



**SPACE-BASED POSITIONING
NAVIGATION & TIMING**
NATIONAL COORDINATION OFFICE

GPS Constellation Status, Modernization, and U.S. Policy

**International Symposium on GNSS 2015
CGSIC/IISC Asia Meeting
Kyoto, Japan – November 16, 2015**

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GPS Constellation Status

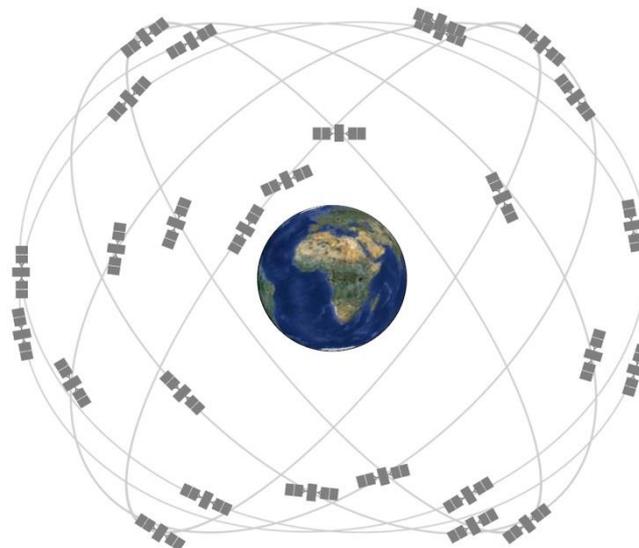


GPS Constellation Status



30 Operational Satellites

- **Block IIA**
 - 1 operational, 8 spare
- **Block IIR**
 - 12 operational
- **Block IIR-M**
 - 7 operational, 1 spare
- **Block IIF**
 - 10 operational, 1 in check-out
- **Oldest satellite is SVN23**
 - 23 years old on Nov 26, 2015
- **U.S. Government continuously assessing constellation optimization to determine launch need**



