FAA Navigation Programs Status Update

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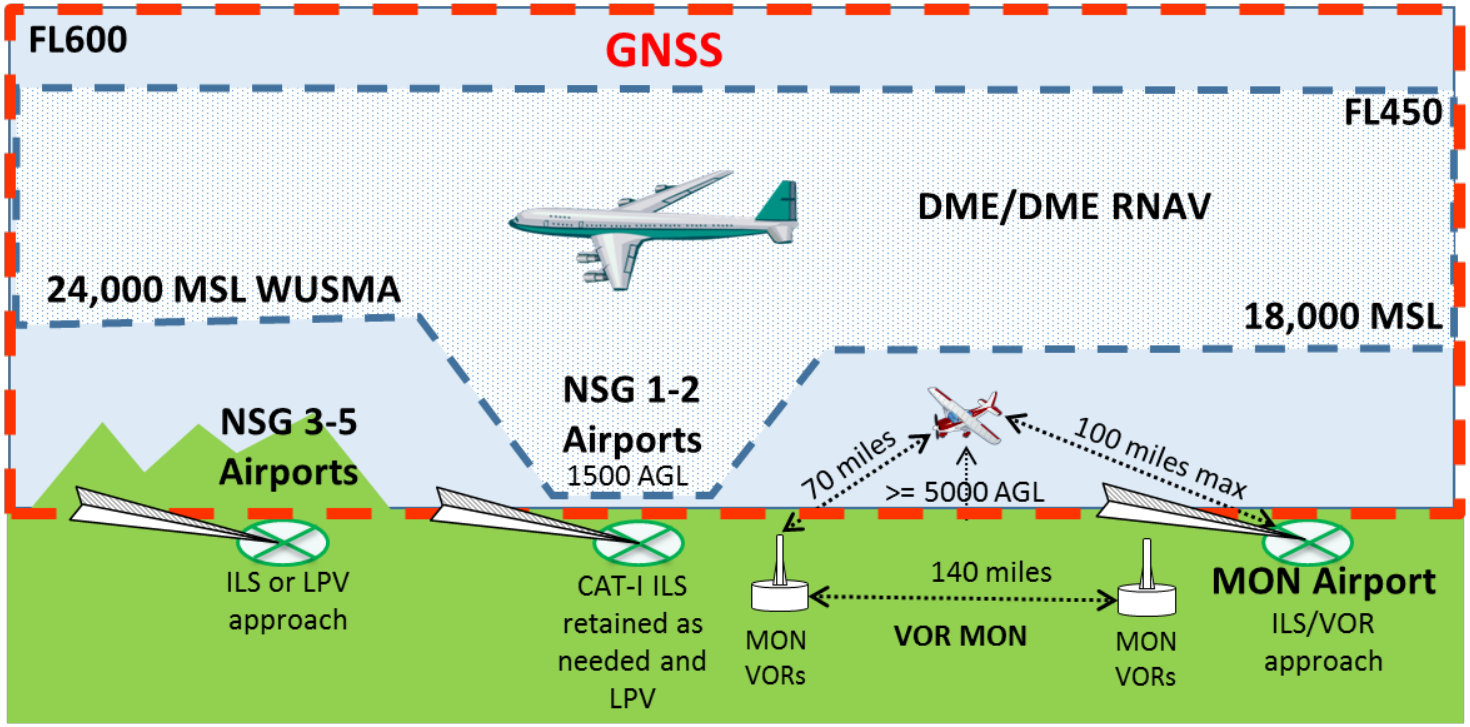
Navigation Programs Strategy Goals

- **Provide navigation services to enable the PBN NAS Strategy – 2016**
  - Provide GNSS (GPS and WAAS) to enable all PBN operations and ADS-B (accuracy & integrity for all separation levels)
  - Provide resilient navigation services to ensure safety, capacity, and efficiency
    - Implement the NextGen Distance Measuring Equipment (DME) Program to provide an RNAV backup for Class A airspace and the Navigation Service Group (NSG) 1-2 airports, during GNSS outages
- **Rationalize NavAids infrastructure to meet the NESS initiative**
  - Implement the VOR Minimum Operational Network (VOR MON)
  - Perform Instrument Landing System (ILS), Non-directional Beacon (NDB), TACAN, and DME rationalization
- **Procure systems to sustain the retained infrastructure**
- **Innovate navigation services to enable new capabilities**

