



International Civil Aviation Organization

**EIGHTEENTH MEETING OF THE  
COMMUNICATIONS/NAVIGATION/SURVEILLANCE  
SUB-GROUP (CNS SG/18) OF APANPIRG**

Beijing, China, 21 – 25 July 2014

---

**Agenda Item 6: Navigation**

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

**IMPLEMENTATION OF GBAS IN INDIA**

(Presented by Airports Authority of India)

**SUMMARY**

Airports Authority of India, in its endeavor to implement the satellite based navigation for precision approach, is in the process of establishing first Ground Based Augmentation System (GBAS) at Chennai, as a pilot project. Honeywell's SmartPath SLS-4000, GBAS is under implementation phase and is expected to be operational by the end of 2014.

**1. INTRODUCTION**

1.1 India, through implementation of GPS Aided GEO Augmented Navigation (GAGAN), has emerged as fourth nation in the world to provide satellite based navigation. Presently GAGAN is commissioned for RNP 0.1 service over the Indian Flight Information Region (FIR). Once certified for precision capability, GAGAN will provide APV –I level service, at the designated airports, within the service volume of GAGAN.

1.2 As a part of extended GNSS initiatives, Airports Authority of India and Honeywell International Inc. are working together towards implementation of first Ground based Augmentation System at Chennai airport.

1.3 Airports Authority of India has signed agreements with Honeywell International Inc. for the supply, installation, testing and commissioning of GBAS System and also for Technical Assistance on GBAS certification.

1.4 SmartPath SLS-4000 can support up to 26 approaches for all runway ends, provided the middle point of GPS receiver antennas is within 6 km. of the decision height of each of the runway approaches, it is to serve.

1.5 This is being taken up as a pilot project and based upon its success Airports Authority of India will evaluate the requirement of GBAS systems for other Indian airports.

1.6 Once implemented, Honeywell SmartPath SLS-4000 will meet the GNSS requirements stated in ICAO Annex 10, Vol. –I

1.7 SLS-4000 is comprised of three major functional subsystems

1.7.1 Reference Receiver Subsystem, it contains four reference receiver with associated antenna system. This subsystem provides raw data to Processor Subsystem

1.7.2 Differential Correction Processor (DCP) Subsystem, it contains redundant differential correction processors, which calculates GPS corrections, monitor GBAS Health and ensure that integrity requirements are met.

1.7.3 VHF Data Broadcast (VDB) Subsystem, it contains VHF transmitters, VHF receivers and VDB antenna. VDB subsystem provides GBAS signals to the approaching aircraft. VDB output messages are produced by DCP subsystem or forwarded from adaptation data file for transmission to space.

1.8 GBAS system produces three types of messages, type 1 message contains differential corrections, type 2 message carries station specific data and type 4 message contains Final approach Segment (FAS) data block to construct the flight path.

### **GBAS Implementation Progress**

1.9 The site survey for GBAS equipment placement has been completed and the selected site meets all the siting criteria requirements for GBAS installation in terms of unobstructed line of sight for GPS antenna, VDB antenna placement requirements etc. Selected site may also fulfill the siting requirement of future CAT III GBAS as well.

1.10 Three Novatel receivers have been installed at Chennai Airport and collected data is continuously being analyzed to characterize the ionospheric behavior over Chennai.

1.11 GBAS Equipment installation activity started from the second week of June 2014.

1.12 System stability test and Site acceptance test is expected to be completed shortly.

1.13 In parallel, Airports Authority of India has taken necessary steps for the creation of Final Approach Segment (FAS) Data block and formation of GBAS flight procedures.

1.14 Certification of GBAS will be carried out on the similar lines, the way it was done for GAGAN. The process will include three major activities, viz. System Approval, Facility Approval and Service Approval.

1.15 To look into certification aspects of GBAS, a core group with the participation of AAI (CNS and ATM) and DGCA has been formed and the group will be responsible for generation of necessary documentation, analysis and review of test reports, compilation of documents and submission to DGCA with a recommendation to grant certification for GBAS operations at Chennai.

**2. DISCUSSION**

2.1 Majority of the Indian airports are within or close to city boundaries. Upcoming infrastructure, tall buildings, dearth of land etc. are certain factors those have implication on airport expansion programs.

2.2 Presence of buildings, hangers or other large structure near and around airfield will adversely affect the operation of Instrument landing system. Due to space constraints, sometimes it may not be feasible to install an ILS because requirement of critical and sensitive areas are not adequately met.

2.3 RWY 07/25 at Chennai is equipped with reciprocal ILS. Approaches at both the ILS are restricted only up to 300 feet, due to sharp bend between ILS point B and C. As the GBAS guidance signal carry digital data. GBAS assisted approaches will be able to bring down the landing aircraft to CAT-I decision height, safely.

2.4 Landing guidance using ILS can be improved at RWY 07 end, if the existing LLZ antenna is replaced with wide array, whereas due to space constraints similar approach cannot be applied to RWY 25 LLZ.

2.5 RWY 12/30 is used as a secondary runway, either end of this runway are not equipped with ILS. Glide Path installation at RWY 12 end is not possible, again due to space constraint.

2.6 Chennai airport has two runways, RWY 07/25 and RWY 12/30, SLS-4000 at Chennai will serve all runways ends with CAT-I service.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to note the contents of paper and states may consider taking up similar studies for implementing GBAS at terrain constrained airports where ILS installation is not feasible.

-----