International Civil Aviation Organization

THE THIRTIETH MEETING OF THE COMMUNICATIONS / NAVIGATION AND SURVEILLANCE SUB-GROUP (CNS SG/30) OF APANPIRG

Bangkok, Thailand, 06 - 10 July 2026

Agenda Item 4: Navigation

4.3. Other navigation-related matters

GUIDANCE MATERIAL ON GBAS IMPLEMENTATION IN CHINA

(Presented by China)

SUMMARY

To provide technical support for the necessity and feasibility of GBAS implementation, CAAC has developed guidance material for GBAS GAST C planning and construction based on China's actual geographical conditions, covering stages including planning, feasibility study, ionospheric assessment, design, construction, and commissioning.

1. INTRODUCTION

1.1 GBAS implementation requires coordinated efforts from airport authorities, air traffic control units, and aircraft operators to achieve optimized flight operations, improved airport capacity and efficiency, and enhanced operational safety.

1.2 CAAC has organized the development of GBAS planning and implementation guidance material to support the planning, feasibility study, ionospheric assessment, design, construction, and commissioning of GBAS GAST C.

2. DISCUSSION

2.1 Project Planning

2.1.1 During the project planning phase, assessments and predictions should be conducted on terminal area capacity enhancement and operational efficiency improvement based on airspace and route, airline avionics equipment configuration, and personnel qualifications.

2.1.2 The preliminary candidate site for GBAS ground subsystem and supporting facilities should be reserved in the airport master plan, or the basic conditions for planning a GBAS site in master plan should be available.

2.1.3 The ranging accuracy, continuity, availability and integrity of GNSS shall meet the requirements for stable and reliable GBAS operation.

2.2 Feasibility Study Phase

2.2.1 Study the feasibility of GLS curved approaches, variable glide path angles, multiple runways and variable runway thresholds, conduct the ionospheric performance analysis and assessment for coverage, optimize the siting and layout of GBAS ground subsystem, and propose control requirements for the surrounding environment of the stations.

2.3 Ionospheric Impact Analysis and Assessment

2.3.1 In mid-latitude regions, the number of ionospheric monitoring stations shall not be less than two, with station spacing preferably ranging from 10 km to 50 km, and the distance from each station to the airport center point shall be less than 100 km.

2.3.2 In low-latitude regions, at least three monitoring stations shall be established, each capable of ionospheric gradient monitoring. The station closest to the GBAS site should also be capable of ionospheric scintillation monitoring.

2.3.3 The ionospheric assessment shall propose an anomalous ionospheric model for the airport and corresponding mitigation measures.

2.4 Project Design

2.4.1 The layout and height of reference antennas and VDB antennas shall meet the requirements of the obstacle limitation surface in ICAO Annex 14, and avoid to be directly jet of aircraft wake on the taxiway. The reflective or re-radiating objects are prohibited in the vicinity of the antennas.

2.4.2 The layout and height of the VDB antenna are usually determined by signal in space simulation software, to satisfy the signal strength requirements in all approach directions. For airports with multiple runways, due to the shielding of the huge terminal building, one or two VDBs may need to be extended to meet the requirements of coverage. A remote monitor similar to the ILS far field monitoring antenna is setup to monitor the GNSS signals and the VDB spatial signals in real time, and also to monitor GNSS RFI.

2.4.3 In low-latitude areas, the GBAS ground subsystem may integrate an ionospheric monitoring station. The ionospheric monitoring data is introduced to the central processing system with mitigation measures.

2.4.4 Design the seamless RNP connection GLS flight procedure according to ICAO Doc8168, and try to keep the GLS trajectory overlay with the ILS. For mountain airports without ILS, curved approach design should be prioritized.

2.4.5 Except the layout of each part, the shop drawings should also include safety risks analysis and conduct special design for key points. The shop drawings can be used for construction only after being reviewed.

2.5 Project Construction

2.5.1 CAAC has issued the performance requirements and test method for GBAS GAST C with reference to ICAO Annex 10 Volume I. Before the certification of approval, a rigorous factory model testing, an onsite operation testing, and flight testing on GBAS ground subsystem must be completed by a neutral party testing unit.

2.5.2 Before flight inspection, a rigorous factory testing and onsite testing on GBAS ground subsystem must completed by the end-user. Flight inspection includes the final approach segment, Type 4 threshold, Type 2 information, VDB signal coverage, and radio interference. Flight measure includes

orbit, level arc, level run, and approach. The flight inspection report shall clearly provide the alignment and structural parameters similar to those of ILS.

2.6 Commissioning and Operation

2.6.1 GBAS ground equipment can be put into operation after passing the as-built acceptance, flight inspection, and reliable operation.

2.6.2 Trail flights to verify the performance of FAST C and the GLS flight procedure. After the verification is qualified, the GLS flight procedure will be published.

2.6.3 The airport authorities, air traffic control units, and aircraft operators shall respectively conduct safety case of GLS operation and take corresponding mitigations.

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.

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