GBAS

Status & Post-Implementation Activities in the U.S.

Presented to: ICAO APAC GBAS/SBAS ITF/4

By: United States

Date: May 11-12, 2022

Contents

- **U.S. GBAS Implementation Update**
- **Ongoing FAA work to ensure ongoing safety of GBAS**
  - Internal GBAS Monitoring
  - Review/approval of system modifications
  - LTIAM monitoring
  - Periodic Ground & Flight inspections
  - Verification of Non-federal Technicians
  - GPS Anomaly Reporting

U.S. Implementation Update

Implementation Strategy

- **GBAS is being implemented as a Non-federal system in the U.S.**
  - System procurement & installation are at the initiative and expense of a sponsor (e.g. airport, port authority, private interest)
  - System development is at the initiative and expense of a vendor (e.g. Honeywell)
  - System approval & oversight are the responsibility of the FAA
    - FAA Order 6700.20 describes Non-federal systems' approval and oversight requirements

GBAS Installations

- **Commissioned GBAS in the U.S.**
  - Newark Liberty Int'l Airport (EWR)
  - George Bush Intercontinental Airport (IAH)
  - **San Francisco Int'l Airport (SFO) as of March 2022***
  - Grant County Int'l Airport (MWH) – Private use only
- **Planned GBAS in the U.S.**
  - John F. Kennedy Int'l Airport ~2024
  - LaGuardia Int'l Airport ~2024

Approved Systems

- **Honeywell's SLS-4000 GBAS is the only model currently approved for use by the FAA**
  - CAT I approaches
  - Continental U.S. (CONUS)
    - CONUS ionospheric threat model is used as the basis for the FAA approval; other regions will need to develop their own threat model and safety case for the SLS-4000
  - Several options approved:
    - Fiber connectivity
      - Reduces system vulnerability to lightning
    - SBAS monitoring
      - Alleviates need for GBAS to assume "worse case" ionospheric environment

U.S. GBAS Users*

- **EWR GBAS**
  - United Airlines, Delta Air Lines, British Airways, DLH, Cathay Pacific, Air Canada, SAS, El Al, Iceland Air, Jet Blue
- **IAH GBAS**
  - United Airlines, Delta Air Lines, Emirates, DLH, Cathay Pacific, British Airways, Air New Zealand, Cargolux, ANA
- **SFO GBAS**
  - Data not yet being collected

*** All airlines that have used the system are listed here, regardless of the number of approaches that have been recorded.**

Ongoing Work to Ensure Continued Safety

Internal GBAS Monitoring

- **The initial approval of the SLS-4000 GBAS by the FAA included considerable effort to verify that internal GPS and environmental monitors were effective.**

- **While availability may be impacted by GPS jamming and interference, local signal blockages, or anomalous behavior of a GPS satellite, *system integrity will be maintained.***

Review/Approval of System Modifications

- **All modifications to the approved baseline SLS-4000 must be reviewed by the FAA prior to operation**
  - Software changes, hardware updates, training/commercial instruction book updates, new functionality, etc
- **FAA review plan will be developed based on the extent of the vendor's changes and potential safety impacts**

LTIAM Monitoring

- **Long Term Ionospheric Anomaly Monitoring (LTIAM)**
  - The FAA continues to conduct long-term ionospheric monitoring to ensure that the Iono Threat model used for CONUS during the system approval is not exceeded by actual events
  - Monitoring is conducted using the LTIAM tool developed by Stanford during the initial GBAS approval

Periodic Ground & Flight Inspections

- **All operational GBAS in the NAS (public and private) are subject to annual ground inspections and periodic flight inspections**
- **Ground Inspections**
  - An FAA Inspector with appropriate GBAS system training oversees an annual equipment checkout done by a non-federal technician
    - Follows a standard inspection checklist created by the FAA
    - Checks various system parameters and tolerances, ensures required logging has been done throughout the year during any maintenance events
- **Flight Inspections**
  - Operational GBAS are subject to periodic (360 days after commissioning and subsequently every 540 days) flight inspections
  - Flight inspections are conducted by the FAA Flight Operations Group
  - Ensures that fielded GBAS continue to meet signal strength requirements

Verification of Non-federal Technicians

- **All Non-federal GBAS Technicians must be approved by the FAA prior to doing maintenance on operational GBAS**
  - Technicians must show proof of passing the vendor's approved training course
  - Technicians must hold an FCC General Radio Operator's License (GROL)
  - Technicians are administered a Performance Exam by an FAA proctor

GPS Anomaly Reporting

- **The SLS-4000 GBAS has sensitive monitors that sometimes detect GPS anomalies**
- **Reported anomalies are internally investigated by several GPS stakeholder organizations**
  - Anomaly details and internal FAA investigation results are passed to the DoD GPS Directorate for investigation and potential action as necessary
- **In general there is no need for action on the part of the GBAS, since it is already identifying the anomaly and excluding the satellite if required to maintain integrity**

Questions?