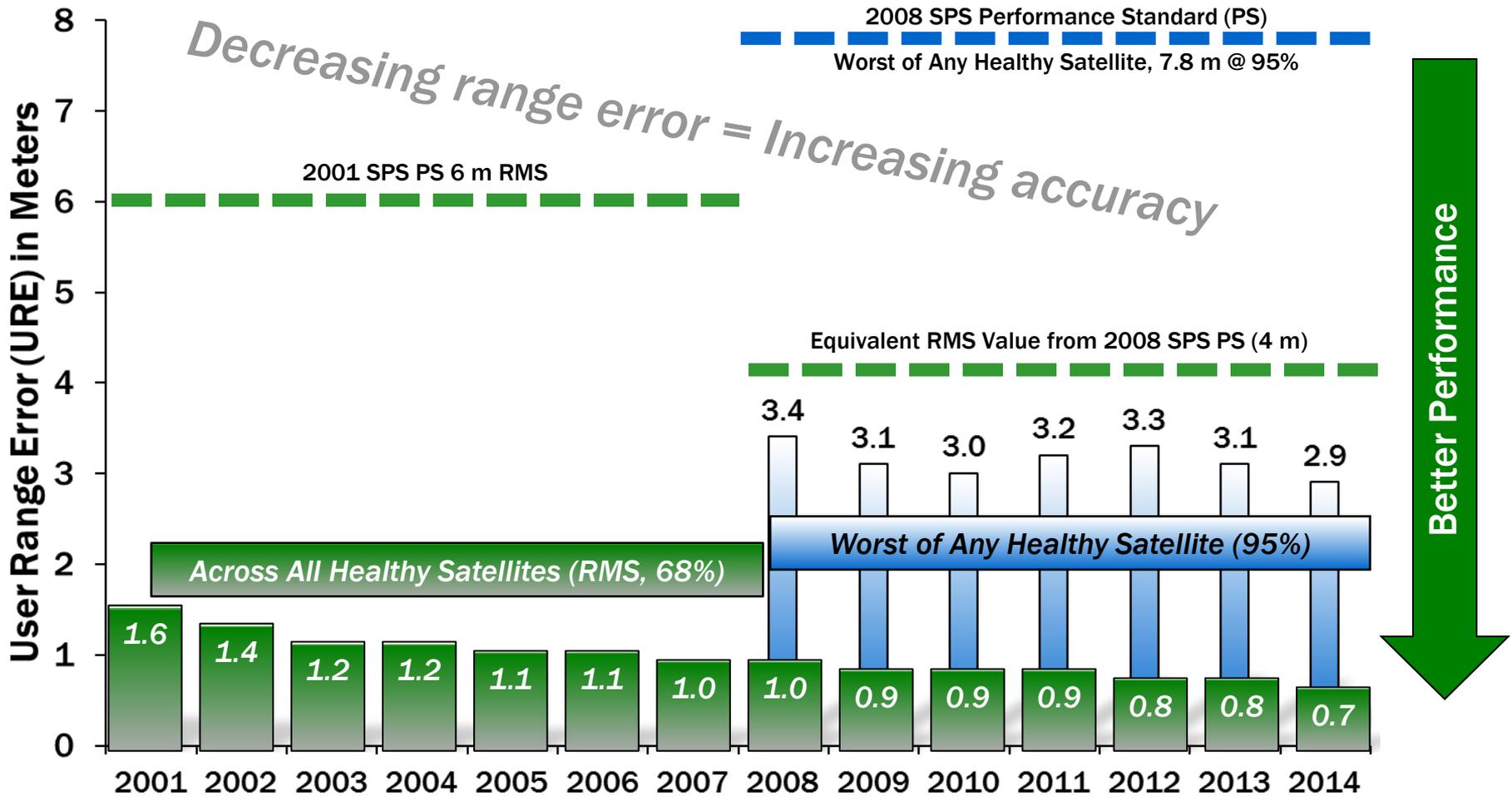


Accuracy: Civil Commitments

Standard Positioning Service Performance Standard



Standard Positioning Service (SPS) Signal-in-Space Performance



System accuracy better than published standard



GPS Modernization



GPS Block IIF



- 11th satellite launched Oct 31, 2015
- Final satellite scheduled for launch in Feb 2016

Courtesy ULA



GPS III



- **SV01-SV10**

- 4 civil & 4 military signals, including common civil signal (L1C)
- SV01-SV08 on contract, SV09-SV10 approved
- 2 year delay due to technical challenges w/ payload
- SV-level thermal vacuum started Oct 15
- SV01 “available for launch” Aug 2016

- **Competing SV11+ production**

- Phase 1: Production Readiness Feasibility Assessment
- Phase 2: Follow-on Production Competition





Next Generation Operational Control System (OCX)



- **New capabilities**
 - GPS III command and control
 - M-Code
 - Robust cyber security infrastructure
 - Modern civil signals & monitoring
 - Improved PNT performance
- **Block 0: Launch and checkout for GPS III**
- **Block 1: Replaces legacy system, adds modern features**
- **Block 2: Adds advanced NAVWAR and civil signal performance monitoring capabilities**





