



Agenda



11:00 Opening Remarks

11:05 “GPS: A U.S. Program and Policy Overview”

by Mr. Michael Shaw, Director, National Coordination Office for Space-Based Positioning, Navigation, and Timing

11:20 “GPS in Aviation”

by Capt. Joseph Burns, United Airlines

11:35 “GPS – Redefining Mobility”

by Mr. Shekhar Somanath, Product Manager, Qualcomm Inc.

11:50 Questions and Answers

12:00 The GPS Receiver Challenge

courtesy of “GPS Adventures” and the Maryland Geocaching Society



SPACE-BASED POSITIONING
NAVIGATION & TIMING
NATIONAL COORDINATION OFFICE



The Global Positioning System (GPS): A U.S. Program and Policy Overview

**Presentation for Congressional Staff
121 Cannon House Office Building**

Michael Shaw, Director

April 28, 2009





Overview



- **Global Positioning System**
- **Augmentation Systems**
- **U.S. Policy**
- **Modernization Program**

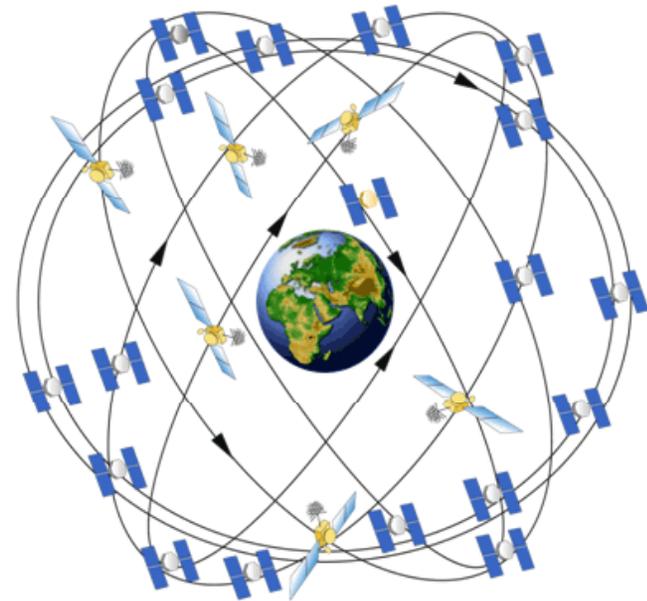




The Global Positioning System (GPS)



- **Baseline 24 satellite constellation in medium earth orbit**
- **Global coverage, 24 hours a day, all weather conditions**
- **Satellites broadcast precise time and orbit information on L-band radio frequencies**
- **Two types of service:**
 - Standard (free of direct user fees)
 - Precise (U.S. and Allied military)
- **Three segments:**
 - Space
 - Ground control
 - User equipment





GPS (continued)



- **GPS service is a one-way broadcast, like FM radio**
 - Unlimited number of users
 - Access to civilian GPS signals is free of direct user fees
- **Owned and operated by the U.S. Government**
 - Paid for by U.S. taxpayers
 - Managed at national level as multi-use asset
 - Acquired and operated by Air Force on behalf of U.S. Government
- **Public domain documentation**
 - Available on equal basis to users and industry worldwide
 - Anyone can develop Civil GPS user equipment



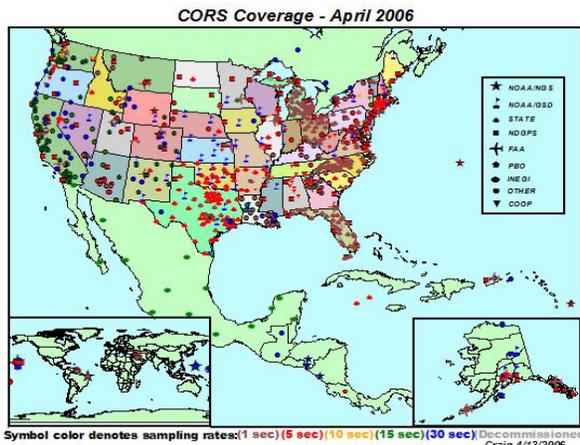
Augmentation Systems Enhance GPS Performance



