



International Civil Aviation Organization

**SIXTEENTH MEETING OF THE
COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND
METEOROLOGY SUB-GROUP (CNS/MET SG/16) OF APANPIRG**

Bangkok, Thailand, 23 – 27 July 2012

Agenda Item 5: Navigation

2) discuss issues related to implementation of GNSS and review developments that have taken place in the Region

JAPANESE RESEARCH AND DEVELOPMENT STATUS CONCERNING GBAS

(Presented by Japan)

SUMMARY

This paper presents the status of research and development of GBAS in Japan.

This paper relates to –

Strategic Objectives:

A: Safety - *Enhance global civil aviation safety*

C: Environmental Protection and Sustainable Development of Air Transport - *Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment*

Global Plan Initiatives:

GPI-5 RNAV and RNP (Performance-based navigation)

GPI-15 Match IMC and VMC operating capacity

GPI-21 Navigation systems

1. Introduction

1.1 Japan Civil Aviation Bureau (JCAB) has developed the long-term strategy of Future ATM and CNS structure in Japan, which is named CARATS. As a candidate for the future GNSS landing system, JCAB has engaged in feasibility study of GBAS from both operational and technical sides.

1.2 Electronic Navigation Research Institute (ENRI) has started the current mid-term plan since 2011. The plan includes two priority subjects related to GNSS based operation, which are developments of a novel procedure for curved approaches using GNSS and a high category approach using GNSS. ENRI also focuses on research and development activity with international collaboration.

Agenda Item 5 (2)

23/07/12

2. Discussion

2.1 ENRI has been operating a CAT-I GBAS functional prototype at Kansai International Airport (RJBB) to collect data for Hazardous Misleading Information (HMI) analysis since January



Figure 1. B787s in the Kansai International Airport during the experiments.

2011. Ten approaches by the B787 of the launch customer All Nippon Airways (ANA) were successfully conducted under VFR and visual approach conditions by Boeing and ANA in cooperation with ENRI in July and October 2011. Flight tests by the B787 of Japan Airlines (JAL) were performed under the same conditions by JAL in cooperation with ENRI in April 2012. Pilot evaluation showed that GBAS landing System (GLS) path is similar to that of ILS, very stable and consistent with Precision Approach Path Indicator (PAPI). These trials with the both experiments completely covered all of four approaches at the Kansai International Airport.

2.2 A GBAS collision risk model (CRM) is under development to be used for researches on development of new operational concepts to enhance GBAS benefits. ENRI submitted an information paper to the 10th Instrument Flight Procedures Panel (IFPP) WGW in March 2012. The IP introduced the re-examination of the existing CRM taking account of the aircraft performance to clear advantages of GBAS to new operational procedures with more accurate obstacle clearance assessment than the current. ENRI will continue development of the model.

2.3 Some experimental approach procedures which utilizes the capability of GBAS have been developed for Kansai International Airport including curved approaches and dual threshold approaches. Test flights for these procedures using experimental aircraft of Japan Aerospace Exploration Agency (JAXA) were conducted in cooperation with JAXA in June 2012. ENRI will obtain a new experimental aircraft by the first quarter of 2013 to replace the previous one which was unfortunately lost due to the tsunami associated with the earthquake on 11 March 2011. More flight tests will be conducted in 2013 with the new experimental aircraft.

2.4 Japan has been involved in the development baseline SARPs of GBAS Service Type-D (GAST-D) which enables Category-III approach by using GPS L1 signals. To identify and solve major technical subjects and to feed our experience back to the GAST-D development SARPs, ENRI has launched a project consisting of the following three major topics, (1) development of a prototype of GAST-D ground subsystem, (2) development of a flight experimental system including major airborne integrity monitors for GAST-D, and (3) validation of the GAST-D ionospheric threat model for low latitude. The prototype GAST-D ground subsystem is planned to be delivered in the third quarter of 2013. It will be installed in an airport (to be determined) in the first quarter of 2014.

2.5 ENRI is actively working on GNSS studies collaborating with a number of institutes and companies worldwide. Especially in the Asia-Pacific Region, ENRI is contributing to the Ionospheric Studies Task Force (ISTF). Since April 2011, ENRI has started research collaboration with King Mongkut's Institute of Ladkrabang (KMITL), Thailand for low latitude ionosphere studies. ENRI is collaborating with Korea Aerospace Research Institute (KARI) in the CNS/ATM field since August 2010, and a joint workshop on GNSS was held from 27 to 29 June 2012 in Daejeon, Republic of Korea. ENRI will organize the 3rd ENRI International Workshop on ATM/CNS (EIWAC 2013) will be held from 19 to 22 February 2013 in Tokyo, Japan. The purpose of EIWAC 2013 is to share ideas and approaches between leading experts from research, industry and academia on research and development of modern air traffic management (ATM) and its enabling technology in Communication, Navigation and Surveillance (CNS). More detailed information can be found at the EIWAC 2013 website (http://www.enri.go.jp/eiwac/2013/eng_2013.html).

3. Action by the Meeting

3.1 The meeting is invited to:

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