NATIONAL SPACE-BASED
POSITIONING, NAVIGATION, AND TIMING
EXECUTIVE COMMITTEE

# GPS-based Industry Applications and Utilization

**International Satellite Navigation Forum 2007**

**Moscow, Russia**

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**Space-Based Positioning, Navigation, and Timing (PNT)**

# GPS Civil Applications

- Enabling technology
  - Unlimited growth potential
  - $68 billion industry worldwide by year 2010
- Wide range of civil uses
  - Telecommunications, surveying, law enforcement, emergency response, agriculture, mining, etc.
  - Used in conjunction with remote sensing
- Expanding use in transportation safety
  - Aviation, maritime, railroad, highway, etc.
  - Potential to reduce land-based navigation systems

# Background

- U.S. policy encourages and promotes commercial growth in markets/applications
- GPS performance is better than ever and will continue to improve
  - Augmentations enable high performance today
  - New GPS signal now available
  - Many additional upgrades scheduled
- International cooperation is essential
  - Other nations are also implementing satnav systems
  - Compatibility and interoperability are critical

# U.S. Policy

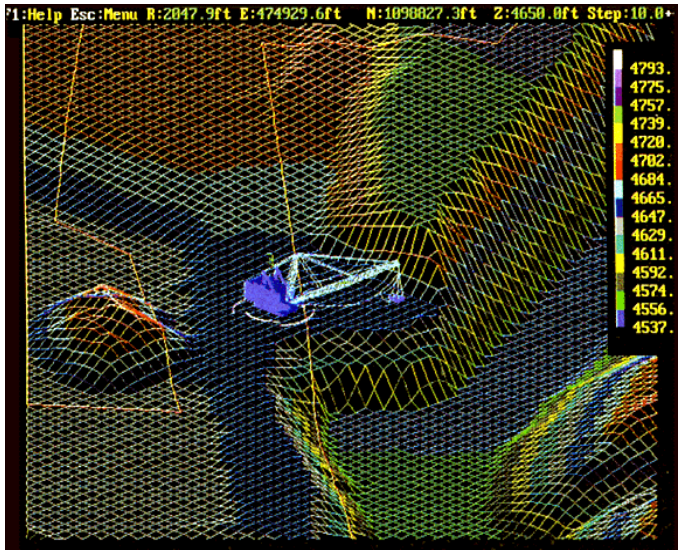
- Provide civil GPS and augmentations **free of direct user fees** on continuous, worldwide basis
- Provide open, **free access to information** needed to use civil GPS and augmentations
- **Improve performance** through modernization of GPS and augmentations
- Seek to ensure that international space-based PNT systems are **interoperable** with civil GPS and augmentations or, at a minimum, are **compatible**

**Policy stability and transparency improve industry confidence and investment**

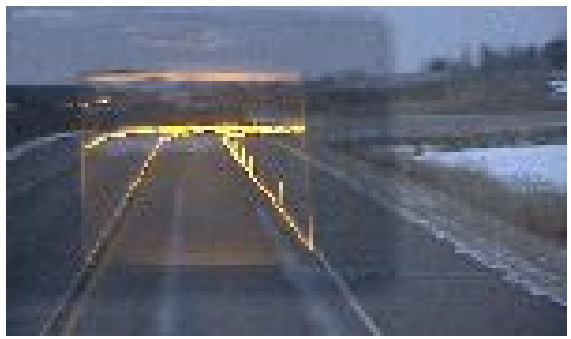
# GPS Applications

- Aviation
- Maritime
- Precise timing
- Surveying/Mapping
- Public Services
- Railroads
- Recreational
- Construction
- Automatic Vehicle Location
- Cell phones (e.g. E911 services)
- Agriculture
- Tracking wildlife
- Atmospheric/Space weather
- Visually impaired
- Computer security
- Map making
- Scientific Research

# New Commercial Applications Developed Every Day




- Open pit mining
- Child safety
- Automatic snowplow guidance
- Spacecraft control
- Power grid management
- Wireless mobile applications



# Aviation

- Reliable and accurate positioning worldwide
- Reduced delays
- More fuel-efficient routes
- Increased safety
- Increased system capacity

# Public Services

A GPS-based automated toll system keeps traffic on Germany's increasingly crowded highways.

- City planning
- Emergency response
  - Law Enforcement
  - Fire Fighting
  - Search and Rescue
  - Paramedics
  - Disaster Relief
- Transportation Infrastructure
  - Road billing network
  - Public road inventory
  - Snowplow guidance

# Construction

GPS/RTK technology was used in the construction of the Øresund Bridge between Denmark and Sweden

- Machinery, asset, and personnel management
- Rapid surveys for laying foundation piles, etc.
- Accident prevention
- Remote control of machinery possible
  - Japanese volcano dam

# Precision Agriculture

- Maximize use of resources
  - Optimized plowing of crop rows
  - Tailored applications of seeds, fertilizer, water, pesticides
  - Improved management of land, machinery, personnel, time
  - Greater crop yields
  - Net benefit: $5-14 per acre
- Minimize environmental impacts
  - Localized identification and treatment of distressed crops reduces chemical use
  - Precise leveling of fields prevents fluid runoff

This grain combine can be outfitted with a GPS receiver, yield monitor, and electronic sensors to track crop production based on location. These data can be transferred to a geographic information system to create a yield map and subsequently used to analyze the field and make site-specific management decisions.

