GAST-D Siting Requirements

Local Area Augmentation Systems

Presented to: GBAS / LAAS Chinese Visitation
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Date: October 18th - 22nd, 2010
Presentation Outline

• Presentation Introduction

• GAST-D Siting Constraints:
  – Derived from the proposed GAST-D Annex 10 Amendments

• View of Selected Airports:
  – Map such siting requirements by utilizing Google Earth

• Presentation Summary / Review

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Presentation Introduction

• **Current GBAS / LAAS Installations:**
  – Developed as early implementations and did not include the benefit of formally approved installation procedures / documentation associated with a commissioned system
  
  – The Federal Aviation Administration has created a formal GBAS siting order based on current development and approval experience

• **Current developments have shifted focus from CAT I to CAT II/III implementation:**
  – The ICAO CSG has developed a new standards concept, termed GAST-D, to support CAT II/III precision approach and auto-land operations.
  
  – Standards supporting CAT I have now been renamed as GAST-C
GAST-D Siting Constraints

• Key Factor 1:
  – The LAAS system components need to be installed in a secure area, generally the AOA of any given airport [1]

• Key Factor 2:
  – The 4 LAAS receive antennas as a group, arranged on a given area of land, will have a mathematical virtual center point that is referred to as the centroid. This centroid must be within 5 kilometers (approximately 2.7 NM) of each runway approach threshold crossing to be supported (measured at ground level) [2]

  – Service providers must 1) evaluate the area around the RRAs and 2) the possible affects it might have on the system’s differential corrections, this is referred to as the Local Object Consideration Area
GAST-D Siting Constraints

• **Key Factor 3:**
  - The VDB Antenna maximum field strength exclusion region must not exceed 200 meters in radius to prevent overdriving LAAS avionics \(^2,3\)
  - Measures should be taken to site the VDB Antenna 200 meters from any operational aircraft venues (runways, taxiways, and ramps)
  - The VDB antenna is to be installed so that no users can employ the LAAS signal for navigation in an area where this signal exceeds the maximum permitted signal level \(^2\)
  - The actual upper bound on the maximum field strength distance is based on the VDB hardware and nominal LAAS VDB power range, both of which are design specific (system is flexible!)
GAST-D Siting Constraints

- **Key Factor 4:**
  - Using a 50 foot ground antenna height, the minimum field strength vs. distance results for 8 ft and 12 ft vertical coverage are satisfied out to a distance of 5.9 km (3.19 NM) and 7 km (3.78 NM) respectively.
  
  - A VDB transmitter should be located no further than this distance from any part of the runway surface where lateral rollout guidance is key.
  
  - For locations near runway approaches, a 50:1 Obstacle Free Zone applies and antenna heights above 25 feet are not recommended.
  
  - As a result, this distance can shrink to as little as 3.33 km (1.8 nm) and 4.25 km (2.3 nm) for 8 and 12 ft vertical coverage respectively when accounting for Earth curvature.
View of Selected Airports

• A high level assessment was completed for several GAST-D candidate airports within the U.S. The following airports were examined:
  – Newark International Airport (EWR)
  – Memphis International Airport (MEM)
  – Houston George Bush Intercontinental Airport (IAH)

• We can simulate and map potential GBAS / LAAS installations by the utilization of Google Earth:
  – Provides considerably accurate overhead views of selected airports
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• We have now seen a brief overview of the U.S. Map Study for GAST-D siting requirements
Presentation References


Comments?