



# ***Domestic Space-Based PNT Interference Detection and Mitigation***

***Captain Curtis L. Dubay, P.E.***

*US Coast Guard*

*Chairman, DHS Positioning, Navigation and Timing Work Group*



# ***Presentation Overview***



- **Current GPS Interference Detection and Mitigation Process**
- **Interference Case Study**
- **Interference Detection and Mitigation (IDM) Plan and Implementation**



# *Current GPS Interference Detection and Mitigation Process*



- **GPS SPS Outage Causes**
  - **GPS Constellation anomalies**
  - **User equipment anomalies**
  - **GPS frequency interference**
    - Intentional
    - Unintentional



# *Current GPS Interference Detection and Mitigation Process*



USAF GPSOC  
(military)



USCG NAVCEN  
(surface)

FAA NOCC  
(aviation)

***Domestic GPS Outage Reporting***



# *Current GPS Interference Detection and Mitigation Process*



- **GPS Outage Detection**
  - **Government managed systems that monitor and/or augment GPS**
    - GPS Ground Segment Monitors (USAF)
    - WAAS (FAA)
    - NDGPS (USCG)
    - CORS (NOAA)
    - JPL DGPS Network (NASA)
  - **User Reports (domestic and international)**
    - Web-based
    - Phone calls
    - Emails



# Interference Case Study



Electric Power

Postal and Shipping

Emergency Services

Chemical and Hazardous Materials

Information and Telecommunications

Transportation

Food and Agriculture

Defense Industrial Base

Public Health

Banking and Finance

Water





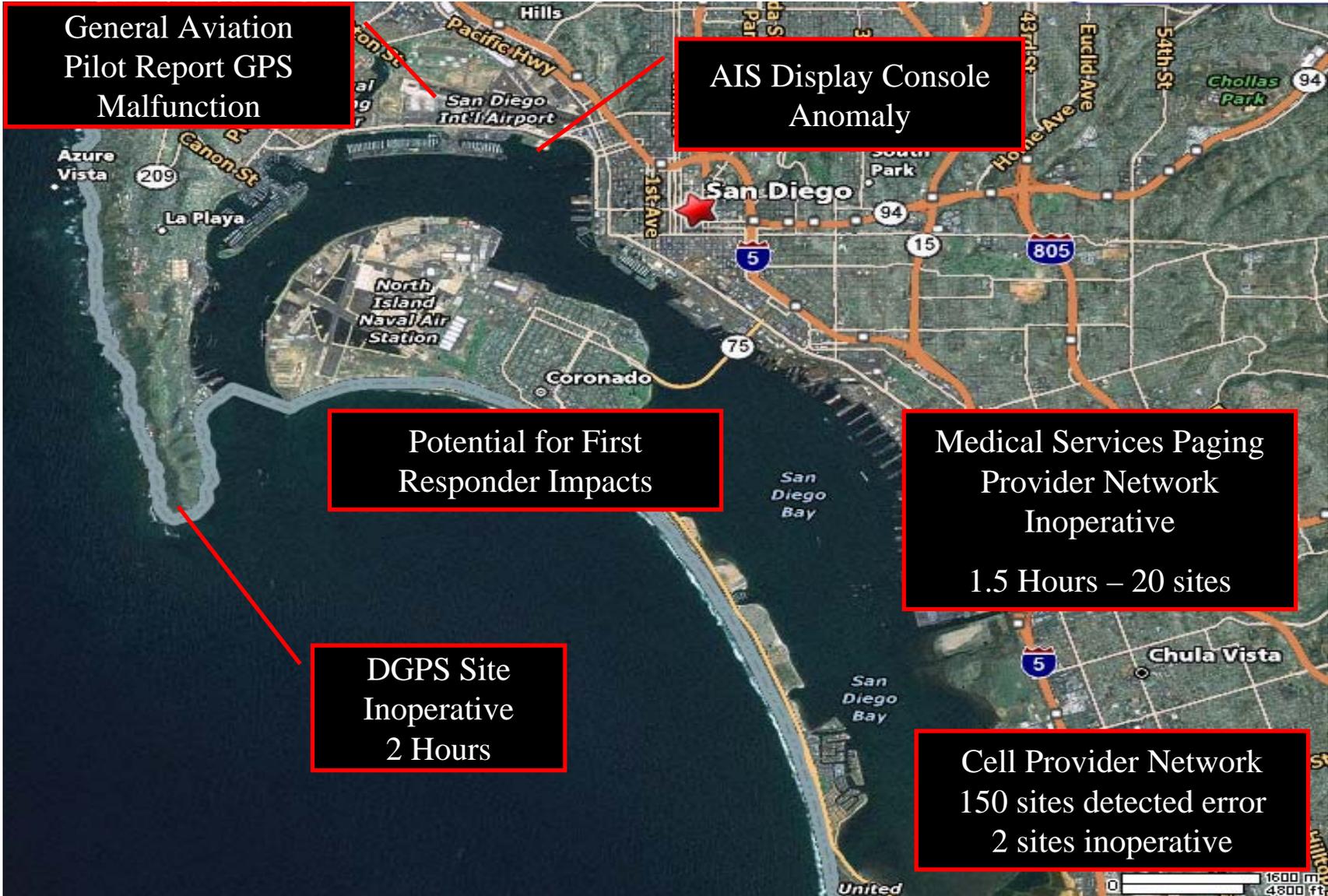
# *Interference Case Study*



- **Date: 22 January 2007**
- **Location: San Diego harbor south to Mexican border and up to 10 miles inland.**
- **Duration: 1200-1600 PST**
- **Cause: Unintentional Interference**