Resilient Navigation Services



- GNSS is the primary enabler for all PBN (RNAV and RNP) and ADS-B accuracy & integrity for all separation levels
- DME/DME provides an RNAV alternative
- VOR MON can be used by aircraft that are not DME/DME RNAV equipped
- CAT-I ILSs will be retained as needed to support safe recovery in the event of a GNSS outage

NavAids Sustainment

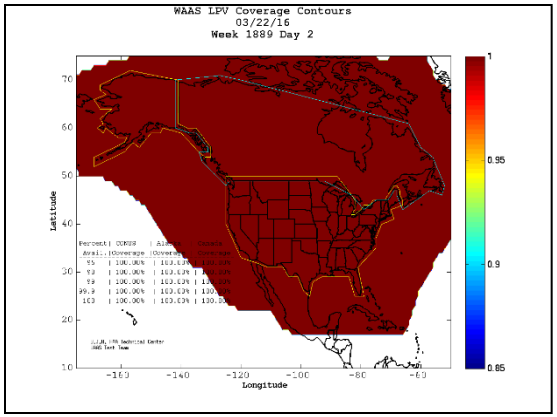
- **Meeting the NAS PBN Strategy requires both conventional NavAids and GNSS**
- **VOR MON, DME, and ILSs may be reduced, but the remaining systems will need sustainment contracts in place**
- **TACAN sustainment requirements will be coordinated with DoD**
  - No acquisition strategy in place currently
- **Lighting systems will be sustained and gradually refreshed to use LED technology**

Current WAAS Components

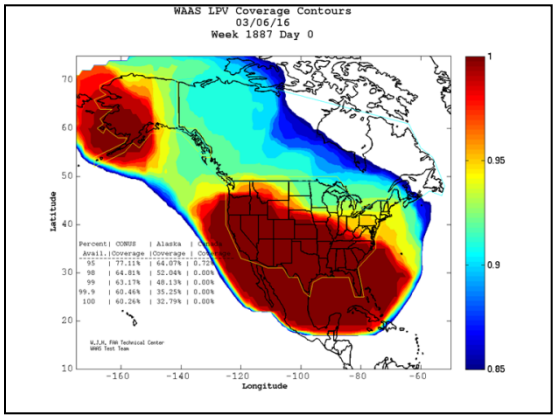
WAAS Current Status

- **Current WAAS provides high availability service to aviation users in North America**
  - **3779** Localizer Performance with Vertical Guidance (LPV) approaches in the NAS
    - **972** LPVs are LPV-200's which provide CAT I equivalent instrument approach performance
- **Preparing WAAS to take advantage of dual frequency service that will be provided by GPS**
  - To continue high availability of WAAS vertical service during ionospheric disturbances
- **GEO sustainability**
  - Currently maintaining 3 GEO's (AMR,CRE,CRW)
  - Developing future GEO's 5/6/7 to replace legacy GEO's upon lease expiration
- **GNSS Ongoing strategies**
  - Dual Frequency Multi-Constellation (DFMC)
  - Advance Receiver Integrity Monitoring (ARAIM)

Current WAAS LPV Coverage



WAAS LPV Coverage March 6, 2016 Iono event



GNSS Programs Strategy

- Integrate 5th & 6th GEOs; and establish procurement strategy for 7th GEO
- Continue 2nd civil signal L5 implementation
- Develop Dual-Frequency MOPS
- Evaluate Multi-Constellation and Advanced Receiver Autonomous Integrity Monitoring (ARAIM)
- Continue technical refresh activities

Summary

- **Navigation Programs will:**
  - Support resiliency by sustaining Ground Based NavAids
  - Support PBN Strategy with NextGen DME
  - Rationalize NavAids based on recommendation from ICAO Air Navigation Conference
- **Future work to include:**
  - Reduce Lighting Systems Footprint
  - Lower approach minimums with WAAS and EFVS
  - Advanced Receiver Autonomous Integrity Monitoring (ARAIM)

Questions?