Status of Assessment: Future of NDGPS

Civil GPS Service Interface Committee (CGSIC)
Nashville, TN; September 16, 2013
LT Luke Byrd                     Timothy A. Klein
Analysis - Future NDGPS Investment Decisions

• Joint DHS/USCG and DOT/RITA Federal Register Notice (FRN) Request for Public Comments [78 FR 22554; April 16, 2013]
  – Public comment period closed July 15
  – Docket still open for additional comments

• Outreach to User Community
  – FRN announcement/articles in trade press
  – Distribution to known interested parties
  – Distribution via CGSIC lists and GPS.gov

• USG Requirements Assessments
  – USCG all elements (e.g., ATON, small boat)
  – DOT all elements (e.g., surface, maritime)
  – All USG agencies via the National Space-Based PNT Executive Committee/Executive Steering Group (ESG)
Contributing Factors for Assessment

- Contributing factors driving assessment timing and decisions
  - (1) Coast Guard changes in policy to allow aids to navigation (ATON) to be positioned with a GPS receiver using Receiver Autonomous Integrity Monitoring (RAIM)
  - (2) increased use of Wide Area Augmentation System (WAAS) in commercial maritime applications
  - (3) limited availability of consumer-grade NDGPS receivers
  - (4) no NDGPS mandatory carriage requirement on any vessel within U.S. territorial waters
  - (5) the May 1, 2000 Presidential Directive turning off GPS Selective Availability
  - (6) continuing GPS modernization
  - (7) the Federal Railroad Administration’s determination that NDGPS is not a requirement for the successful implementation of Positive Train Control
Comments/Information Sought

• Asked the following questions of interested members of the public; and Federal, state and local agencies;
  – (1) To what extent do you use the NDGPS in its current form for positioning, navigation, and timing?
  – (2) What would be the impact on NDGPS users if the NDGPS were to be discontinued?
  – (3) If NDGPS were to be discontinued, what alternatives can be used to meet users’ positioning, navigation, and timing requirements?
  – (4) What potential alternative uses exist for the existing NDGPS infrastructure?

• ACOE sites (7) not included in assessment

• Responses have been few
## FRN Responses – 35 Unique Responses

<table>
<thead>
<tr>
<th>Category</th>
<th>Respondents</th>
<th>Summary Comments</th>
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| Maritime-Related (U.S.)   | • 9 Pilots’ Organizations + 2 individual members | • Universally opposes DGPS reduction/removal in pilotage areas; several technical/safety concerns  
                              |                                                        | • Universal negativity to WAAS as substitute augmentation system in pilotage and navigation  
                              |                                                        | • Most correspond to USCG Vessel Traffic Service (VTS) areas (e.g., Houston, New York, Seattle)  
                              |                                                        | • Quotes IALA R-121 that removal of SA does not remove requirement for augmentation  
                              |                                                        | • Uses data acquisition for underwater investigations |
|                           | • 2 private industry partners             |                                                                                                           |
| Non-Maritime (U.S.)       | • 3 State DOTs                           | • Uses for highway design and monument integrity  
                              | • 2 Local DOT/DPW                                        | • Uses CORS data for RTN; not use broadcast  
                              |                                                        | • Uses DGPS-based CORS for project control, post-processing, automated survey and construction  
                              |                                                        | • Uses DGPS – critical for survey, mapping, GIS and data sets, coastal and maritime navigation and environmental applications  
                              |                                                        | • Suggests use in GPS+GLONASS streaming RTK applications |
## FRN Responses – 35 Unique Responses (2)