# Summary

- The U.S. supports free access to civilian GNSS signals with public domain documentation necessary to develop user equipment
- GPS is a key component of the global information infrastructure
  - Compatible with other satellite navigation systems and interoperable at the user level
  - Guided at a national level as multi-use asset
  - Acquired and operated by Air Force on behalf of the USG
- The U.S. promotes open competition and market growth for commercial GNSS equipment

**GPS is a Global Public Service providing consistent, predictable, dependable performance**

# Contact Information

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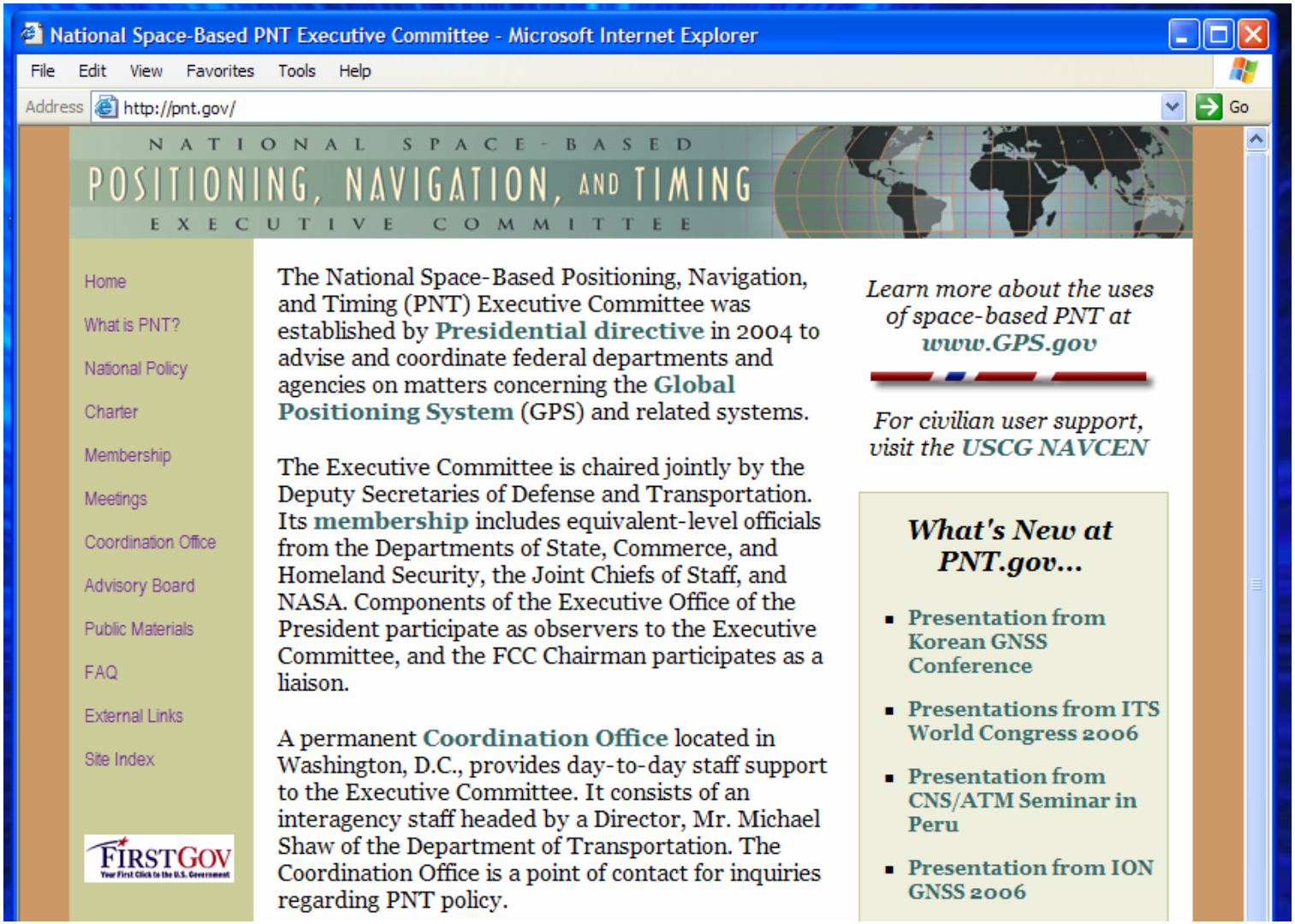
Presentation and other GPS information available:
**www.PNT.gov**

