

International Civil Aviation Organization



ICAO

**Twenty Fifth Meeting of the Communications/
Navigation and Surveillance Sub-group (CNS SG/25) of
APANPIRG**

Web-conference, 18 – 22 October 2021

Agenda Item 5: Navigation

**Review of Report of the Third Meeting of GBAS/SBAS Implementation Task Force
(GBAS/SBAS ITF/3)**

(Presented by Secretariat)

SUMMARY

This paper provides information on the outcomes of the GBAS/SBAS ITF/3 held through VTC from 27-28 September 2021 for the review by the meeting.

1 INTRODUCTION

- 1.1 The third Meeting of the ICAO GBAS/SBAS Implementation Task Force (GBAS/SBAS TF/3) was held by Video Teleconference (VTC) on 27-28 September 2021 and 134 participants from Australia, Cambodia, China, Hong Kong China, India, Indonesia, Japan, Malaysia, Myanmar, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, Vietnam, USA, IATA, IFALPA and ICAO attended the meeting. A total of six (6) Information Papers (IPs), nine (9) Working Papers (WPs) and one (1) flimsy were presented in the meeting. The papers and report are available on the webpage of the meeting: <https://www.icao.int/APAC/Meetings/Pages/2021%20Third-meeting-of-GBAS-SBAS-Implementation-Task-Force-GBAS-SBAS-ITF3.aspx>.

2. DISCUSSION

- 2.1 The meeting deliberated on the following main Agenda Items:-

Agenda Item 2: GBAS/SBAS Information Sharing Platform

Agenda Item 3: Updates from States about GBAS/SBAS Implementation

Agenda Item 4: Technical Updates related to GBAS/SBAS

Agenda Item 5: Guidance Reference on Implementation Process for GBAS/SBAS

Agenda Item 6: GBAS/SBAS Flight Procedure Design Overview

Agenda Item 7: Review of Action Item List

2.2 GBAS-SBAS Information Sharing Platform

The Secretariat informed the meeting that a GBAS-SBAS Information Sharing Platform had been created on the APAC website for benefit of all States. This platform contains all those reference documents required for implementation of GBAS/SBAS listed there with applicable links. Following Information is available on this platform:-

- Applicable and Reference Documents
- Introduction of GBAS and SBAS concept
- Update on the GBAS and SBAS Program per APAC State
- List of National Focal Points
- Map of GBAS-SBAS procedures- Planned & Published (placed as Annexure A)

The information is available on the following link: <https://www.icao.int/APAC/Pages/GBAS-SBAS.aspx>. This will help States in the implementation of GBAS/SBAS. States were encouraged to go through the contents and suggest for any amendment in the contents, as well as updating the information about focal points and GBAS/SBAS implementation status in their respective States at least every six month.

2.3 Updates from the States about GBAS/SBAS Implementation

2.3.1 The US presented about Cross Border Application of its SBAS (WAAS) to Support Terminal Approach Procedures in its neighboring States. The US also recommended Asia/Pacific States to consider similar arrangements for current or planned SBAS serving the region and offered its expertise and lessons learned to interested States.

2.3.2 Australia presented the journey for implementation of GBAS in Australia with detailed steps involved in each stage of implementation.

2.3.3 Japan presented the use of MSAS v2 (one GEO) to introduce LPV-250 approach and the use of MSAS v3 (three GEOs) for LPV-200.

2.3.4 India presented the current status of Indian SBAS - GAGAN (GPS Aided GEO Augmented Navigation) and its expansion plan in the Asia-Pacific region.

2.3.5 Japan informed that CAT I GLS procedures had been published for operational trial since July 2020 at Tokyo International Airport (Haneda).

2.3.6 Japan presented about the certification framework for SBAS and GBAS implementation.

2.3.7 Singapore presented a paper to highlight potential vulnerabilities to Global Navigation Satellite System (GNSS) disruptions, mitigations, and a resultant Concept of Operations (CONOPS) for the successful mitigation of a GNSS Outage in a State.

