

INTERNATIONAL CIVIL AVIATION ORGANIZATION



**REPORT OF THE FOURTH MEETING OF THE
ICAO ASIA/PACIFIC GBAS/SBAS IMPLEMENTATION TASK FORCE
(GBAS/SBAS ITF/4)**

Video Teleconference, 11-12 May 2022

The views expressed in this Report should be taken as those of the Meeting
and not the Organization

Approved by the Meeting and published by the ICAO Asia and Pacific Office, Bangkok

1. INTRODUCTION

Meeting

1.1 The fourth Meeting of the ICAO Asia/Pacific GBAS/SBAS Implementation Task Force (GBAS/SBAS ITF/4) was held by Video Teleconference (VTC) on 11-12 May 2022.

Attendance

2.1 A total of 113 participants from Australia, China, Hong Kong China, Fiji, India, Japan, Mongolia, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, Vietnam, USA, IATA, IFALPA and ICAO were registered for the GBAS/SBAS ITF/4 VTC. A list of participants is provided at Appendix B to this report.

Officers and Secretariat

3.1 Mr. V. K. Mishra, Regional Officer, PBN, ICAO APAC was the Secretary of the meeting. He was supported by Yang Siqi, Program Assistant, ICAO APAC RSO.

Opening of Meeting

4.1 On behalf of Mr. Tao Ma, Regional Director of ICAO Asia and Pacific Office, Mr. Raphael Guillet, Chief of ICAO APAC RSO welcomed all participants to the meeting. The meeting was conducted by the incumbent Co-Chairs of the meeting Mr. Susumu Saito, ENRI Japan and Mr. George Wong, CAD, Hong Kong China.

Documentation and Working Language

5.1 The working language of the VTC and all documentation were in English.

5.2 A total of six (6) Information Papers (IPs) and twelve (12) Working Papers (WPs) were presented in the meeting. The list of papers and presentations is provided in Appendix A to this report. The papers are available on the webpage of the meeting; <https://www.icao.int/APAC/Meetings/Pages/2022-GBAS-SBAS-ITF4.aspx>

REPORT ON AGENDA ITEMS

Agenda Item 1: Adoption of Agenda

1.1 The following proposed agenda was adopted by the meeting.

Agenda Item 1: Adoption of Agenda

Agenda Item 2: Updates from States about GBAS/SBAS Implementation

Agenda Item 3: Progress on the work of Expert Groups constituted to:

- Review and revise the GBAS and SBAS safety assessment guidance document related to anomalous ionospheric conditions, and to
- Draft a Guidance Document on Implementation Process for GBAS/SBAS.

Agenda Item 4: Review of Action Item List

Agenda Item 5: Any Other Business

Agenda Item 6: Date and Venue of Next Meeting

Agenda Item 2: Updates from the States about GBAS/SBAS Implementation

WP03- Implementation of LPV (GAGAN) Approaches -India

India presented the implementation status of GAGAN based LPV approaches with emphasis on implementation at regional airports in India to improve access, regularity and efficiency of aircraft operations to provide reliable connectivity to relatively remote places in India. PBN OPS Approval process for LPV procedure was also explained and it was informed that one major Airline and AAI for its calibration aircraft was in the process of getting the OPS approval. Another Airline had also submitted those documents for OPS approval. It was also informed that the first LPV procedure would be promulgated on 16 June 2022.

ICAO raised a query about FAS DB validation. India informed that, after it was provided by the procedure designer, it would go to database coder and then validated in flight simulator before live flight trial.

WP04- GBAS Brief - USA

The United States of America presented WP04 summarizing the current state of their GBAS activities. As GBAS is being implemented as a Non-federal system, the USA currently has four active GBAS equipped aerodromes with another two planned for operations by 2024. Fifteen airlines, including several from APAC, have conducted GBAS approaches at these locations. The US continues Long Term Ionospheric Anomaly Monitoring (LTIAM) to refine and improve system availability and performance. The presentation also included information on GBAS approvals, monitoring and inspection processes.

Mongolia enquired about the cost of a GBAS system. USA informed that the overall cost of a GBAS system was significantly lower than an ILS as one GBAS system could serve multiple runways at an airport and less expensive to maintain.

On a query from Pakistan about effective oversight and its frequency of GBAS service provider, USA explained that the oversight was similar to ILS and had a robust monitoring system. The same would apply to airlines.

