Navigation Systems Panel

GBAS Working Group Meeting

Virtual, 8-12 November 2021

GBAS Working Group Agenda and Supporting Material

Presented by Tim Murphy - GWG Rapporteur

This flimsy provides material to support the meeting of the GWG. The package includes:

Attachment A Agenda: GBAS Working Group Meeting, Nov 8th – 12th, 2021 - Virtual

Attachment B List of Working Papers and Information Papers for GWG Meeting – Nov 8th – 12th, 2021 - Virtual

Attachment C Revised Issues List and Action Plan as a Result of GWG Meeting – April 26th – 30th, 2021

Attachment A Agenda: GBAS Working Group Meeting, Nov 8th – 12th, 2021 - Virtual

Proposed Agenda

1) Misc GWG Business
   a) Agenda review
   b) Status of GBAS (IPX1, IPX8, IP 5)
   c) Coordination with other panels and groups on GBAS (IP2, IP 3, IP 5, IP 6, IP 13, IP 9, IPX2,IP X6,)
   d) GNSS/GBAS Manual (WP 13, WP 27)
2) GBAS SARPS Maintenance
   a) VDB Related Issues (WP 14, WP 11)
   b) New Maintenance Issues ()
   c) GNSS Interference and Spoofing ()
   d) Ionosphere Issues (WP 26, IP 4)
   e) GBAS Expanded Service Volume ()
   f) Tropospheric Issues (WP 22)
   g) Multipath Modeling and Validation (WP 8)
3) GAST C & D Developments
   a) Reports on programs/open issues
   b) MOPS Update Status ( )
   c) Update of Doc 8071 Vol 2 (X2) (note flimsy 9 revision from last mtg.)
   d) GAST D Implementation Issues ()
4) Dual Frequency Multi-constellation GBAS
   a) DFMC Conops (IP 1, WP 34, WP 39)
   b) DFMC Programs/Projects (X5)
   c) Plan for DFMC SARPS development (WP 35)
5) Work Plan
   a) Review of actions
   b) Plan for inputs to Next Meeting
   c) Discuss next steps for this group
   d) Establish schedule for work prior to Next Meeting

General Plan for When Agenda Items Will be Taken

	Mon 11/8	**Tues 11/9**	**Wed 11/10**	**Thu 11/11**	**Fri 11/12**
Before Coffee (7 - 9:30 AM Montreal Time)	Plenary	2, 3	Joint GWG/SWG (GBAS VDB Papers) 2.a	5	5
After Coffee 9:45- 12 Montreal Time)	1	4	5	5	Plenary

Joint GWG/SWG Meeting Papers:

WP 11, WP 14

Joint GWG/CNTWG Meeting Papers:

None

Attachment B List of Working Papers and Information Papers for GWG Meeting – Nov 8th – 12th, 2021 - Virtual

Working papers

WP No.	Agenda Item	Subject	Presented by
8	2.g	Experimental Validation of Multipath and On-Board Antenna Group Delay Models for L1oc and L3oc Glonass Signals.	Vladimir Korchagin
11	2.a	Draft ICAO guidance on 'GBAS/VDB siting' and 'same-airport frequency compatibility'	Morten Grandt
13	1.d	Proposed Outline for Future GBAS Manual	Gary Berz Morten Grandt
14	2.a	Simulation of VDB Antenna Errors	Morten Grandt
22	2.f	Guidance Material on Tropospheric	Matsuda
26	2.d	Guidance Material on Characterization of Ionospheric Threat Model for GBAS	Tim Murphy
27	1.d	DOC 9849, GNSS Manual Update Summary	Jason Burns (Adhoc Group Rapporteur)
34	4.a	DFMC Ad Hoc status and Current Concept Paper Draft	Gerhard Berz
35	4.c	One possible way forward to converge on a consolidated DFMC GBAS concept	Gerhard Berz
39	4.b	SESAR GAST F Work Update	Gerhard Berz

Information Papers

IP No.	Agenda Item	Subject	Presented by
1	4.a	Updated GAST X Proposal	Tim Murphy
2	1.c	RTCA SC-159 WG 4 Status	Tim Murphy
3	1.c	RTCA SC-228 WG 4 Status	Tim Murphy
4	2.d	IGM Ad Hoc Status Report	Tim Murphy
5	1.b	Status of GBAS Implementation in San Francisco	Tim Murphy
9	1.b	GBAS Status in Japan	Kuniyuki Matsuda
12	1.c	EUROCAE WG 28 Status	Tim Murphy
13	1.c	United States GBAS Status	Ken Alexander
IPX1	1.b	Eurocontrol GBAS Status and SESAR Demonstration	Gary Berz
IPX2	1.c	Status of IFPP Coordination on PANS Ops and Annex 10 Discrepancies	Gary Berz
IPX6	1.c	Report of APAC GBAS/SBAS Implementation Task Force	Secretary?