2.3.8 Thailand presented an overview of the GBAS Proof-of-Concept (PoC) Project between Japan and Thailand to install GBAS PoC equipment at Suvarnabhumi International Airport and conduct an experiment for the deployment of GBAS at low geomagnetic latitude area, of which the performance is affected by ionospheric irregularities.

2.3.9 The Republic of Korea presented status of Korean SBAS called KASS (Korea Augmentation Satellite System) and informed that its certification process would be completed by end 2023 for the provision of Safety of Life (SoL).

2.4 Technical Updates related to GBAS/SBAS

2.4.1 The Secretariat presented a summary of Amendment to Annex 10 - Vol-I to include DFMC GNSS & SBASs, as well as Galileo & BDS Standards, to be applicable from 2 Nov 2023. This will help States to plan their GBAS/SBAS Implementation. This amendment will also allow some flexibility in location of GBAS system in an airport.

2.4.2 The Co-Chairs presented a paper regarding the review of the GBAS safety assessment guidance document related to anomalous ionospheric conditions and identified items to be updated. States were requested to nominate members to constitute an expert group for updating this document.

Decision GBAS/SBAS ITF/3-1: Review and revise the GBAS and SBAS safety assessment guidance document related to anomalous ionospheric conditions	
What: That, GBAS/SBAS ITF will review and revise the GBAS and SBAS safety assessment guidance document related to anomalous ionospheric conditions in view of GAST-D to support Cat II/III and DFMC SBAS.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To provide updated GBAS and SBAS safety assessment guidance related to anomalous ionospheric conditions	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 28 September 2021	Status: Adopted by TF.
Who: <input type="checkbox"/> Sub groups <input type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> Other: GBAS/SBAS ITF	

Action 3/1- To review and revise the GBAS and SBAS safety assessment guidance document related to anomalous ionospheric conditions available on APAC website in view of GAST-D to support Cat II/III and DFMC SBAS. A draft document is targeted for ready by the forth GBAS/SBAS ITF meeting. Two Co-chairs will lead the task force expert group and States are urged to nominate experts to the group by 31 Oct 2021.

2.4.3 Hong Kong, China presented a paper to share their strategy and experience in VDB frequency assignment for GBAS as VDB frequency would use the same radio frequency band as other types of ground-based navigational systems, such as VHF Omni-directional Range (VOR) and Instrument Landing System (ILS), but with large (around 1MHz) channel space required from existing DVOR/ILS frequencies already in use.

2.4.4 Hong Kong, China presented about safety and risk Assessment process, covering both engineering and operation aspect, applied for GBAS Trial at HKIA.

2.5 Guidance Reference on Implementation Process for GBAS/SBAS

2.5.1 A framework of guidance reference for implementation of GBAS/SBAS developed by the Co-Chairs was presented. The paper presented a high level framework of guidance reference document on implementation process for GBAS/SBAS. The framework will be taken as a reference for the task force expert group to draft the guidance document for the Region.

Decision GBAS/SBAS ITF/3-2: Guidance Document on Implementation Process for GBAS/SBAS	
What: That, GBAS/SBAS ITF will draft a guidance reference document for implementation of GBAS/SBAS in the Asia/Pacific Region.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To provide guidance for implementation of GBAS-SBAS in the Asia/Pacific Region	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 28 September 2021	Status: Adopted by TF.
Who: <input type="checkbox"/> Sub groups <input type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> Other: GBAS/SBAS ITF	

Action 3/2- To draft a guidance reference for implementation of GBAS/SBAS in the region. A draft document was planned to be ready by the fourth GBAS/SBAS ITF meeting. Two Co-chairs would lead the group and States were urged to nominate experts to the task force expert group by 31 Oct 2021.

2.6 GBAS/SBAS Flight Procedure Design Overview

2.6.1 The Secretariat presented about GBAS/SBAS Flight Procedure Design Overview to describe the differences of these procedures vis-a-vis conventional procedures. It was emphasized that FAS DB was one of the main difference of GBAS/SBAS procedures as compared to conventional procedures.

2.7 Review of the Action list

2.7.1 The Action List of the task force was discussed, with description, relevance and priority being assessed by the meeting. Some of the action items have been closed as those actions have been completed and for others new target dates have been assigned. The amended Action list is attached as **Annexure B** to the report.