India enquired about removal of ILS, where GLS was available. USA explained that, in view of the current aircraft equipage, it was a long-term plan.

Japan raised a query on whether SBAS could provide CAT-I, and the utility of GBAS. USA explained that GBAS was not widely used in USA as there were large number of LPV (SBAS) procedures available. However, as CAT-II/III was possible with GBAS, it was the future of precision approach.

On a query from Singapore about requirement of SBAS monitoring for GBAS, USA informed that SBAS reference stations around the GBAS helped in GBAS operation, but it was not mandatory for GBAS operation. Further query was raised by Singapore on whether it could be monitored if reference station was not available. USA explained that the SBAS monitoring for GBAS might not be feasible. India supplemented that Singapore was within the coverage of GAGAN and a reference station was feasible.

ICAO raised a query on whether the flight inspection of GBAS was being conducted as per FAA standard as presently there was no such requirement for GLS in ICAO document. USA explained that unlike ILS, GBAS VDB signal was only monitored. Co-chair of the meeting clarified that flight inspection of GLS was being included in the forthcoming version of Doc 8071.

IP01- GBAS Status - Japan

Japan presented the status of GBAS implementation in Japan. Installation and operational trial of CAT- I GBAS at Tokyo Haneda International Airport was introduced. GBAS R&D activities included CAT- I flight demonstration of RNP to GLS APCH with a portable GBAS system and DFMC GBAS concept study in southern Japan.

Co-chair of the meeting enquired when this trial would be extended to other airlines and the flight procedures would be available for other runways. Japan supplemented that the trial was available for other airlines and the procedures for other runways would be made available in the next step.

India raised a query about the criteria for having number of receiver stations. Japan informed that it depended on the size of the airport. In response to India's further query on whether there was any CAT-III prototype, Japan informed that there was one on experimental basis. India enquired about the critical and sensitive areas for GBAS, and Japan explained that there was no equivalent critical and sensitive areas as ILS for GBAS, except an area defined around VDB and GBAS Antenna.

Singapore wanted to know whether the delay was due to any technical reason and a timeline for regular operation of GBAS in Japan. Japan explained that adequate data was being collected and examined before regular operation of GBAS and there was no other technical reason concerned.

IFALPA raised a query about when the GBAS would be made operational on regular basis. Japan supplemented that it was being examined and a definite date had not been determined yet.

IP02- SBAS Status - Japan

Japan reported on the SBAS status update that MSAS was currently served by QZS-3, the GEO of the Quasi-Zenith Satellite System. It was reported that LPV-250 would be provided on a trial basis in Hokkaido in this year using the current V2 ground equipment. In the future, Japan would aim to achieve LPV-200 using V3 with improved software and three GEOs. In response to India's clarification on the necessity of 3 GEOs, Japan informed that it was for redundancy and obtaining sufficient elevation angles for flying aircrafts from any space within the coverage area.

ICAO raised a query about the certification of SBAS system and when an LPV procedure will be published for airspace users. Japan explained the process and informed that LPV procedure will be published by 2023. ICAO suggested to present the system certification and safety assessment process in the next meeting, which was agreed by Japan.

On a query from India about reference station outside Japan, it was informed that there was no such station. On a further query from India, Japan explained that purpose of 3 GEO was for redundancy and obtaining sufficient elevation angles for flying aircrafts from any space within the coverage area.

IP03- Korean SBAS Implementation Status - Republic of Korea

The Republic of Korea is developing Korean SBAS called KASS (Korea Augmentation Satellite System). The KASS System Qualification Review (SQR) is planned for the second half of 2023. Thereafter, the certification process will be completed by the end of 2023 for the provision of the Safety of Life (SoL) service across the designated coverage. In response to ICAO's enquiry about the target service volume of KASS, ROK informed that it was for Incheon FIR. ROK informed that the target service level was APV-I. India enquired how the user would differentiate between open service and Safety of life (SOL). ROK explained that initially it would be open service, not meant for aviation user. After certification, it would be safety of life (SOL) and made available for aviation user.

