USCG’s
Electronic Navigation Branch
DGPS & LORAN

Lieutenant Lee Hartshorn
USCG Headquarters
CG-54132
• Differential GPS
  • Overview
  • Signal Coverage
  • Recapitalization Efforts
  • Site Replacements/Additions

• Loran-C
  • Current Status and Future Initiatives
Differential GPS Concept

Reference Station
Typical DGPS Site Layout

- GPS Reference Antenna
- Beacon (MSK) Antenna
- Transmitting Antenna (150 ft)
- Equipment Hut
Nationwide DGPS

Combined Differential GPS Partnership (87 Total Sites):
• U.S. Coast Guard → 49 sites
• U.S. Army Corps of Engineers → 9 sites
• U.S. Department of Transportation → 29 sites

NAVcen is the Operational Control Center for the combined system
• Maritime Information Operations Center (MIOC)
Coast Guard (49) + ACOE (9) + DOT (29)

Single coverage - 92% of CONUS
Double coverage - 65% of CONUS
Site Recapitalization

• Reference Stations and Integrity Monitors
  – Upgraded Receivers & Antennas: L1/L2 (L2C) Geodetic Grade
  – Software / Server based system replaces legacy hardware implementation
  – COTS open architecture design
  – Improved integrity monitoring and accuracy
  – 5 of 58 Maritime Sites remain

• Transmitter replacement project commences in FY09.

NOTE: Nationwide (DOT Sponsored) sites are not currently funded for RSIM or Transmitter Recap.
Performance Enhancements

• RSIM (EC-03)
  – Increased Processor Power
  – Open architecture simplifies & reduces cost of future upgrades
  – Simplified installation and support
  – Increased remote management and configuration capabilities (reduced travel delay/cost)
  – Unified Software (RS & IM in single application)

• Transmitter Replacement
  – Legacy Transmitter responsible for ~17% of current downtime
Legacy Site Replacements

• New sites designed for better reliability in heavy weather.
• Increase dual coverage in hurricane regions.

• Miami site has been replaced with a new site in Card Sound, FL
  – Verification testing completed on April 9th, 2009.
  – Operational status in mid-June

• Mobile Point, AL site has been replaced with a new site at Eglin AFB, FL
  – System verification testing completed on March 27th, 2009.
  – Operational status in late May.
Miami, FL ➔ Card Sound, FL

GPS & Beacon Antennas
Miami, FL →
Card Sound, FL

Valcom Whip
Efficiency = 0.03

Efficiency = 0.4

Transmit Antenna

Equipment Hut

150 ft
Miami, FL → Card Sound, FL
Mobile Point, AL → Eglin AFB, FL

Equipment Hut
Mobile Point, AL → Eglin AFB, FL

Transmit Antenna

150 ft Efficiency = 0.17

150 ft Efficiency = 0.5
Mobile Point, AL → Eglin AFB, FL
Site Addition – St. Mary’s, WV

- Fills large coverage gap on Ohio River
- Operational on December 10\(^{th}\), 2008
  - Has exceeded availability requirements since commissioning.
Site Addition – St. Mary’s, WV
Loran-C

- 2010 Budget Proposal
- Status of eLoran Development & Testing
- Current/Future Initiatives
2010 Budget Proposal

• The President’s *Proposed* 2010 budget identifies potential savings across the federal government to reduce the Nation's deficit and to discontinue outdated programs. Included therein is termination of the Loran-C program.

• Loran operations will continue 'business as usual' pending Congressional approval of FY10 proposed budget.
eLoran Development & Testing

- eLoran does not exist in an operational state in the U.S.
- Time-of-Transmission (TOT) control is being tested by LSU in the Northeast U.S and Great Lakes Chains
- Loran Data Channel (LDC) is being tested by LSU at multiple stations.
Current/Future Initiatives

• Automated Loran Station (ALS)
  – ALS evaluations underway at Loran Stations Carolina Beach, NC, Jupiter Inlet, FL, and Kodiak, AK.
  – Lorsta personnel are temporarily assigned to a co-located ESU or ESD.
  – The eventual goal is to unman all SSX Loran Stations by 2012.
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DHS Integrated Common Analytical Viewer (iCAV)

- DGPS plays a key role in GPS Interference detection and mitigation (IDM).
- DGPS and Loran sites included as a infrastructure protection layer in the iCAV data.