3. ACTION BY THE MEETING


3.1 The meeting is invited to:

- a) review the Summary Report on the outcome of the GBAS/SBAS ITF/3 Meeting;
- b) note **Decision GBAS/SBAS ITF/3-1 and 3-2** of the task force and the information contained in this paper; and
- c) discuss any relevant matters as appropriate.

Annexure A

LPV (SBAS) Implementation Map (Zoom Airport Icon to View Procedure Type and Status)

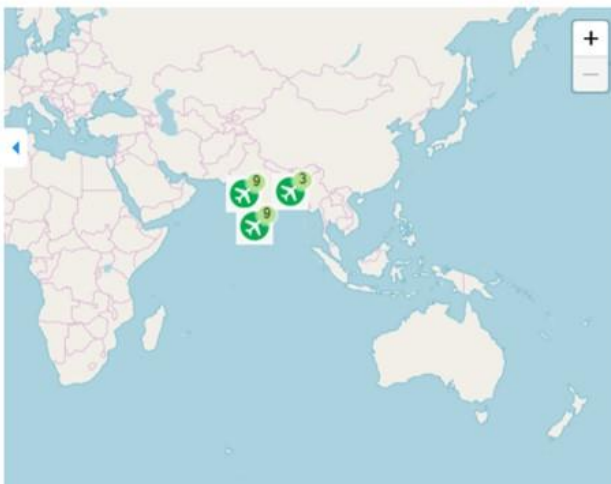
LPV Planned	LPV Operational
	





SEARCH MAP


Operational and Planned LPV (SBAS...

- LPV OPERATIONAL
- LPV PLANNED
 - PLANNED (21 pins)
 - LPV (21 pins)



GLS (GBAS) Implementation Map (Zoom Airport Icon to View Procedure Type and Status)


GLS Planned	GLS Operational
	



SEARCH MAP

GLS(GBAS) Procedure Map

- GLS PROCEDURE
 - OPERATIONAL (10 pins)
 - GLS (10 pins)
 - PLANNED (6 pins)
 - GLS (6 pins)



ACTION PLAN

GBAS SBAS Implementation TF

Last Updated: 28/9/2021

N	ACTION ITEM	PRIORITY	OWNER	DUE	STATUS	NOTES (ICAO Document ref)	Decision by the meeting
1 Develop awareness and information sharing							
1.1	Organize a workshop with airspace users of the APAC region (expected benefits, comparison with ILS and Baro VNAV, operational concept, coverage of SBAS and GBAS, programmes in the region, fleet readiness, cockpit interface, business case, retrofit, mandates, inviting air operators already using SBAS or GBAS procedures)	HIGH	ICAO/IATA	Early 2021		ICAO and IATA as main organizers, with the host State. First choice would be to have a face-to-face workshop , in India for example, as Gagan has been put in place. Second choice is to organize a small webinar. To be decided in Dec 2020.	Wait until COVID-19 situation to allow international travel.
1.2	Organize a specific meeting with APAC regulators interested in GBAS SBAS (update of regulation, certification of provider, certify pilot training and standard operating procedures., approval of procedures,...)	HIGH	ICAO and some States to conduct a survey first	To be discussed at the 3rd TF meeting	Before ITF/4 Meeting	Australia is supporting	Develop a survey plan, then circulate to States- Secretariat in onsultation with Co- Chairs - Before 4th Meeting
1.3	Create a brochure to summarize main aspects of GBAS and SBAS systems	HIGH	1) ICAO to collect information already available and put on the website 2)See whether we do need a	S1 2021	Closed	With input from other actions, may be combined with 1.4 Brochure in a second stage	Already available on Information Sharing Platform, TF members are encouraged to see and suggest for any changes
1.4	Make reference to existing information about benefits of GBAS and SBAS vs ILS and APV Baro	MEDIUM	ICAO	12/31/2020	Closed	What is already available from ICAO or from other regions ? From FAA : https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/ https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/library/factsheets/media/RNAV_QFacts_final_06_122012.pdf From ICAO EUR/NAT https://www.icao.int/EURNAT/EUR%20and%20NAT%20Documents/EUR%20Documents/EUR%20Documents/025%20-%20EUR%20RNP%20APCH%20Guidance%20Material/EUD%20Doc%20025%20RNP%20APCH.pdf	Already available on Information Sharing Platform, TF members are encouraged to see and suggest for any changes
1.5	Develop a list of GBAS and/or SBAS focal points in each APAC State	HIGH	ICAO / Action of the GBAS SBAS ITF/2 for ICAO RO to send a State Letter	9/30/2020- for dispatch of SL	Closed	Information to be put on the website	Already available on Information Sharing Platform, TF members are encouraged to see and suggest for any changes
1.6	Develop a synthetic list of the on going development of GBAS SBAS systems in the APAC region (coverage, date of entry into service)	HIGH	ICAO / Information to put on the website / Action Focal point to provide GBAS SBAS programme information to ICAO	12/31/2020	Closed	Reuse the format of the information presented at the workshop in Republic of Korea in 2019	Already available on Information Sharing Platform, TF members are encouraged to see and suggest for any changes
1.7	Develop a synthetic list of GBAS and SBAS fleet readiness	MEDIUM	ICAO/IATA/Eurocontrol	End of Q1 2021	Closed	Public information from IGWG and aircraft manufacturers. (https://ext.eurocontrol.int/analytics/saw.dll?Dashboard) The IGWG information is available at the EUROCONTROL's One Sky Team website (registration required).	Can be accessed through One Sky Team website and Airbus and Boeings presentation in ICAO APAC GBAS-SBAS workshop contents.

