## Personnel Strength of Armed Forces

<table>
<thead>
<tr>
<th>Service</th>
<th>Military personnel</th>
<th>Percent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Army</td>
<td>1,042,200</td>
<td>48.2%</td>
</tr>
<tr>
<td>Air Force</td>
<td>483,000</td>
<td>22.3%</td>
</tr>
<tr>
<td>Navy</td>
<td>370,900</td>
<td>17.2%</td>
</tr>
<tr>
<td>Marine Corps</td>
<td>223,300</td>
<td>10.3%</td>
</tr>
<tr>
<td>Coast Guard</td>
<td>43,604</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,163,004</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Active duty and Reserve*

Source for Department of Defense (DOD) – FY15 Defense Manpower Requirements Report
US Coast Guard’s Missions

By law, the US Coast Guard has 11 Missions:

- Marine Safety
- Aids to Navigation
- Ports, Waterways, and Coastal Security
- Search and Rescue
- Marine Environmental Protection
- Living Marine Resources
- Other Law Enforcement
- Drug Interdiction
- Defense Readiness
- Migrant Interdiction
- Ice Operations
USCG Atlantic and Pacific Commands
USCG District Structure
NAVcen Mission Statement

The Navigation Center provides services to enhance the safety, security, and efficiency of U.S. waterways, and respond to the needs of civil Global Positioning System (GPS) users. These services include:

• Operating the Nationwide Differential GPS (DGPS) System
• Operating the Long Range Identification and Tracking (LRIT) business helpdesk
• Operating the Nationwide Automatic Identification System (NAIS)
• Publishing Notices to Mariners and the Light List
• Managing the US Aids to Navigation Information Management System
• Managing electronic charting portfolios for U.S. Coast Guard units
• Serving as the primary U.S. government interface with GPS users (except aviation and DOD)
• Receiving and coordinating investigation of GPS outage reports
• Disseminating navigation information through 24/7 operations center and the NAVcen website
## Nationwide Differential GPS (NDGPS)

### System Description

- 46 Nationwide Remote Broadcast Sites throughout the United States and territories (39 USCG and 7 USACE)
  - System in operation since 1996
  - Better than 10 meter accuracy
  - 10 second integrity alarm to the user
  - Satisfies Harbor/Harbor Approach requirements
  - 99.7% availability requirement
  - 99.9% availability requirement for Vessel Traffic Service (VTS)
  - Sites equipped with out-of-tolerance user alerting
   - Use ALMIS to report and document casualties

### Operations

- Redundant equipment at sites
- Redundant control stations at NAVCEN

### Stakeholders

- U.S. Army Corps of Engineers (USACE)
- Department of Transportation (DOT)
- National Oceanic & Atmospheric Administration (NOAA):
  - Continuously Operating Reference Stations (CORS) network
## System Description

- Assist U.S. flagged ships subject to Safety of Life at Sea (SOLAS) regulation
- Uses existing INMARSAT/Iridium equipment
- Track U.S. SOLAS ships worldwide
- Track inbound vessels on Int’l voyages, or traveling within 1,000 NM of the U.S. that are:
  - Passenger ships, 300+ GT cargo ships, or self-propelled offshore drill unit, not on site
  - Available for search and rescue surface picture and maritime domain awareness

## Operations

- Around the clock watch to provide assistance
- Conformance testing
- Verification of vessel reporting (4x/day)
- Currently track 700+ U.S. vessels worldwide
- Track over 7,000 vessels within the U.S. border

## Stakeholders

- Over 100 countries participate in LRIT
- Pole Star (Private Contractor Data Management)
- Internally used within the Coast Guard to serve as:
  - Search and Rescue
  - Harbor Approach Early Notification

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**Homeland Security**

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**United States Coast Guard**
Nationwide Automatic Identification System (NAIS)