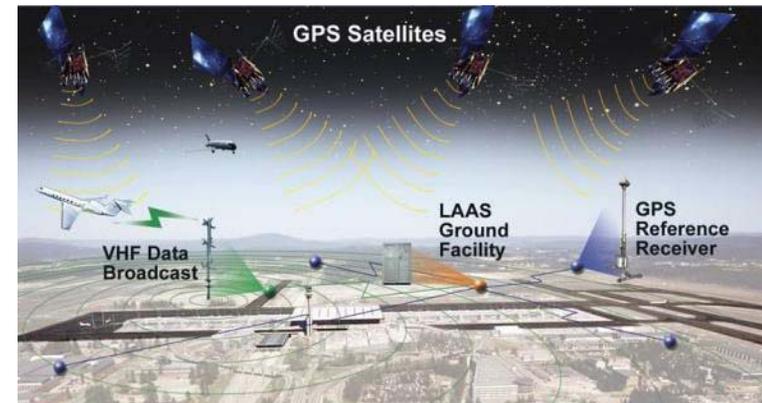
Nationwide Differential GPS



Wide Area Augmentation System



Continuously Operating Reference Stations



Local Area Augmentation System



U.S. Space-Based PNT Policy



GOAL: Ensure the U.S. maintains space-based positioning, navigation, and timing services, augmentations, back-up, and service denial capabilities that...

ASSURE SERVICE

Provide uninterrupted availability of PNT services

MEET DEMANDS

Meet growing national, homeland, economic security, and civil requirements, and scientific and commercial demands

LEAD MILITARILY

Remain the pre-eminent military space-based PNT service

STAY COMPETITIVE

Continue to provide civil services that exceed or are competitive with foreign civil space-based PNT services and augmentation systems

INTEGRATE GLOBALLY

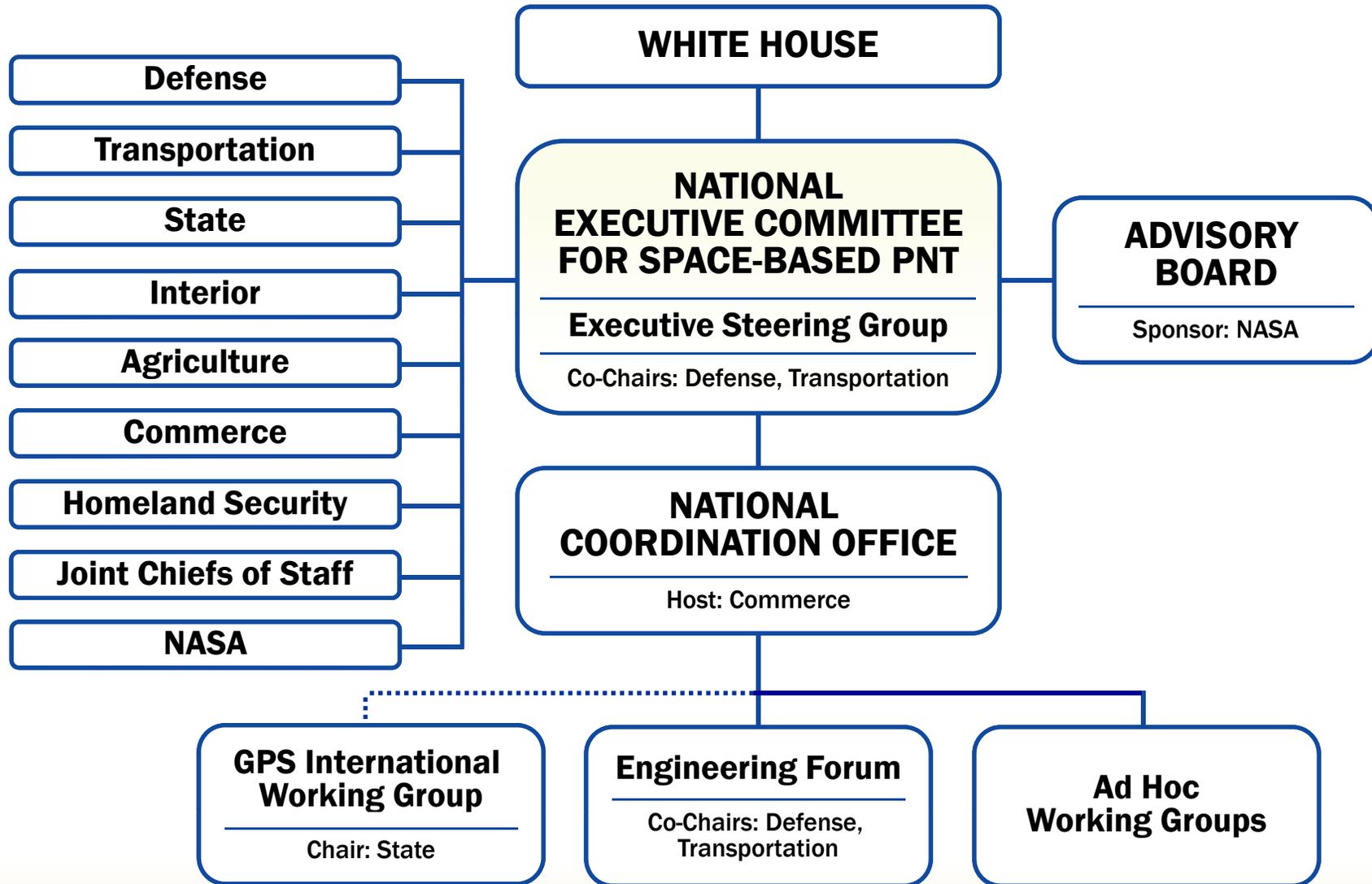
Remain essential components of internationally accepted PNT services