IP04 - GBAS Proof-of-Concept Project Japan -Thailand

Thailand presented an update about the progress on the GBAS Proof-of-Concept (PoC) Project, which was technical collaboration between Japan and Thailand. The GBAS PoC equipment construction and installation work had been done. Three reference receivers (RR), data processing, and VDB (VHF Data Broadcast) transmitter had been installed after the end of runway 19R of Suvarnabhumi International Airport. In addition, the IFM (Ionosphere Field Monitor) had been installed at the King Mongkut's Institute of Technology Ladkrabang (KMITL) campus to detect ionospheric disturbances.

Thailand also presented the progress of the ionospheric threat model development. The preliminary ionosphere characteristics from the year of 2012 and 2020 (represented high and low solar activities, respectively) of Bangkok had been evaluated by AEROTHAI using the single-frequency carrier-based and code aided (SF-CBCA) method. The final ionospheric threat model used for this project was under finalization. In addition, the GLS approach procedures design had started and would be done by AEROTHAI with a technical assistance of JCAB with the target date of flight schedule in the last quarter of 2022.

WP05 – MSAS LPV250 Performance - Japan

NPAC-JCAB presented MSAS performance demonstration example. Japan is currently conducting an LPV trial and planning to expand the trial to an airport in the north. NPAC introduced the MSAS performance analysis conducted at New Chitose Airport in northern Japan for about one month. The results showed no HMI & MI, but some unavailability could be confirmed. This is because the analysis is performed by V2. The ongoing V3 development process is expected to improve availability. India asked the frequency of plot and the reason of lower continuity. NPAC informed that the frequency rate was 1 second and current Version 2 affected the lower continuity. Co-chair (Mr. Saito) added that it might be caused by influence of the ionosphere around that time.

Agenda 3 - Guidance Documents

WP06 – Expert group 3-1 – iono report - Co-chair

Co-Chair (Mr. Susumu Saito) of the task force presented reports on activities of the Expert Group 3-1 for revision of the GBAS and SBAS safety assessment guidance documents related to anomalous ionospheric conditions with timeline for the work of the Expert Group 3-1. Activities of the Expert Group 3-1 for revision of the GBAS and SBAS safety assessment guidance documents related to anomalous ionospheric conditions were reported. The group reviewed the GBAS and SBAS safety assessment guidance documents related to anomalous ionospheric conditions published in 2016, and identified points to be updated. The group targets to deliver the first drafts of the guidance documents by fall 2022 and circulates the drafts to the Task Force members by December 2022. To achieve this, the group will have online meetings on a monthly basis.

WP12 - SBAS guidance review - India

As lead of Expert Group 3-1, India presented the Working Paper WP12 on Review of SBAS Safety Assessment Guidance Document Related to Ionospheric Anomalies. The paper highlighted the new proposed contents of the document and briefly described about the potential areas where updates of the SBAS Safety Assessment Guidance Document Related to Ionospheric Anomalies would be required. These were mainly – Ionospheric Characteristics, Definition of Nominal and Anomalous ionosphere, Ionospheric Monitoring and GAGAN Iono threat model.

ICAO enquired what was expected from the document. The Co-chair (Mr. Saito) clarified that the existing document was being updated to account for new SBAS in the region. It would not go into details but remained a high level guidance as the current version.

WP07 - GBAS SBAS Guidance Reference - Expert Group 3-2 – Co-Chair

The WP/07 was presented by Co-Chair (Mr George Wong) on behalf of Expert Group 3-2 tasked to draft a guidance reference document for implementation of GBAS/SBAS in the Asia/Pacific Region. Per the review and discussion under Expert group for this task, the guidance reference document will be prepared to present a holistic view of implementation from the initial phase for the analysis of operational needs to the phase for conducting post-implementation review. States' experience in implementation of GBAS/SBAS will also be incorporated in this guidance document to be prepared under this Expert Group. The paper presented those outcomes from corresponding discussion under Expert Group regarding

the structure of guidance document on implementation process for GBAS/SBAS and the timeline for drafting this guidance document for the Region, with the 1st draft of guidance reference document ready in March 2023.

ICAO suggested that there should be an intermediate meeting in Dec 2022 to review the draft documents, which was agreed. India suggested that there should be one or two experts from regulators in the Expert Group 3-2 to cover regulatory perspective in the guidance documents. ICAO welcomed the suggestion and requested all the States to nominate experts for joining the Expert Group through email to APAC-RSO@icao.int.

Agenda Item 4: Review of the Action list

The Action List of the task force is a collection of technical matters identified during the first meeting of the task force. It provides description, relevance, ownership and priority to be assessed in each meeting. Some of the action items have been closed as those actions have been completed and new target dates have been assigned for remaining ones. The amended Action list is attached as **Appendix C**.