# Backups

# PNT.gov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FIRSTGOV
Your First Click to the U.S. Government
The National Space-Based Positioning, Navigation, and Timing (PNT) Executive Committee was established by Presidential directive in 2004 to advise and coordinate federal departments and agencies on matters concerning the Global Positioning System (GPS) and related systems.
The Executive Committee is chaired jointly by the Deputy Secretaries of Defense and Transportation. Its membership includes equivalent-level officials from the Departments of State, Commerce, and Homeland Security, the Joint Chiefs of Staff, and NASA. Components of the Executive Office of the President participate as observers to the Executive Committee, and the FCC Chairman participates as a liaison.
A permanent Coordination Office located in Washington, D.C., provides day-to-day staff support to the Executive Committee. It consists of an interagency staff headed by a Director, Mr. Michael Shaw of the Department of Transportation. The Coordination Office is a point of contact for inquiries regarding PNT policy.
Learn more about the uses of space-based PNT at www.GPS.gov
For civilian user support, visit the USCG NAVCEN
What's New at PNT.gov...
Presentation from Korean GNSS Conference
Presentations from ITS World Congress 2006
Presentation from CNS/ATM Seminar in Peru
Presentation from ION GNSS 2006

# GPS.gov


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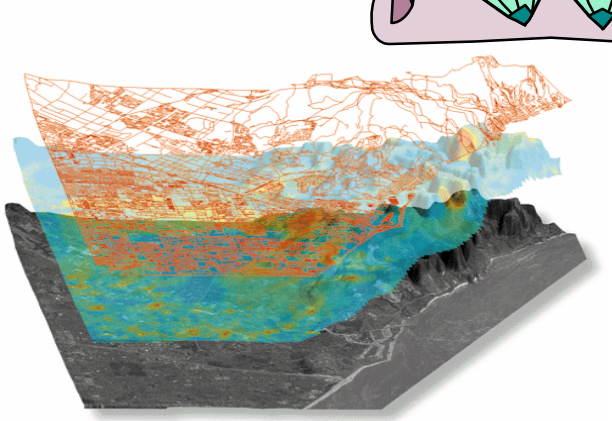
GLOBAL POSITIONING SYSTEM
Serving the World
The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis -- freely available to all. For anyone with a GPS receiver, the system will provide location and time. GPS provides accurate location and time information for an unlimited number of people in all weather, day and night, anywhere in the world.
SYSTEM INFORMATION
The Global Positioning System
GPS Augmentations
APPLICATIONS
Timing

# Automatic Vehicle Location

- Cargo Fleet Tracking
  - Improves safety and security
- Fleet Control/Dispatch
  - Increases fuel savings
  - Improves asset management
- Emergency Operations
  - Reduces response times
  - Reduces injury and property loss
- Road Maintenance
- In Vehicle Navigation
  - Determines accurate position
  - Reduces air pollution



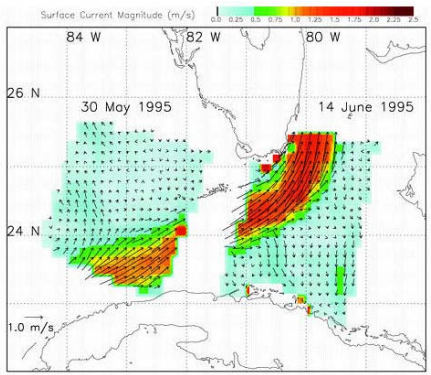

# Surveying/Mapping



- Sub-centimeter accuracy
- 100%-300% savings in time, cost, & labor
  - Control survey point: $10,000 in 1986; $250 in 1997
- Rural electrification
- Telecom tower placement
- Pipelines
- Oil, gas, and mineral exploration
- Flood plain mapping
- $3.12B market by 2003

# Scientific Research

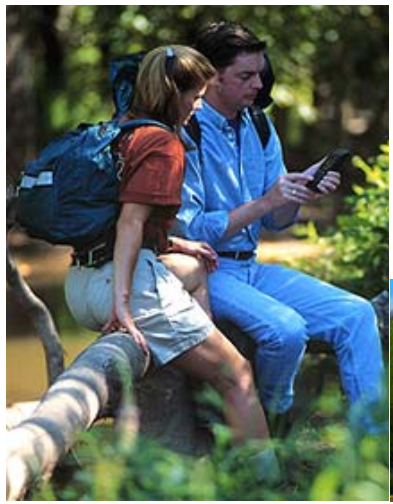
Glacial meltdowns, caused by undersea volcanic erruptions, are being tracked with GPS.




- Monitoring geological change
  - Glaciers, tectonic plates, earthquakes, volcanoes
- Wildlife behavior
- Atmospheric modeling
  - Water vapor content
- Oceanic studies
  - Tidal patterns
  - Surface mapping
- Time transfer

# Recreational

- Portable receivers for fishermen, hunters, hikers, cyclists, etc.
- Recreational facilities -- golf courses, ski resorts
- Integration of GPS into cellular phones
  - E-911 requirement
- $3.8B market by 2003




# Timing

- GPS offers an inexpensive alternative to costly, high maintenance timing equipment
- Telecommunications network synchronization & management
  - Phones, pagers, wireless systems
  - LANs, WANs, Internet
- Financial transactions
- Electrical power grid management & fault location
- Digital signatures for e-commerce