Estimated Benefits of GPS for U.S. Civil Aviation

National Space-Based Positioning, Navigation, and Timing (PNT) Advisory Board Meeting

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Federal Aviation Administration

Introduction

- **GPS Usage by U.S. & International Aircraft**
  - Thousands of U.S. and international aircraft flying in U.S. airspace are equipped with GPS
  - Significant Federal Investment in GPS for aviation
- **NextGen benefits dependent on GPS**
  - GPS receivers are already used for NextGen navigation, and are planned for NextGen surveillance and trajectory-based operations
- **Safety & Efficiency Benefits of GPS**
  - GPS applications are vital to transportation safety & efficiency

Civil Aircraft Operators with GPS

- **FAA oversees 35,000 instrument flights per day + visual flights**

- **Civil aircraft operators have invested ~$3 - $5 billion in current GPS equipment.**
  - *5,800 – 7,250 passenger, cargo and regional U.S. operated aircraft;*
  - *2,800 to 4,000 international operators' aircraft from 105 countries;*
  - *61,000+ IFR-approved GPS navigation and general aviation and air taxi aircraft; and*
  - *310,000 pilots without instrument ratings*
  - *+DOD aircraft and state/government aircraft*

Aviation Infrastructure

- **GPS use in the National Airspace System (NAS)**
  - Wide Area Augmentation System (WAAS)
  - Automatic Dependent Surveillance-Broadcast (ADS-B)
  - Precise timing source
    - En route and terminal automation
    - Time-tagging radar data
    - Embedded within terrestrial communication networks
  - Ground-Based Augmentation System (GBAS)

- **Over $3 billion in FAA investment as of FY11**

GPS Impact to NextGen Operations

- **GPS is critical to NextGen Implementation**
  - Performance Based Navigation (PBN) implementation
  - Parallel approaches using GNSS
  - Safety enhancements through moving map and surface display of traffic for flight crew

- **Total planned FAA NextGen and GPS investments through 2018 around $12 Billion.**
  - ~ $1 Billion for WAAS and GPS
  - ~$11 Billion for NextGen infrastructure (which depends on GPS)

GPS Aviation Safety Benefits

- **Accident Categories Mitigated by GPS:**
  - Approach and Landing
  - Controlled Flight into Terrain (CFIT)
  - Runway Incursion
  - Night Flight (GA-only)

GPS Saves Lives

FAA analysis indicates GPS saves lives:

- 9 Air carrier accidents might have been averted with Terrain Alerting and Warning Systems (TAWS)
  - 51 deaths resulted from 4 of those 9 accidents
- An estimated 73 fewer General Aviation deaths have occurred annually over the past 5 years due to increased use of GPS technology.
- Estimates are conservative – serious injuries and property loss are also being averted.

GPS Aviation Efficiency Benefits

- **Economic Benefits for Aviation:**
  - Greater runway capability,
  - Reduced separation standards which allow increased capacity in a given airspace without increased risk, and
  - More direct enroute flight paths.

- **Estimated $200 million in economic benefits per year.**