System Description

- Track vessels transiting throughout the NAIS areas
- Support coordinated information sharing with U.S. organizations and port partners
- 50 NM receive range, 24 NM transmit range
  - Interim Receive – Operate
  - Permanent Transceive System – Operate
  - Includes VTS AIS Transceiver - Only monitor
  - Marine Exchange Alaska – Only monitor

Operations

- Around the clock monitoring the performance of the NAIS sites
- Remote troubleshooting
- Monitor data connection to users

Stakeholders

- Bidirectional data sharing with Canada in the St. Lawrence Seaway
- Partnerships with U.S. Departments of Defense (DOD), Transportation (DOT), Homeland Security (DHS), and Commerce (DOC)
- U.S. Coast Guard operational units
# Local Notice to Mariners (LNM)

## System Description

- A region based method by which the public is informed of changes to aids to navigation
- LMSs are a carriage requirement onboard all commercial vessels
- NAVCEN website is the single authoritative source for LNMs and the chart corrections contained therein, as well as Light Lists

## Operations

- U.S. Coast Guard Districts create LNM
- LNMs distributed via NAVCEN Website (33 CFR 72.01-5)
- Users subscribe to a list server for notification that the NAVCEN website is updated

## Stakeholders

- Service to all mariners who navigate the waters of the United States
- National Oceanic and Atmospheric Administration (NOAA)
- National Geospatial-Intelligence Agency (NGA)
**System Description**

- USAIMS is the official electronic record of USCG and private Aids to Navigation (ATON)
- NAVCEN supports District Prevention Department Waterway Management staffs (dpw) and ATON Units with application support (e.g., special queries, tutorials, document system change requests)
- Automate production of weekly and annual Light List for NAVCEN website
- Produce print files for the annual version of the Light List

**Operations**

- Produce annual Light List for NAVCEN website and printing
- Produce weekly Light List updates (PDF and XML) for NAVCEN website
- Manage updates and maintenance of the system, perform system testing and training

**Stakeholders**

- Service to all mariners who navigate the waters of the United States
- CG ATON Units
- District Waterways
Electronic Chart Portfolio Management

System Description

• USCG Electronic Chart Portfolio Manager
• Provide electronic charts to the USCG cutter fleet and boat forces
• Provide help desk service, Electronic Chart Display and Information System (ECDIS) lab
• Electronic charts covering U.S., Caribbean, Mesoamerican waters, and other select areas
• Cover 321 cutters/boats (49’+) and 1190 boats

Operations

• Subject matter experts on policy and acquisitions for electronic charts
• Liaison with NOAA, NGA, and USACE for charting and maritime information

Stakeholders

International and national agencies

• National Oceanic and Atmospheric Administration (NOAA)
• National Geospatial-Intelligence Agency (NGA)
• U.S. Army Corps of Engineers (USACE)
# Electronic Tracking (E-Tracking)

<table>
<thead>
<tr>
<th><strong>System Description</strong></th>
<th><strong>Stakeholders</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Management Processes:</strong></td>
<td>• All USCG Program Offices</td>
</tr>
<tr>
<td>• Commercial AIS error notification</td>
<td>• OGAs (Internal Revenue Service (IRS), Department of Justice (DOJ), Department of Defense (DOD), Customs and Border Patrol (CBP))</td>
</tr>
<tr>
<td>• CG and Port Partner AIS error notification</td>
<td>• Civilian Legal Offices, Port Partners, Educational Institutions</td>
</tr>
<tr>
<td>• NAIS historical and live data request processing</td>
<td>• Freedom of Information Act (FOIA)</td>
</tr>
<tr>
<td><strong>MIOC application support:</strong></td>
<td></td>
</tr>
<tr>
<td>• LRIT Business Help Desk (BHD) application administration</td>
<td></td>
</tr>
<tr>
<td>• System Operation Center (SOC) tool administration</td>
<td></td>
</tr>
<tr>
<td><strong>NAIS infrastructure analysis:</strong></td>
<td></td>
</tr>
<tr>
<td>• Monitor and troubleshoot system performance criteria</td>
<td></td>
</tr>
<tr>
<td>• Technical liaison to system sponsor and Product Line</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Key Outcomes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• NAIS meets functional and operational requirements</td>
</tr>
<tr>
<td>• International Maritime Organization (IMO) vessel assistance and notification of AIS infractions</td>
</tr>
<tr>
<td>• CG assets meet AIS requirements</td>
</tr>
<tr>
<td>• NAIS data product delivered to customers</td>
</tr>
</tbody>
</table>
Navigation Information Service (NIS)

