#">[A/C-02a]-Enhanced positioning using GBAS single frequency</a> <a href="#">[A/C-56a]-Flight management and guidance for Precision Approach GBAS CATII/III using GPS L1</a>		
<b>Finalisation criteria:</b>	1 - Aircraft have been fitted with suitable GBAS CAT II/III equipment compliant to EASA AMC XX-YY.		
<b>NAV11.2-USE02</b>	<b>Get airworthiness certification and operational approval</b>	From: -	By: -
<b>Action by:</b>	<b>Airspace Users</b>		
<b>Description &amp; purpose:</b>	Apply for approval against EASA CS AWO and IR OPS. The applicant needs to submit, to the competent National Authorities, a compliance statement which shows how the criteria of the EASA CS AWO and IR OPS have been satisfied.		
<b>ATM Master Plan relationship:</b>	<a href="#">[A/C-02a]-Enhanced positioning using GBAS single frequency</a> <a href="#">[A/C-56a]-Flight management and guidance for Precision Approach GBAS CATII/III using GPS L1</a>		
<b>Finalisation criteria:</b>	1 - The airworthiness and operational approval has been granted by the competent National Authorities to the operator.		
<b>NAV11.2-INT01</b>	<b>Develop material for certification of GBAS ground facilities</b>	From: -	By: -
<b>Action by:</b>	<b>ICAO, EUROCAE, RTCA</b>		
<b>Description &amp; purpose:</b>	Publish standards material for GBAS CAT II/III ground facilities approval/certification using the L1/E1 frequency.		
<b>Finalisation criteria:</b>	1 - Standards material for approval of GBAS CAT II/III ground facilities has been published.		

NAV11.2

Implement precision approach procedures using GBAS CAT II/III based on GPS L1 and/or GALILEO E1

