FAA APNT Update

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Topics

• APNT Overview
• Scoping Background
• Re-Scoping Status
• Updated Timeline
APNT Overview

Program Description
- FAA APNT project investigating alternatives for providing higher precision back-up for GPS-based PNT services. GPS PNT services are the enablers of performance-based navigation (PBN) and Automatic Dependent Surveillance Broadcast (ADS-B) services that, in turn, enable Trajectory-Based Operations (TBO), area navigation (RNAV), Required Navigation Performance (RNP), and other NextGen improvements.
- The FAA currently relies on existing legacy systems for GPS alternative navigation which does not fully support RNAV, RNP, or TBO.

Primary Benefits
- Provides a backup to GPS in the event of a GPS interference event or outage
- Leverages existing infrastructure
- Safe recovery of aircraft (landing)
- No significant increase in pilot/controller workload
- Strategic Modifications of trajectories
- Continued dispatch To/From affected area(s)
APNT Overview

Alternative Positioning, Navigation, and Timing

- Safe Recovery (landing) of Aircraft
- No Significant Increase in Pilot/Controller Workload
- Strategic Modification of Trajectories
- Continued Dispatch To/From Affected Areas

Safety → Resilience ← Capacity/Efficiency
Original Target of Technology

- Leverages Existing DME/DME Technology
- Evaluating means to support both Inertial Reference Unit (IRU) and non-IRU aircraft
- RNAV Today; Impacts to Avionics to realize RNP

- Uses Ground and Aircraft-based emitters for coverage
- Leverages Planned and Existing Automate Dependent Surveillance-Broadcast (ADS-B) Technology and Air/Ground Infrastructure
- Provides precise time to aircraft
- Impact to Avionics

- Leverages DME/Ground Based Transmitter Infrastructure
- Leverages Planned and Existing Automate Dependent Surveillance-Broadcast (ADS-B) Technology and Air/Ground Infrastructure
- Provides precise time to aircraft
- Impact to Avionics
APNT Scoping Background (Original Proposal)

- Maintain the four pillars of APNT
  - Safe recovery (landing) of aircraft
  - No significant increase in pilot/controller workload
  - Strategic modification of trajectories to avoid areas of interference
  - Continued dispatch to/from affected areas

- Targeted Objective – support 80% - 90% of commercial aviation operations
  - FL 240* and above: RNAV 2
  - Class B airspace: RNAV 1
  - Transition from class B to FL 240*: RNAV 2

*Note: Coverage Requirements are evaluated on Mean Sea Level Altitudes (MSL) and not Flight Levels
Near Term Objectives

- Coverage zones for Class B And Core 30 Airports, and at FL 240 and Above En Route
- No Avionics Change
- RNAV Only
- **No Critical DMEs**
- IRU Required
- TSE At 1NM Without Monitor And Alert
- No Support To ADS-B
- Separation standards: 5 NM en route, 3 NM in the terminal area

Far Term Objectives

- Expand Coverage
- Avionics Change Required
- Monitor And Alerting (Dynamic RNP CONOPS (Datalink RNP values on a leg-by-leg basis (scalable RNP), Radius to Fix (RF) Legs and Fixed Radius Transitions (FRT), and reduced lateral separation)
- Provide Position Source For ADS-B
- Provide Timing Synchronization With Ground
- Enable further reduction of legacy NAVAID infrastructure
Near Term Objectives

- NextGen DME
  - Reconfigure Network
  - Deploy Enroute DMEs
  - Deploy Terminal DMEs for Core 30/Class B/Other High Volume Terminal Areas
  - Potential DME Reduction Of 30%
  - Supports Commercial Operations
    - Except RAA Community Until Aircraft Equip With IRUs
- Continue Research And Development To Support Targeted Objectives
  - Messaging Capability: Pseudolite/Time & Distribution/Authentication
  - Incorporate ADS-B In Capability As A Means Of Providing Ranging Data (Not Actual Position) To Aircraft
Re-scoping Alternatives (con’t)

- Far Term Objectives (increase accuracy and integrity)
  - Enhanced DME (eDME)
    - Supports Commercial Operations
      - Except RAA Community Until Aircraft Equip With IRUs
      - RNAV And RNP Operations
    - Precise Time Distribution
  - Hybrid (DME/ADS-B)
    - Supports Position Source For ADS-B
    - Highest Performance Of All Alternatives
    - Supports All Commercial And GA Operations
APNT Re-scoping Status

• Engage internal and external stakeholders to define minimum navigation operational service levels during a GPS outage
  – Technical/Risk assessment driven
  – Leverages work/analyses completed to date
  – Operational service levels will drive Acquisition Management System artifacts
    • Shortfall Analysis, updated ConOps, operational requirements

• Align with FAA’s enterprise strategies
  – Navigation Strategy, PBN Strategy, etc.
APNT Re-scoping Status

• Define Service levels objectives
  – Scenario based approach by event type (i.e., scheduled, accidental, deliberate)
    Example – Deliberate interference event occurs in a Terminal environment
    » Assumptions (e.g., Specific coverage’s (nm) and varied durations)
    » Asses impacts to efficiency and capacity
  – Define minimum operational service levels objectives

• Coordinate and socialize results externally
  – TOC, PARC, RTCA, AOPA, ALPA, etc.

• Update APNT Documents
  – Shortfall Analysis, Con Ops, etc.

• Develop Operational Requirements
  – Conduct functional analysis
  – Derive/validate operational requirements
  – Update APNT preliminary Requirements Document
New AMS Decision Point dates per approved Enterprise Architecture Roadmap, Version 9.0, January 2015

- APNT Strategy Decision (new milestone) in Dec. 2015
- Initial Investment Decision (IID) originally Dec. 2016, amended to Dec. 2017
- Final Investment Decision (FID) originally Dec. 2017, amended to Dec. 2018
Questions