International Civil Aviation Organization

THE THIRD MEETING OF THE ASIA/PACIFIC GBAS/SBAS IMPLEMENTATION TASK FORCE (APAC GBAS/SBAS ITF/3)

(Video conference, 27-28 September 2021)

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

GBAS PROOF-OF-CONCEPT PROJECT

(Presented by Japan and Thailand)

SUMMARY

This paper presents an overview of the GBAS Proof-of-Concept (PoC) Project between Japan and Thailand focusing on the installation of a GBAS PoC equipment at Suvarnabhumi International Airport in Bangkok, Thailand.

1. INTRODUCTION

1.1 The GNSS-based navigation for aeronautical applications was officially initiated in Thailand in 2007 when Thailand's National Working Group for PBN and GNSS Implementation was established. After that, the Thailand PBN implementation plan was developed and approved in 2009. This plan corresponded to the APAC regional PBN implementation plan developed by the ICAO APAC regional office. Consequently, the instrument flight procedures (e.g. En-Route, Terminal and, Approach) were officially published. In January 2017, the Thailand PBN implementation plan was revised to be in line with the current Regional APAC Seamless ATM Plan. In this plan, the GBAS is planned to be installed at selected airports (Phuket International Airport first and then Suvarnabhumi International Airport). However, the project has been delayed due to the financial impacts of the COVID-19 pandemic.

1.2 Since Thailand is located in the low geomagnetic equatorial region which is affected by the ionospheric irregularities (e.g. equatorial plasma bubble (EPB) and equatorial ionization anomaly (EIA)), the assessment of its impact is necessary for approving GBAS operations in Thailand. In early 2019, the Ministry of Internal Affairs and Communications (MIC) and the Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) of Japan has initiated a joint technical collaboration between Japan and Thailand called the "GBAS Proof-of-Concept (PoC) Project". The main objective of this collaboration project is 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 the ionospheric irregularities. The expected outcome of this collaboration project would be beneficial for both sides as well as to facilitate other member states for the effective implementation of GBAS in the Asia-Pacific region.

2. DISCUSSION

2.1 The GBAS PoC project is supported by the MIC through the industrial promoting program that supports Japanese industries' activities to solve the social problems/challenges in Asian countries by using Japan's cutting-edge wireless technologies. The NEC Corporation is contracted by the MIC to provide the GBAS PoC equipment and technical support for this project to assist the host countries with familiarization on GBAS and can move forward for a decision of GBAS implementation in the future.

2.2 The timeframe of this project is 2020-2023. The summary of annual plan activities is shown below,

Year	Key Activities
2020	- initial ionospheric threat model preparation - construction and installation preparation - equipment preparation
2021	- ionospheric threat model preparation (continue) - equipment construction and installation work
2022	- equipment evaluation - flight demonstration preparation - training and technical transfer
2023	- flight demonstration and performance evaluation.

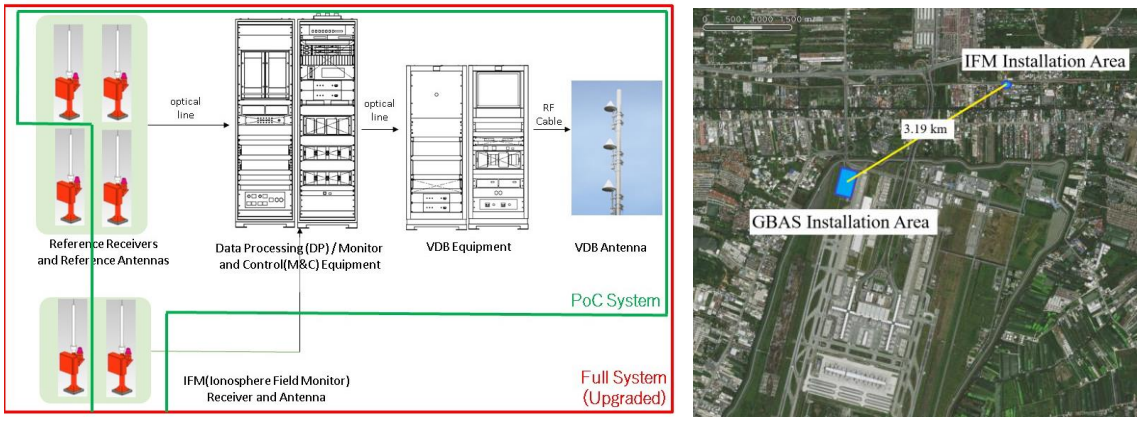

Figure 1. The GBAS PoC system configuration (left) and installation location (right)

2.3 Figure 1 shows the GBAS PoC system configuration and installation location. Three reference receivers, data processing, and VDB transmitter will be installed above the end of runway 19R of Suvarnabhumi International Airport. In addition, the IFM (Ionosphere Field Monitor) will be installed at the King Mongkut's Institute of Technology Ladkrabang (KMITL) campus to detect ionospheric disturbances.

2.2 To evaluate the impacts of ionospheric irregularities for GBAS, the ionospheric threat model will be developed by the Aeronautical Radio of Thailand (AEROTHAI) with the technical analysis tools and data support from the Electronic Navigation Research Institute (ENRI) and King Mongkut's Institute of Technology Ladkrabang (KMITL). The collected GPS data since 2012-now will be analyzed to estimate the background residual ionospheric uncertainty during ionospheric quiet conditions and the ionospheric delay gradient, front velocity, and front width during the ionospheric disturbed conditions for the ionospheric threat model development. The results will be presented in the next GBAS-SBAS Implementation Task Force (APAC GBAS/SBAS ITF) meeting.

3. ACTION REQUIRED BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this papers; and
b) discuss any relevant matters as appropriate.

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