WP08- Air services Presentation - GBAS - ATC Perspective- Australia

Australia presented a Working Paper on their GBAS implementation and considerations from an Air Traffic Control (ATC) perspective (including ATC training). Australia developed a Concept of Operations describing how the GBAS would be used within Australia's National Airways System. The Concept of Operations essentially involved replicating existing Category I ILS practices. With a defined Concept of Operations, an assessment was performed on the scope of change to ATC with the introduction of GBAS which then informed the ATC Training Needs Analysis. Given the similarities to existing practices, ATC training primarily involved internal briefings on the technology and key differences to the ILS (including differences in phraseology).

Australia noted the implementation of a Constellation Alerting capability to predict potential GLS service outages due to changes in the GPS satellite constellation. Australia presented key lessons learnt with the introduction of the GBAS, including the limitations associated with the initial GBAS Maximum Use Distance (Dmax) setting of 23 NM on ATC operations (which was subsequently increased to 50 NM post the change to the definition of Dmax in ICAO Annex 10, Volume 1, Amendment 91) and the need for an independent constellation alerting capability to meet Continuity of Service requirements.

Pakistan raised a query about suitable duration for controller training to implement procedure. Australia informed that there was no formal training, but one hour briefing about the difference between ILS and GLS, an overview of technology and subsequent briefings in one or two hours on constellation alerting practices were imparted to ATCOs.

WP09- VDB frequency Coordination- Co-chair

The Co-chair (Mr. Saito) presented a report on the recent ICAO updates of frequency coordination related to GBAS VDB. To facilitate frequency assignment for GBAS VDB, the frequency coordination criteria for VHF are necessary. The ICAO Navigation Systems Panel (NSP), as well as the Frequency Spectrum Management Panel (FMSP), have discussed the technical details of frequency coordination criteria. This paper summarized the frequency coordination criteria related to GBAS VDB discussed in the ICAO NSP. Recent updates on GBAS VDB frequency coordination criteria discussed at ICAO were reported in this paper. The airport-to-airport compatibility assessment methodology which would be described in the next

update of the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc9718) Vol. II was explained. An example of frequency compatibility assessment for GBAS at Tokyo Haneda International Airport was demonstrated. Although the information was quite technical, it was commented that this information was useful, especially when frequency coordination with neighboring States/Administrations was necessary.

WP10- IATA Equipage Survey - GNSS Augmentations – IATA

IATA presented a preliminary analysis of airline responses to the GNSS Augmentations section of IATA's Aircraft Equipage and Capability Survey for Asia-Pacific and North Asia conducted in Quarter 1 of 2022. This paper presented GBAS and SBAS equipage of the aircraft in the APAC region.

ICAO commented that as per information presented by India, successful flight trial of LPV (SBAS) procedures had been conducted by Indigo Airlines with ATR-72-600 and several regional aircraft of this type were equipped with SBAS receivers. Besides, a set of Q400 type of aircraft with Spice Jet was also equipped with SBAS receivers. ICAO further raised a query on whether equipage survey covered regional aircraft. IATA informed the meeting that they would review the data.

In response to Co-chair (Mr. Saito)'s enquiry on whether there were GBAS CAT- III equipped aircraft, IATA advised that there were some wide body aircraft with such equipage.

Republic of Korea raised a query whether there was similar survey of other regions. IATA supplemented that such survey was being conducted in other regions.

IP05 - SBAS Training for ATSEP - Japan

Japan shared the information about the summary of contents of SBAS training for ATSEP, which was being conducted in Network Performance Assessment Center (NPAC). The Republic of Korea asked about total number of MSAS rating awarded ATSEP in NPAC since 2019. JAPAN informed that they developed 105 MSAS rating awarded ATSEP so far. In addition, Secretariat and India asked about GNSS related information. NPAC answered that NANU information was used for RAIM information.

In response to India's enquiry on the purpose of Space weather in the prediction tool, Japan clarified that Space weather and RFI monitoring were not included for RAIM generation and used for situation awareness. ICAO asked whether the recorded data could be used for accident investigation. Japan replied that they would consider this suggestion.

Republic of Korea inquired whether more information on the training course could be shared. Japan replied that they would share the point of contact.