**System Description**
- Primary interface to disseminate information on GPS, DGPS, AIS, NAIS, LRIT Maritime Safety, Maritime Communications, Maritime Regulations & Local Notice to Mariners
- Over 275,000 hits monthly on the NAVCEN website
- 21,000+ List Server subscribers for GPS status, GPS advisories, and LNMs
- Coordinate Civilian GPS Interference detection and mitigation response
- Civil interface for non-aviation GPS users

**Operations**
- Around the clock NAVCEN point of contact for maritime and civil GPS users
- Main dissemination point of information for NAVCEN
- GPS testing coordination

**Stakeholders**
- General Public
- Maritime and public entities include:
  - Maritime users
  - Civil GPS users
  - Other non-Department of Defense (DOD) users

Homeland Security
Navigation Information Service (NIS) Inquiries

944 Total Inquiries in 2015

- GPS 7%
- DGPS 3%
- ADMIN <1%
- AIS 9%
- CHARTING/LNMs 20%
- LAWS/REGS 9%
- MARITIME COMMUNICATIONS 5%
- MERCHANT MARINE <1%
- MISCELLANEOUS 12%
- NAVIGATION RULES 10%
- OTHER CG MISSIONS 8%
- VESSEL DOCUMENTATION 1%
- RECRUITING <1%
- LRIT 1%
- WEB SERVICES/WEBSITE 3%
- WWM/ATON 14%
- LAW/REGS 9%
- OTHER CG MISSIONS 8%
- RECRUITING <1%
- VESSEL DOCUMENTATION 1%
- LRIT 1%
- WEB SERVICES/WEBSITE 3%
- WWM/ATON 14%
# Operational Civil Interface Duties

## Description
- 1986 – GPS became a dual-use (Military/Civil) system, DOD formed an MOU with DOT for GPS Civil Interface
- Civil GPS Service Interface Committee (CGSIC) was formed as liaison between world’s civil GPS users and U.S. GPS authorities
- DOT assigned operational interface to U.S. Coast Guard for dissemination of GPS operational information, CG retained responsibility after shifting to DHS

## Operations
- CGSIC Deputy Chair and Executive Secretariat
- Publish GPS operational files for public use
- Accept and process GPS inquiries and problem/interference reports
- Advocate for the civil GPS community

## Stakeholders
- U.S. Air Force GPS Operations Center (GPSOC)
- FAA National Operations Control Center (NOCC)
- Other agencies of the U.S. government for response to inquiries
- Civil, non-aviation users

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Homeland Security

U.S. Department of Homeland Security
United States Coast Guard
## Civil GPS Services Interface Committee (CGSIC)

### Description
- 1989 – DOT Takes Lead for Civil Users
- 1991 – Civil GPS User Interface Committee (CGSIC):
  - Chair (DOT/Research and Innovative Technology Administration)
  - Deputy Chair (CO NAVCEN)
  - Executive Secretariat (NAVCEN Staff)
  - Liaison for world’s Civil GPS Users

### Operations
- CGSIC Provides:
  - Technical information exchange with civil GPS users
  - Identify type of information & distribution methods
  - Identify Issues for resolution by U.S. GPS Authorities
  - Conduct GPS information studies on civil user needs
  - Advocate for civil use of GPS

### Stakeholders
#### Subcommittees
- Survey, Mapping & Geo-Sciences
- Timing
- U.S. States & Local Government
- International Information

#### Advisors
- Land
- Aviation
- Marine
- GPS Industry Council
GPS Information Sharing & Interference Detection and Mitigation (IDM)

