International Civil Aviation Organization

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

(Video conference, 11- 12 May 2022)

Agenda Item 4: Review of Action Item List

GBAS VDB FREQUENCY COORDINATION

(Presented by Co-Chair)

SUMMARY

This paper reports on the recent ICAO updates of frequency coordination related to GBAS VDB.

1. INTRODUCTION

1.1 The Action Item 3.3 of the GBAS/SBAS ITF is entitled "VDB frequency assignment and coordination in APAC".

1.2 WP07 of GBAS/SBAS ITF/3 shared Hong Kong China's experiences in frequency assignment for GBAS and noted that a regional guidance material on aeronautical frequency spectrum management for APAC States/Administrations is under development by ICAO Spectrum Review Working Group (SRWG).

1.3 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 summarizes the frequency coordination criteria related to GBAS VDB discussed in the ICAO NSP.

2. DISCUSSION

2.1 In implementing GBAS, a VDB frequency must be assigned so that there will be no harmful interference from and to other VHF sources including VOR, ILS LOC, VHF COM, and FM broadcast.

2.2 There are two classes of frequency compatibility, the airport-to-airport compatibility and the same-airport compatibility. The airport-to-airport compatibility is the frequency compatibility of VDB with other VHF facilities outside the airport where the GBAS is installed. This is important for coordination of VDB frequency assignment not necessarily within a State/Administration but also with neighboring States/Administrations.

2.3 The same-airport compatibility refers to the compatibility with VHF facilities in the same airport as the GBAS is installed. It is more complex and requires detailed compatibility analysis. The same-airport compatibility is a function of relative directions of VHF facilities from the aircraft through patterns of the airborne and VHF facilities antenna. Sometimes aircraft comes closer to VHF transmitter antenna and received power may become very strong to saturate the receiver. Because this is an issue within the same airport, however, this is regarded as a matter of siting of the GBAS ground facilities and is not relevant to frequency coordination with VHF facilities outside the airport.

2.3 The airport-to-airport compatibility will be described in the next revision of ICAO Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc9718) Vol. II which is expected to be published in the near future. The principles of the airport-to-airport compatibility for VDB and VOR which share the same VHF NAV band are as follows:

- The ratio of the desired-to-undesired power (D/U ratio) must be greater than a threshold.
- The D/U ratio threshold is defined as a function of the frequency separation. Though it is also a function of the power input to the receiver, it is -60 dB for 1 MHz separation with sufficiently low power.
- The D/U ratio can be assessed at the edge of the declared operational coverage where the desired power will be minimum.
- The power of signals can be estimated as per the ITU propagation curve (ITU-R Recommendation P.528-4)

2.4 Assuming that the radius of the DOC is 23 NM which is the nominal value for GBAS, the above criteria are safely satisfied when the frequency separation is 1 MHz or more and the geographical separation is 30 NM or more. The ICAO Frequency Finder utilizes this fact to find available frequencies. Even if the 1 MHz and 30 NM separations cannot be satisfied, more detailed assessment may be conducted to find appropriate frequencies by applying the principles described in Doc 9718 Vol. II. Furthermore, a real shape of the service volume of the GBAS could be considered, because the potential interference may occur outside the intended service volume. It should be noted that the minimum service volume as defined in the ICAO Annex 10 is not a circular area but is a “keyhole” shape (see Annex 10 Attachment D Figure D-5).

2.5 Example of assessment of frequency compatibility for the GBAS at Tokyo Haneda International Airport which is under operational trial is provided in the attachment. For details of the compatibility criteria for VDB with ILS LOC, VHF COM, and FM broadcast which use near but different frequency bands, please refer to the coming update of the ICAO Doc 9718 Vol. II.

3. ACTION REQUIRED BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this papers;
b) consider the information as an input to the guidance documents on GBAS implementation; and
c) discuss any relevant matters as appropriate.

Attachment

GBAS VDB FREQUENCY COMPATIBILITY FOR TOKYO HANEDA (CNS-SG/24 IP14)