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<tbody>
<tr>
<td>Associations</td>
<td>1 Shipping Association</td>
<td>Seeks measurement on relative position fixing capability of DGPS signal v. uncorrected GPS</td>
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<tr>
<td>(U.S.)</td>
<td>1 PNT Association</td>
<td>Cites 30,000 daily navigation users in CONUS + tens of thousands at sea&lt;br&gt;Suggests NDGPS as most reliable augmentation for surface applications, and as backup for power, IT and other critical infrastructure outages; and natural disaster recovery</td>
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<td></td>
<td>1 Conservation Assn.</td>
<td>Uses for GIS, emergency response</td>
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<tr>
<td>Private Sector</td>
<td>2 private industry partners</td>
<td>Concerns for loss of critical accurate/reliable CORS stations for research, survey and mapping&lt;br&gt;Limits integration with SBAS and diversity of high integrity PNT services; suggests integration into national PNT network&lt;br&gt;Suggests integration with wide area nationwide Network RTK, and ubiquitous nationwide high accuracy location and timing</td>
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## FRN Responses – 35 Unique Responses (3)

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| Individuals     | • 4 individuals              | • Use for remote sensing elevation data/coastal management  
|                 |                              | • Lose realtime NAD83 data, WAAS accuracy insufficient  
|                 |                              | • Most accurate system for obstructed areas  
|                 |                              | • Specific concerns for NDGPS broadcast and CORS loss in Alaska, Hawaii, Puerto Rico |
| International   | • 3 international organizations | • Increasing use of Portable Pilot Navigation Systems/ Personal Pilot Units requiring reliable signal input  
|                 |                              | • Concerns for loss of DGPS attributes and impact on broader aims of e-Navigation  
|                 |                              | • Limits integration with SBAS; limits diversity of high integrity PNT services  
|                 |                              | • No use in Canadian cadastral surveying; increasing use of WAAS, IGS, and commercial systems |
| Federal Agencies | • 5 Federal agencies         | • CORS at DGPS sites critical; not use broadcast (2)  
|                 |                              | • Concerns for accuracy impacts on OPUS solutions  
|                 |                              | • Concerns for impacts of loss on space weather and severe storm models and operations, as well as CORS density  
|                 |                              | • Can replace with WAAS, but not RAIM (accuracy)  
|                 |                              | • No impact (2) |

UNCLASSIFIED
USG Responses

• U.S. Coast Guard (USCG)
  – No USCG requirement for NDGPS on USCG or commercial vessels, or for any other mission
  – No International Maritime Organization (IMO) requirement for carriage of a DGPS system

• U.S. Department of Transportation
  – No Federal Railroad Administration requirement for NDGPS to implement Positive Train Control
  – No St. Lawrence Seaway requirement for NDGPS for navigation
  – No requirements identified by any DOT Operating Administration

• Other USG Agencies (via PNT Executive Steering Group)
  – No mission requirements identified for NDGPS
  – Specific concerns for loss of CORS: density and site-specific
  – Dependencies identified for space weather and severe weather modeling and operations
Next Steps

• Identify and assess alternatives
  – Technical assessments of impacts of alternatives
  – Cost assessments of alternatives/use cases
    – Requires site-by-site assessment as well as systemic
    – Need to include costs for various scenarios:
      – Continuation/partial continuation/phased continuation
      – Partial/staged decommissioning – by site/use cases
      – Transfer to other parties
      – Hybrid alternatives
    – Ongoing O&M; environmental assessment and remediation; deconstruction; cost/benefit assessments

• Decision timeline: NET Summer 2014
  – FRN: Support FY16 budget request (implement NET FY16)
    – Existing O&M budgets (USCG and DOT) cannot support deconstruction and site remediation, especially if continuing service
    – Support planning/decision processes within USCG and USDOT
Continuing Responsibilities

• Uninterrupted NDGPS service to users as currently provided
  – Routine operations and maintenance of 85 NDGPS sites
    (49 USCG/Maritime, 29 DOT/Inland sites, 7 ACOE).
  – Watchstanding, troubleshooting, systems support engineering,
    systems analysis and reporting

• Public/user community information/involvement in decision
  processes and Next Steps, but no public meetings planned

• Continuation of DOT site recapitalization
  – Full funding received and work in progress
  – Sets long-term low-cost O&M baseline, 15 year service life
  – Sets a single “plug and play” configuration across USCG and
    DOT sites for reduced outyear O&M costs
  – Enables all possible alternatives/use cases for decision