IP06 - SBAS Safety Assessment - India

India presented the information regarding steps taken by India for SBAS Safety Assessment related to anomalous ionosphere as part of post-adoption activities of GAGAN.

Agenda Item 5: Any Other Business

WP11 - Degradation of GPS Navigation Performance in the oceanic airspace in Fukuoka FIR - Japan

Japan presented the event of GPS signal degradation, occurred on 23 September 2021, TOPS (ATC oceanic Control System in Japan), detected that the FOM level, which was a navigation performance index used in ADS-C application, had declined on the oceanic airways in the southeastern offshore of Hokkaido region. At the same time, aircrafts reported that EICAS Advisory Message “ADS-B OUT” also occurred. NPAC researched this event and issued NOTAM.

Co-Chair (Mr. Wong) enquired whether there were other cases of signal degradation. NPAC informed that this was the first case so far.

FPP Presentation

APAC FPP introduced the FPP flight procedure design-training plan for the current year 2022. The upcoming Quality Assurance Workshop, which was scheduled for 5-6 July 2022 and would have experience sharing on ground validation and flight validation from Australia and France, was also introduced. More information of QA Workshop is available at following link:

<https://www.icao.int/APAC/Meetings/Pages/2022-FPP-QAOW.aspx> .

APAC FPP also mentioned that the FPP Flight Procedure Design Course (Module 3) would be held on 19-30 Sep, in which a session on SBAS flight procedure design would be included.

The Co-chairs proposed to conduct the 5th Task Force meeting in early 2023 and an intermediate meeting in Dec 2022 to review the progress of draft guidance documents.

Mr. Raphael GUILLET thanked all participants for their fruitful contributions and closed the meeting.

List of Papers

Information Papers

- IP-01- GBAS Status -Japan
- IP-02- SBAS Status -Japan
- IP-03- Korean SBAS Implementation Status - ROK
- IP-04- Update on GBAS PoC Project - Japan_ Thailand
- IP-05- SBAS Training for ATSEP- JAPAN
- IP-06- SBAS Safety Assessment - India

Working Papers

- WP-01- Provisional Agenda- Secretariat
- WP-02- Provisional order of Business - Secretariat
- WP-03- Implementation of LPV (GAGAN) Approaches -India
- WP-04- GBAS Brief - USA
- WP-05- MSAS LPV250_Performance - Japan
- WP-06- Expert group – iono - report - Co-chair
- WP-07- GBAS SBAS ITF4 - Guidance Reference - Expert Group Outcomes – Co-Chair
- WP-08- Air services Presentation - GBAS - ATC Perspective - Australia
- WP-09- VDB frequency - Co-chair
- WP-10- Equipage Survey_ GNSS Augmentations - IATA
- WP-11- Degradation of GPS Navigation Performance in the oceanic airspace in Fukuoka FIR – Japan
- WP-12- SBAS guidance review - India

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ACTION PLAN

GBAS SBAS Implementation TF

Last Updated:

NL	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 2023		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			Australia is supporting	To wait for dec meeting in Dec2022
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 brochure	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_06122012.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 amendments.
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.

NL	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	On going			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	Expert Subgroup 3-1	2022/12/1		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	Closed	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.	WP07 from HK in ITF/3 and WP09 from Cochair in ITF/4
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 in Dec2022		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	India and USA prsented in ITF/3. Competed
3.6	GBAS and SBAS safety assessment	HIGH	States to share their experience	Next meetings		Presented by Australia on GBAS in ITF/3	GBAS Completed, SBAS Safety Assessment prsented by India in ITF/4(IP06)
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
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

NL	ACTION ITEM	PRIORITY	OWNER	DUE	STATUS	NOTES (ICAO Document ref)	Decision by the meeting
3.1 0-	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	Expert Sub group 3-2	1st draft to be presented at the next meeting in March 2023		What is already available from ICAO or from other regions ? Ref- GBAS Guide- ICAO SAM Region	Expert Sub Group 3-2 working on this
4.3	Technical support for system certification and operation certification	TBD		Next meeting in Dec2022		To be decided after meeting with regulators Linked with 1.2 and 3.6 above.	SBAS to be covered
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	Next meeting			
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				WP08-ATC perspective from Australia in ITF/4, IP05-ATSEP training for SBAS by JAPAN in ITF/4;WP04-USA on GBAS in ITF/4
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)