<table>
<thead>
<tr>
<th>System Description</th>
<th>USAF GPSOC (military)</th>
<th>FAA SOG (airspace)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 2014 Interagency GPS User Support MOA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Trilateral-agency User Segment Representation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Multi-agency IDM Coordination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Implement GPS MOA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Maintain Trilateral Representation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Multi-agency IDM Coordination in Annex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Designated by USCG as GPS testing focal point for all GPS band testing and Other Government Agency (OGA) testing events</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operations</th>
<th>USCG NAVCEN (surface)</th>
<th>Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Support Civil Mission Planning and User Requirements</td>
<td></td>
<td>U.S. Air Force GPS Ops Center (GPSOC)</td>
</tr>
<tr>
<td>• Provide Satellite Constellation Status</td>
<td></td>
<td>FAA Satellite Operations Group (SOG)</td>
</tr>
<tr>
<td>• Provide User Advisories</td>
<td></td>
<td>FAA Air Traffic Control System Command Center (ATCSCC)</td>
</tr>
<tr>
<td>• Coordinate GPS Testing</td>
<td></td>
<td>U.S. Coast Guard Navigation Center (NAVCEN)</td>
</tr>
<tr>
<td>• Process GPS Disruption Reports</td>
<td></td>
<td>Federal Communications Commission Ops Center (FCCOC)</td>
</tr>
<tr>
<td>• Interface Control Document Review and Coordination</td>
<td></td>
<td>DHS National Coordinating Center for Telecomms (NCC)</td>
</tr>
<tr>
<td>• GPS related Committees and Working Groups</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The primary means of information dissemination used by the NIS is the NAVCEN Website. It is the focal point of all NAVCEN data regarding GPS, DGPS, NAV Rules, NAIS, LRIT and much more.
NAVIGATION CENTER’S FEDERAL PARTNERS

DEPARTMENT OF STATE
- FEDERAL HIGHWAY ADMINISTRATION
- OFFICE OF OPERATIONS, RESEARCH AND DEVELOPMENT
- NATIONAL TRANSPORTATION SYSTEMS CENTER (VOLPE)
- OFFICE OF POSITION, NAVIGATION AND TIMING (OPNT)
- NATIONAL TRANSPORTATION SYSTEMS CENTER (VOLPE)

DEPARTMENT OF TRANSPORTATION
- NATIONAL TRANSPORTATION SYSTEMS CENTER (VOLPE)
- OFFICE OF OPERATIONS, RESEARCH AND DEVELOPMENT
- NATIONAL TRANSPORTATION SYSTEMS CENTER (VOLPE)
- OFFICE OF POSITION, NAVIGATION AND TIMING (OPNT)

DEPARTMENT OF DEFENSE
- AIR FORCE
- ARMY
- NAVY
- NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA)

DEPARTMENT OF COMMERCE
- NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)
- OFFICE OF COAST SURVEY
- NATIONAL GEODETIC SURVEY (NGS)
- OFFICE OF RESPONSE AND RESTORATION (ERMA)

USCG NAVIGATION CENTER MISSIONS
- DIFFERENTIAL GPS
- LONG RANGE IDENTIFICATION & TRACKING (LRIT)
- NATIONWIDE AUTOMATIC IDENTIFICATION SYSTEM (NAIS)
- NOTICE TO MARINERS AND LIGHT LISTS
- e-CHARTING
- U.S. GOVERNMENT INTERFACE FOR GPS (CIVILIAN LAND AND MARITIME USERS)
- INTERFERENCE DETECTION AND MITIGATION (IDM)
NAVIGATION CENTER’S FEDERAL PARTNERS

DEPARTMENT OF STATE
- Federal Highway Administration
- Bureau of Oceans and International Environmental and Scientific Affairs
- Office of Operations, Research and Development
- National Transportation Systems Center (VOLPE)

