Assessing Economic Benefits and Productivity Gains from GPS

Space-Based PNT Advisory Board Meeting

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GPS-Based Applications are Critical to Major DOT Initiatives

Aviation – NextGen
- Reliable and accurate positioning worldwide
- Reduced delays
- More fuel-efficient routes
- Increased system capacity with enhanced safety

Rail – Positive Train Control
- Reduced probability of collisions
- Increased efficiency and capacity

Crossmodal – ITS
- Enable crash prevention among vehicles and between vehicles and infrastructure
- Increased mobility and reduced environmental impact

Maritime
Vehicle Transportation

Safety
• 32,788 highway deaths in 2010
• 6,000,000 crashes/year
• Leading cause of death for ages 4 to 34

Mobility
• 4,200,000,000 hours of travel delay
• $80,000,000,000 cost of urban congestion

Environment
• 2,900,000,000 gallons of wasted fuel
DOT Investment in GPS

- Funding for Civil-Unique Capabilities: $128.7M to Date
  - Funding Provided to GPS Directorate for L1C and Civil Signal Monitoring

- GPS Augmentation Systems: Approx. $100M/ year

- Research and Development Activities Across DOT
  - In Conjunction with Major Program Initiatives

- Applications Rely on Investment from Commercial Industry and Consumers
Challenges in Assessing Economic Benefits and Productivity Gains Resulting from GPS

- Benefits Assessed at Application Level
  - GPS only one component of a system and often is incorporated with other technology innovations (e.g. communication systems)

- PNT Requirements: Accuracy, Availability, Integrity, Continuity
  - GPS May Not Be Only PNT Technology to Meet Requirements

- Don’t Have a Good Baseline of Benefits Before Introduction of GPS to Measure Against
Rail Applications

• Freight Railroads: Use of GPS to track train position and movement for operational efficiency
  - Degradation or loss of GPS could result in rail network congestion or gridlock
  - Federal Railroad Administration estimates railroads could lose productivity gains of $15B (7% discount factor) or $29B (3% discount factor) over 20 years

• Automated Track Inspection Program (ATIP) Vehicles: Use of GPS to record the location of track perturbations, including violations, defects and anomalies
  - ATIP has achieved a 359% increase in track inspection frequency over the last decade
Motor Carrier Applications

• 2009 Motor Carrier Efficiency Study: Characterized inefficiencies
  - $2.7B/year Driven Empty Miles
  - $900M/year Waiting in Ports
  - $9.67B/year Delays in Loading and Unloading
• GPS part of the solution to address inefficiencies to support “Just In Time” shipping

• Smart Roadside Initiative and Wireless Roadside Inspection
  - Streamline roadside inspection processes
  - Potential for $461M/year savings

• ITS Mobility Applications: Use of GPS for dynamic routing, navigation, and tracking
  - Degradation or loss of GPS could result in loss of significant transportation benefits such as decreased travel times, fuel savings, and corresponding environmental benefits
Maritime Applications – St. Lawrence Seaway

• GPS-based Automatic Identification System (AIS) reduces transit times (with accompanying lower fuel consumption) through better traffic management, and enhanced scheduling of lock passages.

• Enhances fleet management for ship owners - arrival times can be more accurately estimated, leading to more efficient scheduling of appointments with pilots and ship inspectors, thereby minimizing delays.

• Enhances navigation via the provision of timely and accurate environmental information, broadcasted through AIS channels by the Seaway's Traffic Management System
Recommendations from DOT Chief Economist

• Tie Use of GPS to Cost Reductions
  ➢ Ensure assumptions are validated

• Incorporate Cost Reductions into a Computable General Equilibrium (CGE) Model

• Run Model to Obtain Estimates of Dynamic Economy-Wide Effects