LEAD TECHNICALLY

Promote U.S. technological leadership in applications involving space-based PNT services



U.S. Space-Based PNT Structure





U.S. Policy Promotes Global Use of GPS Technology



- **Service improvements for civil, commercial and scientific users worldwide**
- **No direct user fees for civil GPS services**
 - **Provided on a continuous, worldwide basis**
- **Open, public signal structures for all civil services**
 - **Promotes equal access for user equipment manufacturing, applications development and value-added services**
- **Global compatibility and interoperability of GPS**
- **Encourages open, market-driven competition**



Benefits of GPS Modernization



System-wide improvements to meet increasing civil, commercial and military demands

- **Higher standalone performance, accuracy, etc.**
- **More robust against interference**
- **Improved indoor, mobile, and urban use**
- **Provides separate more secure military signal**
- **Capability for second (L2C) and third (L5) civil signals**
- **Delivers fourth civil signal (L1C) for interoperability with other Global Navigation Satellite Systems**



GPS Modernization – New Signals



- **Second civil signal (“L2C”)**
 - Designed to meet commercial needs
 - Higher accuracy through ionospheric correction
 - Began with GPS Block IIR-M in **Sep 05**; 24 satellites with L2C: **~2016**
- **Third civil signal (“L5”)**
 - Designed to meet demanding requirements for transportation safety (safety-of-life)
 - Begins with GPS Block IIF
 - First launch: **24 Mar 09** (GPS IIR-M Demo); **Fall 09** (GPS IIF); 24 satellites: **~2018**
- **Fourth civil signal (“L1C”)**
 - Designed with international partners to enable GNSS interoperability
 - Begins with GPS Block III; First launch: **~2014**; 24 satellites: **~2021**
- **Next-Generation Operational Control Segment (OCX)**
 - Will implement full functionality of new signals
 - Two development contracts awarded, **Nov 2007**; Project contract award in **2009**



GPS is Critical to Our Economy and National Infrastructure



Satellite Operations



Precision Agriculture



Surveying & Mapping



Aviation



TeleComm



Disease Control



Power Grids



Trucking & Shipping



Oil Exploration



Fishing & Boating



Personal Navigation



Summary



- **Continuing to improve GPS and U.S. Augmentations**
 - Civilian agencies are responsible for funding new, civil-unique GPS capabilities
- **Stable, predictable national policy**
 - No direct user fees; open market-driven competition
- **GPS is critical to our national infrastructure and economic security**

GPS Modernization program is enhancing capabilities for tomorrow



**SPACE-BASED POSITIONING
NAVIGATION & TIMING**

NATIONAL COORDINATION OFFICE

Michael Shaw, Director

**6822 Herbert C. Hoover Building
14th & Constitution Ave., NW
Washington, D.C. 20230**

Tel: (202) 482-5809

Email: PNT.office@PNT.gov