# Interference Case Study





## *IDM Plan Goals*



- **Coordinate domestic capabilities** to identify, analyze, locate, attribute, and mitigate sources of interference to the GPS and its augmentations
- **Collect, analyze, store, and disseminate interference reports** from all sources to enable appropriate investigation, notification and enforcement action
- **Develop and maintain capabilities, procedures and techniques, and routinely exercise civil contingency responses** to ensure continuity of operations in the event that access to the GPS is disrupted or denied.



# ***IDM Implementation Actions***



- **August 2007 – The President approved the National PNT IDM Plan**
- **January 2008 – DHS signed IDM Plan Implementation Strategy into force**
- **DHS expected to issue publicly releasable fact sheet and summary of IDM Plan**



## *Implementation Actions*



- February 7, 2008 – DHS announced adoption of eLoran as a national backup to the GPS to mitigate any safety, security, or economic effects of a GPS outage or disruption
- President's Fiscal Year 2009 Budget Request:
  - Migrate administration of LORAN-C from USCG to DHS National Protection and Programs Directorate (NPPD), includes transfer of budget authority for funding and personnel
    - Prepare for conversion of Loran-C operations to eLoran
  - NPPD to oversee development of eLoran to provide national backup capabilities for positioning, navigation, and timing.
  - Coast Guard will continue operation of the system in 2009 on a reimbursable basis



# Questions?





# DHS Loran Statement



The February DHS Press Secretary's Statement can be downloaded from the NAVCEN website homepage.



The screenshot shows the NAVCEN website homepage with the following content:

**NAVIGATION CENTER**  
The Navigation Center of Excellence

U.S. Department of Homeland Security  
UNITED STATES COAST GUARD

Consolidated Nav Info | DGPS Advisories | GPS Advisories / NANUs | GPS Testing Notices | LNMs | Almanacs | Nav Rules | AIS | Contact Us | Search | Home

**Primary Mission Areas:**

- Global Positioning System
- Differential GPS
- Nationwide DGPS
- LORAN C
- Inland River Vessel Movement Center
- Civil GPS Service Interface Committee
- Automatic Identification System
- Electronic Navigation & Charting
- Maritime Telecommunications

**Services & Reporting:**

- Receive Free LNM Updates
- Receive Free GPS Status Messages
- Receive NANU Updates
- Join CGSIC (free)
- Report an ATON Discrepancy or Outage
- Report a GPS Problem
- Report a DGPS Problem
- Report an AIS Problem
- Report a LORAN Problem
- Contact Us

April 17, 2008

**NAVIGATION CENTER POINTS OF INTEREST**

**Current Operational / Safety Information**

- Consolidated Nav Info
- DGPS Site Status
- GPS Ops Advisories & NANUs
- GPS Almanacs
- GPS Interference Notices
- Local Notice to Mariners
- Light List and Corrections
- Navigation Rules
- Navigation Regulations
- Navigation Safety Alerts

**Maritime Information**

- USCG "Homeport" Website
- Vessel Traffic Services
- Global Maritime Distress and Safety System
- CG Nat'l Distress System
- Digital Selective Calling
- Vessel Traffic Services
- VHF Channels & Freqs
- MF & HF Channels
- Nav Pubs and Documents
- Radio Watch Requirements
- Marine Safety Information Broadcasts
- Ports and Waterways Safety System

**More About NAVCEN**

- Mission Statement
- Contact Us
- Directions to NAVCEN
- Search Our Site
- Site Map
- Website Privacy Policy

**News and Notices:**

- Reported GPS/AIS User Equipment Problems Involving PRN32: Read our notice...
- PRN 32 Announcement: Per NANU 2008023, PRN 32 will be set healthy at 1800Z 26 Feb 2008.
- DoD Announcement: Success In Intercepting Non-Functioning Satellite in Final Orbits. Read more...
- Adoption of a National Backup System to GPS - On Feb 7th, 2008, DHS issued a statement regarding the adoption of eLoran (enhanced LORAN) as the back to GPS...read the statement in its entirety (18K, PDF).**
- Decision made to continue providing high frequency (HF) radio broadcasts of weather forecasts and warnings...Final Report now available: A Business Case for the Continuance of the USCG High-freq Broadcasts of National Weather Service Marine Weather Forecasts.
- The 2007 Light Lists have been published and are available for download in PDF.
- Please read Coast Guard Marine Safety Alert 2-07 (PDF, 85K) regarding marine radios and AIS equipment.
- You may view previous news items here.



# ***U.S. 2009 Budget Information***



- Department of Homeland Security 2009 Budget

<http://www.whitehouse.gov/omb/budget/fy2009/budget.html>

- U. S. Coast Guard Posture Statement with 2009 Budget in brief, Loran discussed on page 41

<http://www.uscg.mil/comdt/DOCS/LOW.RES.CG%20FY09%20Posture%20Statement.FINAL.Jan29.pdf> - 2008-02-08