Flimsies

Flimsy No.	Agenda Item	Subject	Presented by
1	1	GBAS Working Group Agenda and Supporting Material	T. Murphy

Attachment C Revised Issues List and Action Plan as a Result of GWG Meeting – April 26th – 30th, 2021

Number	Action	Volunteer	Due By	Status
85	Develop a concept paper addressing future multi-constellation, multi-frequency GBAS. Define a hypothetical architecture and assess the viability of that architecture to be supported by a single frequency given the impact of MT 11 and the current GBAS change proposal for GAST D. Also consider the extensibility of the classification scheme and requirements methodology.	Andreas Lipp and Matt Harris SESAR Team (Tim Murphy and ICCAIA to support).	~~Oct 2008 meeting~~ ~~May 2010~~	Opened Mar 2008 meeting. CSG 07/08 WP 9 and IP 2. CSG 03/09 WP 31 CSG 05/2014 IP 15 CSG 09/2014 IP 8 NSP/2 IP 11 NSP/3 WP 13 and IP 14 JWGs 3 WP 27 and IP 23 NSP5 WP 41 NSP 6 IP 17 NSP 6 WP 17 JWGs/7 WP 9 JWGs/7 WP 12, JWGs/7 WP 13 JWGs/7 WP 14

Number	Action	Volunteer	Due By	Status
177	Ad-hoc group to develop SARPS proposal for separation criteria for GBAS VDB versus VHF COM as well as GBAS VDB versus ILS based on SeptOct2014_wg1_AND_wg2_Flimsy10. Review and modify separation criteria in Attachment D, section 7.2.1.3, 7.2.1.4, 7.2.1.5 and 7.2.1.6 as necessary.	~~Pierre Ladoux~~ – Felix Butsch.	Validated proposal by April 2018 meeting. April 2015 Meeting	Opened Oct. 2014 SeptOct2014_wg1_AND_wg2_WP6 SeptOct2014_wg1_AND_wg2_Flimsy10 Feb15_CSG_WP19 NSP/2 WP 6 NSP/2 WP 10 NSP/2 WP 8 NSP/2 WP 17 NSP/3 WP 16, WP 11, IP 25, IP 22 and IP 21 JWGs2:WP 11, WP 12, WP 13, WP 19, IP 14, and IP 27 NSP4 WP 28, WP 15, WP 16, WP 17, IP 11, WP 2, IP 9 flimsy 5. JWGs3 WP 4, WP 5, WP 6, WP 18 WP 21, WP 22, WP 28 and IP 8 JWGs4 WP 6, WP 25 JWGs5 WP 24 JWGs/7 IP 3 **Closed:** JWGs7 IP3

Number	Action	Volunteer	Due By	Status
205	Propose text for SARPs (or GM) which explains that sensitive areas are not required for GBAS operation provided that the siting of the ground station was done properly. NSP/3 action revised to: Develop considerations for protection of areas around GNSS reference receivers, VDB antennas and aircraft. 4/28/2021 – On the work plan for ED-114, but no recent progress. Change 1 to ED-114B by summer 2022.	Mike Spanner; with Matt Harris, Jason Burns, Winfried Dunkel, Stefan Naerlich, Pierre Ladoux, Laurent Azoulai, Bruce Johnson, Gary Berz	~~End July 2016~~ In time to support ~~Mature input by end of 2018 for 2020 SARPS cycle~~ Fall of 2019	Opened: 3 Jun 2016 JWG 1 IP 10 GWG_Aug16 IP 7 NSP/3 IP 5 JWGs2 – WP20 (Not discussed, deferred to the next meeting). NSP4 WP 33
216	GWG members to contribute to the development of a specification to be included into ICAO Doc 8071, Vol. II, how to evaluate fieldstrength measurement results. 4/28/2021 – ongoing task in WG 28. Material may be available 4Q21	Winfried Dunkel & Matt Harris – VDB Ad-hoc group	~~April 2019 GWG meeting~~ - Next meeting – final target is Doc 8071 completion	Opened NSP4 WP 6 NSP 5 IP 34 JWGs IP 4 and IP 26