N	ACTION ITEM	PRIORITY	OWNER	DUE	STATUS	NOTES (ICAO Document ref)	Decision by the meeting
1.8	Develop a list/map of published GBAS and SBAS procedures in the APAC region	MEDIUM	ICAO with input from focal points	Next meeting	Closed	The flygls.net website (Airbus/Eurocontrol) lists the GBAS stations worldwide SBAS : FAA LPV approaches: https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/approaches/media/LPVs.xlsx EGNOS LPV https://egnos-user-support.essp-sas.eu/new_egnos_ops/resources-tools/lpv-procedures-map Europe through Eurocontrol access https://www.eurocontrol.int/platform/performance-based-navigation-map-tool	Already available on Information Sharing Platform. TF members are encouraged to see and suggest for any changes
1.9	Develop a list of APAC States' mandates (existing and planned) related to GBAS and SBAS	MEDIUM	ICAO with input from focal points	Next meeting			Remind focal points to respond.
2 Experience sharing							
2.1	Organize a discussion and a visit if possible of States/Airports who have already implemented Gbas or Sbas systems (all subjects including siting, performance demonstration, safety assessment..)	HIGH	ICAO / When possible	To be discussed in the next meetings		Could be done in : - Australia as Melbourne and Sydney have published procedures on GBAS stations. - Japan : a GBAS operational trial procedure has been published at Tokyo Haneda and is applicable from 16 July 2020.	Wait until COVID-19 situation to allow international travel.
3 Technical issues							
3.1	Review of the previous ionosphere studies published in 2016 (also look at how to use SBAS coverage for GBAS)	HIGH	Japan / Ad hoc group under GBAS SBAS ITF ICAO to send an email to get volunteers with Mr Susumu as	Next meeting		Coordination/harmonization with the ad hoc group of ICAO NSP GWG (GBAS Working Group) working on iono guidance for GBAS in low latitude regions.	At least GBAS guidance needs update to include GAST-D. ICAO NSP GWG is working on developing a manual on GBAS including iono mitigation. SBAS guidance should be reviewed, maybe to add some on DFMC SBAS.
3.2	Management of SBAS Channel	MEDIUM	States to contact ICAO to get the SBAS channel numbers as per SL 2019/87		Closed	Handled by ICAO HQ SL 2019/87 from ICAO to States to nominate contact point and then can access the ICAO tool	Already available on Information Sharing Platform
3.3	VDB frequency assignment and coordination in APAC	HIGH	Hong Kong China to coordinate with other States and ICAO	Next meeting		ICAO Doc 9718 is under revision to include VDB frequency compatibility criteria. To coordinate with Spectrum Review WG and Navigation System Panel (NSP). Mr Susumu Saito offered to help in coordination with NSP.	Outcome of NSP to be reported to the next meeting.
3.4	ATC interface and NOTAM matters (both for GBAS and SBAS) (Ref essential navigation means in Annex 10 ??)	MEDIUM	ICAO/ WP and discussion for a future meeting	Next meetings		Based from ICAO provision and experience of other regions	
3.5	SBAS coverage extension to neighboring States (simulation, adding ground station and associated costs, certification, Service Level Agreement)	HIGH	States operating SBAS should present WP	Next meetings	Closed	India / USA are willing to contribute to this WP	Completed
3.6	GBAS and SBAS safety assessment	HIGH	States to share their experience	Next meetings			States to respond
3.7	GBAS SBAS performance demonstration (acc,int,avail,cont,time to alarm, data collection, simulation,...)	HIGH	States to share their experience	Next meetings		Also addressed in IGWG	States to respond
3.8	GNSS signal monitoring (legal recording,...)	MEDIUM	States to share their experience	Next meetings	Closed	Ref ICAO GNSS Manual	Already available on Information Sharing Platform

