Nationwide Differential GPS (NDGPS) Program Update

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NDGPS Operating Partners

• United States Coast Guard
  – Aids to Navigation (maritime)
  – DGPS systems operations and maintenance

• Army Corps of Engineers
  – Aids to Navigation
  – Dredging and underkeel clearance
  – Underwater survey

• U.S. Department of Transportation
  – Surface transportation applications
    – Safety systems
    – Survey and construction (AMC)
    – Quality assurance
    – Asset and fleet management
    – Structures monitoring
    – Roadside/ROW management
    – Transit bus and rail location and separation
  – St. Lawrence Seaway (with Canada)
NDGPS Applications Partners

- **Department of Commerce**
  - Continuously Operating Reference Stations
  - Severe Weather Forecasting – water vapor estimates to national weather models
  - Space Weather Monitoring – free electron mapping

- **Federal Resource Agencies (USDA, NPS, USGS)**
  - One meter real-time positioning and navigation
  - Fire management and safety
  - Survey and mapping; GIS applications

- **State, County and Local Governments, Private and Non-Profit Sectors**
  - Lands, parks and environmental resources management
  - Precision agriculture
  - Mining and other resource management
**Vicksburg DGPS Site Closure (ACOE)**

- **Vicksburg Area Saw Significant Flooding in May-June 2011**
  - Mississippi River crested at Vicksburg on Wednesday, May 18
  - Crested at a record level of 57 feet; bankfull is 43 feet
  - Flood stage lasted through third week of June

- **Vicksburg DGPS Site Underwater**
  - Equipment removed/stored by ACOE
  - Facility significantly damaged

- **Vicksburg Site Permanently Off Air July 7**
  - ACOE requested immediate site decommissioning
  - Bobo, MS and English Turn, LA provide adequate DGPS coverage
Current Coverage
NDGPS Program Status

• Inland (DOT) Tower Recapitalization
  – Upgrade reference stations/integrity monitors/antenna
  – Install IP-based operations system
  – Upgrade transmitters
  – Depends upon FY12/13 funding

• Buildout Unlikely
  – No budget support for construction funding
  – Strong support for O&M and recap

• USCG/DOT MOA Rewrite
  – Funding
  – Property accountability
  – USCG Billets (FY2016 commitment current)

• USDA NDGPS Study
  – Identified 15 potential new services from existing or new NDGPS infrastructure
  – All high-accuracy/high-integrity applications
High Accuracy NDGPS Work in Progress/To Do

• Two Small Business Innovation Research (SBIR) Projects in Progress
  – Ranging
    • Phase I complete; achieved better than 10 meters
    • Results indicate standalone range of <100 miles
  – Compression
    • Compress data stream, ionosphere, troposphere, to < 1000 bits per epoch
    • Awardee willing to make algorithm open source

• Still To Do
  – Integrity
    • Algorithms available; need to determine parameters
    • Lots of testing
  – Multi-site integration
    • Used brute force for earlier testing
    • Interpolation between sites is theoretically feasible
    • 3 epoch sub-decimeter solution
  – System testing
Where are New Applications in Transportation?

- GPS Enforcement of Designated Truck Routes
  - Illinois State Legislature required study
  - Illinois DOT study makes eight recommendations for truck GPS systems
    - Vertical clearance
    - Weight restrictions
    - Communications and enforcement of truck GPS systems

- Automated Vehicle Location (AVL) Systems for Data Collection
  - 2011 VDOT Survey
    - Road weather management systems
    - Near-real-time road conditions
    - Mapping noxious weed control
    - Tracking incarcerated workers
What Are We Trying to Get to?

• Intelligent Transportation Systems (ITS) Safety Applications for all Surface Modes of Transportation
  – Leverage technology to make vehicles discoverable to other vehicles, infrastructure, and pedestrians
  – Enable 360° situational awareness to the vehicle and driver

• Intelligent Railroad Systems
  – Assessing HA-NDGPS for meeting requirements
    • Positive Train Control
    • Track Defect Location
    • Automated Asset Mapping/Surveying