Number	Action	Volunteer	Due By	Status
223	Prepare GBAS related material for the Doc 8071 Vol II update (chapter 4).	Ad-hoc. Led by ~~Mike Spanner.~~ Linda Lavik and Winfried Dunkel Membership:, ~~Bruce Johnson,~~ Winfried Dunkel, Susumu Saito, Matt Harris, Barbara Clark,	Outline and plan/schedule in a paper for NSP 5	Previous action 146 History: NSP_may11_wgw_WP_14 May14_wgw_14 SepOct2014_wg1_AND_wg2_WP 3 SepOct2014_wg1_AND_wg2_Flimsy_2 SepOct2014_wg1_AND_wg2_WP 5 JWGs2_WP_11 NSP4 WP 6 Opened JWGs 3 WP 2 JWGs4 WP 14, JWGs5 WP 48 CNTWG/2 Flimsy 1 JWGs/7 WP 3 JWGs/7 WP 15
231	Develop guidance material on GBAS/VDB siting and same-airport compatibility with other VHF-navigation aids for inclusion into ICAO Annex 10, Vol. I Attachment D => GWG/SWG.	GWG/SWG Joint Effort	JWGs 5 (in time for the Frequency Management Handbook next year).	Opened: JWGs4 WP 25 JWGs5 WP 24 JWGs/7 WP 16 JWGs/7 WP 20 JWGs/7 WP 21 **Closed:** JWGs/7 WP 16 - See Action 238 for follow on work.

Number	Action	Volunteer	Due By	Status
232	Ad-hoc activity to explore expanded concepts and potential services for DFMC GBAS.	Led by Matt Harris and Andreas Lipp	NSP/6 (or 4Q 2020)	Opened: JWGs4 WP 35 See Action Item 85
234	Continue development of SARPs requirements to support Eig>2.75 at remote runways or in equatorial regions • Perform sensitivity study to look at continuity and availability as a function of Eig, Ev, El, etc. • Build some hypothetical scenarios and quantify the benefit of allowing Eig>2.75	Linda Lavik & IGM AdHoc	4Q 2020	Opened: JWGs4 WP 19 JWGs5 WP 42 & WP 50. NSP: WP 8 & 9 NSP 6: Flimsy 26 – proposal Closed: 10/14/2021
235	Review GBAS AIS information in WP 2 and provide feedback to Gary Berz.	All GWG members	A reasonable time before the next meeting	Opened: JWG25 WP 2
236	Read and Comment on JWGs7/ WP 19. Comments directly back to Andreas Lipp	All GWG members	By the end of May 2021	Opened: JWGs/7 WP 19 JWGs8 WP X4 Proposed Closing: On-going ad-hoc work
237	Updates to the GNSS Manual. GWG expertise is needed. Section 4.4 needs to be revised to cover GAST D.	**Jason Burns,** Tim Murphy, Matt Harris, Susumu Saito, Nuria Blanco Mark Dickinson	JWGs/8	Opened: 4/2021 JWGs/7 IP 1
238	Ad hoc Group to consider a GBAS Manual. Draft an outline & identify potential existing material to be included (from annex 10 guidance, existing GNSS manual or new material (i.e. JWGs/7 WP 6, JWGs/7 WP 19, JWGs/7 WP 17, JWGs7 WP 16 Revision 1)	**Andreas Lipp,** Susumu, Jason Burns, Alessandro, Mark D.,	JWGs/8	Opened: JWGs/7 WP 6 JWGs/7 WP 19

Number	Action	Volunteer	Due By	Status
239	IGM ad-hoc to develop a long form version of JWGs/7 WP 17 in the form of a chapter on Iono Threat Modeling that will eventually be included somewhere (ICAO Annex 10, the GBAS Manual or ?)	IGM ad-hoc group	JWGs/8	Opened: JWGs/7 WP 17
240	Develop additional guidance material on tropo-refractivity and its uncertainty.	Susumu Saito, Takayuki Yoshihara,	JWGs/8	Opened: JWGs/7 WP 6