N	ACTION ITEM	PRIORITY	OWNER	DUE	STATUS	NOTES (ICAO Document ref)	Decision by the meeting
3.9	GBAS siting criteria	MEDIUM			Closed	EUROCAE ED114B and FAA Order 6884.1 (http://www.faa.gov/documentLibrary/media/Order/6884_1.pdf)	Already available on Information Sharing Platform
3.1	Information to be provided in the flight plan and information into AIP	MEDIUM			Closed	ICAO DOC 4444	Already available on Information Sharing Platform
3.1	Final Approach Segment Data Block : 1) Tool to elaborate the FAS DB ; 2) How to validate FAS DB during the ground and flight inspection	MEDIUM	States to share their experience	Next meetings	Closed	Same for SBAS and GBAS? Ref Eurocontrol tool to create FAS DB : EUROCAE ED114B for GBAS	Completed
3.1	Phraseology	LOW			Closed	ICAO DOC 4444	Already available on Information Sharing Platform
3.1	Lack of PRN numbers for SBAS Geo Satellites	MEDIUM	Mainly for new SBAS providers		Closed	Annex 10 / NSP and receiver standards RTCA DO229F	Already available on Information Sharing Platform
3.1	Interference management (but this is not only specific to GBAS SBAS)	MEDIUM	States to share their experience		Closed		Refer to GNSS manual (Doc9849) on website
4 Quick guides and references							
4.1	ICAO and others document review (Top Down)	HIGH	ICAO / Website		Closed	Source : ICAO presentation given at the first workshop in ROK in 2019	Already available on Information Sharing Platform
4.2	Develop High Level guide on Implementation Process for GBAS and SBAS	HIGH	Co-chairs	WP/ Skelton to be presented at the next meeting		What is already available from ICAO or from other regions ? Ref AIDC and ADSB High Level Guide	Skelton presented , needs to developed with constitution of an expert group, States to nominate members and Co-chairs to work on it.
4.3	Technical support for system certification and operation certification	TBD				To be decided after meeting with regulators Linked with 1.2 and 3.6 above.	
4.4	Complement the "PBN in a page"	LOW	ICAO to assess what could be done		Closed	https://www.icao.int/APAC/Documents/edocs/PBN-in-a-page%20V2.pdf GBAS is not part of PBN but rather comparable with ILS	Already available on APAC website
5 Training							
5.1	Develop syllabus for ATCOs	MEDIUM	To be confirmed				
5.2	Develop one day/two day training workshop for ATCOs (Use of GBAS/SBAS for approach and landing : mixity of traffic, ATC interface, Notam,...)	MEDIUM	To be confirmed				
5.3	Deliver a training module on GBAS and SBAS instrument flight procedure design	MEDIUM	ICAO TCB Flight Procedure Programme (FPP)			Training conducted by FPP on 13-17 July 2020	Report to the next meeting (if conducted)