DEPARTMENT OF TRANSPORTATION
- Research and Innovative Technology Administration (RITA)
- Office of Position, Navigation, and Timing (OPNT)

DEPARTMENT OF HOMELAND SECURITY
- Coast Guard Headquarters
- National Cybersecurity & Communications Integration Center
- Air Force
- Army
- Navy
- National Geospatial-Intelligence Agency (NGA)

DEPARTMENT OF DEFENSE
- Atlantic/Pacific Area Commands
- National Geodetic Survey (NGS)
- Office of Coast Survey
- Office of Response and Restoration (ERMA Application)

DEPARTMENT OF COMMERCE
- National Oceanic and Atmospheric Administration (NOAA)
- National Geospatial-Intelligence Administration (NGA)

OFFICE OF OPERATIONS, RESEARCH AND DEVELOPMENT
- National Ocean and Marine Security (NOMS)
- Air Traffic Control Systems Command Center (ATSCCC)
- Navigation Center (NAVCEN)
- DNR National Coordination Center (NCIC)
- GPS Operations Center (GPSC)
- US Army Corps of Engineers (USACE)
- Naval Research Laboratory
- Maritime Safety Office (MSI)

NAVIGATING CENTER MISSIONS
- Differential GPS
- Long Range Identification & Tracking (LRIT)
- Nationwide Automatic Identification System (NAIS)
- Notice to Mariners and Light Lists
- E-Charting
- U.S. Government Interface for GPS (Civilian Land and Maritime Users)
- Interference Detection and Mitigation (IDM)
NAVIGATION CENTER’S FEDERAL PARTNERS
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DEPARTMENT OF STATE
- FEDERAL HIGHWAY ADMINISTRATION
- OFFICE OF OPERATIONS, RESEARCH AND DEVELOPMENT
- NATIONAL TRANSPORTATION SYSTEMS CENTER (VOLPE)
- OFFICE OF POSITION, NAVIGATION AND TIMING (PNST)
- NATIONAL OPERATION COMMAND CENTER (NOCC)
- AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER (ATCSCC)

DEPARTMENT OF TRANSPORTATION
- UNITED STATES COAST GUARD (USCG)
  - HEADQUARTERS
  - NAVIGATION CENTER (NAVcen)
  - TS NATIONAL COORDINATION CENTER (NCC)
  - GPS OPERATIONS CENTER (GPSOC)
  - NAVIGATION CENTER'S FEDERAL PARTNERS
  - LONG RANGE IDENTIFICATION & TRACKING (LRIT)
  - NATIONWIDE AUTOMATIC IDENTIFICATION SYSTEM (NAIS)
  - NOTICE TO MARINERS AND LIGHT LISTS
  - e-CHARTING
  - DIFFERENTIAL GPS
  - US ARMY CORPS OF ENGINEERS (USACE)
  - OFFICE OF OPERATIONS (NAIS)
  - Oppositions, Navigation and Timing (NOCC)
  - Air Traffic Control System Command Center (ATCSCC)
  - Notice to Mariners and Light Lists (NML)

DEPARTMENT OF HOMELAND SECURITY
- NATIONAL CYBERSECURITY & COMMUNICATIONS INTEGRATION CENTER
- NAVIGATION CENTER'S FEDERAL PARTNERS
- NATIONAL TRANSPORTATION SAFETY BOARD (NTSB)
- OFFICE OF RESPONSE AND RESTORATION (ERMA)
- OFFICE OF COAST SURVEY (NOAA)
- NATIONAL GEOGRAPHIC SURVEY (NGS)
- OFFICE OF RESPONSE AND RESTORATION (ERMA)
- U.S. GOVERNMENT INTERFACE FOR GPS (CIVILIAN LAND AND MARITIME USERS)
- INTERFERENCE DETECTION AND MITIGATION (IDM)

DEPARTMENT OF DEFENSE
- AIR FORCE
- NAVY
- NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA)
- OFFICE OF RESPONSE AND RESTORATION (ERMA)

DEPARTMENT OF COMMERCE
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