U.S. Space-Based PNT Policy



U.S. National Space Policy

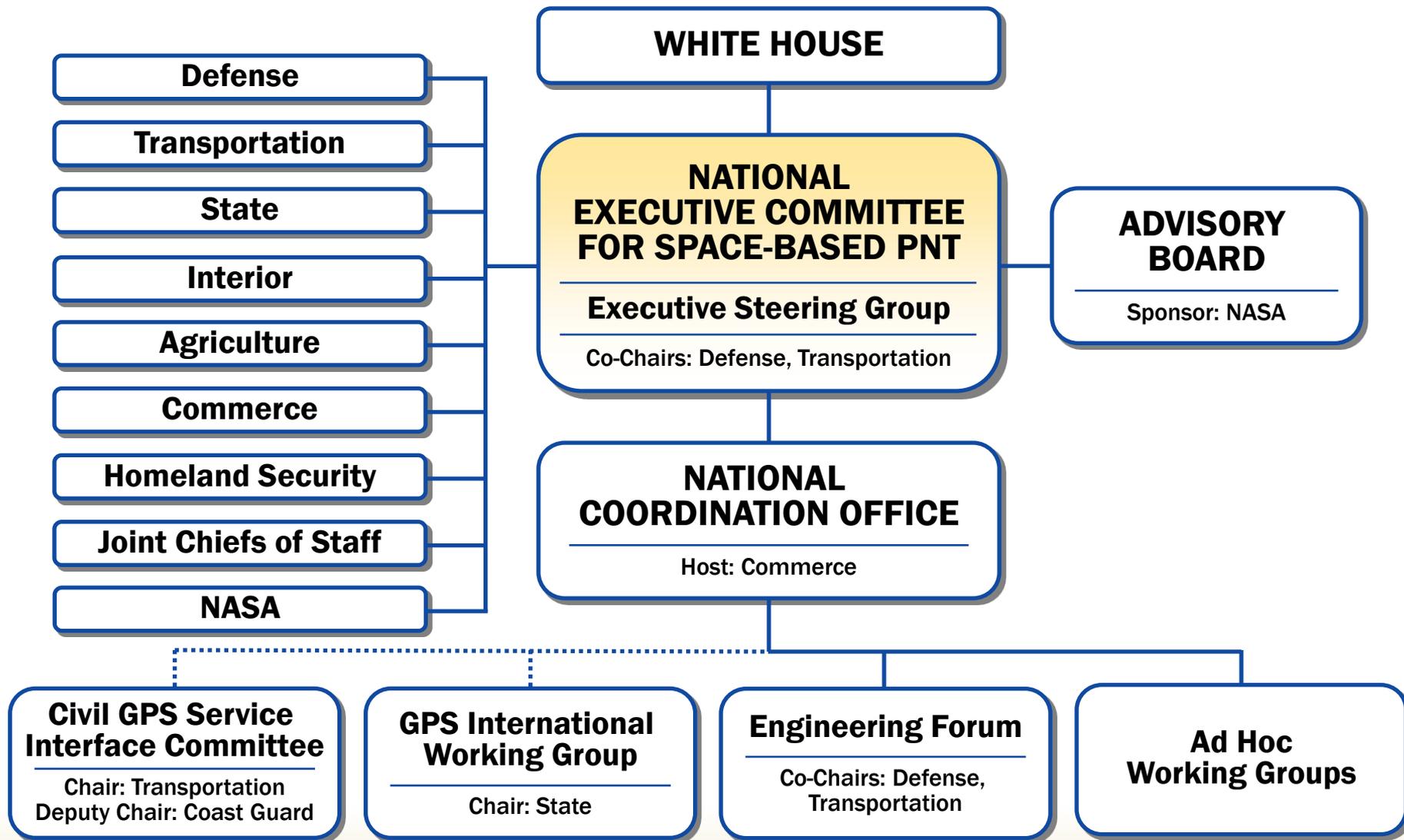


Space-Based PNT Guideline: Maintain leadership in the service, provision, and use of GNSS

- **Provide continuous worldwide access to GPS for peaceful uses, free of direct user charges**
- **Engage with foreign GNSS providers on compatibility, interoperability, transparency, and market access**
- **Operate and maintain GPS constellation to satisfy civil and national security needs**
 - Foreign PNT may be used to strengthen resiliency
- **Invest in domestic capabilities and support international activities to detect, mitigate, and increase resiliency to harmful interference**



U.S. Space-Based PNT Organization Structure





Complementary PNT



- **EXCOM looked at need for complement to GPS**
 - Assessment driven by many factors: from policy to technology
 - U.S. coverage for GPS outage from natural or man-made events
- **Current Activity: Identify and assess alternatives**
 - Assessed a broad mix of terrestrial RF and autonomous PNT technologies
- **Decision timeline: Support FY 2017 investment decisions**
- **Public stakeholder comments obtained by Federal Register Notice**



GPS Economic Benefits Assessment (2013 -- U.S. Only)



Application	Range of Benefits (\$B)	Mid-Range Benefits (\$B)
Precision agriculture: grain	10.0–17.7	13.7
Construction: earthmoving w/ machine guidance	2.2–7.7	5.0
Surveying	9.8–13.4	11.6
Air transportation	0.119–0.168	0.144
Rail transportation: positive train control	0.010–0.100	0.055
Maritime transportation: private sector use of nautical charts and related information	0.106–0.263	0.185
Road: fleet vehicle connected telematics	7.6–16.3	11.9
Road: consumer and other non-fleet vehicles	7.3–18.9	13.1
Timing	0.025–0.063	0.044
TOTAL	37.1–74.5	55.7



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Official U.S. Government information about the Global Positioning System (GPS) and related topics

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ICG International Committee on Global Navigation Satellite Systems

The United States was pleased to host the 10th meeting of the UN-affiliated International Committee on GNSS (ICG) in Boulder, Colorado.

ICG-10 Meeting Held November 1-6, 2015

[VISIT ICG-10 WEBSITE](#)

Upcoming Events

Monday, November 16
IS-GNSS 2015 (Kyoto)
Tuesday, November 17
IS-GNSS 2015 (Kyoto)
Wednesday, November 18
IS-GNSS 2015 (Kyoto)
Thursday, November 19
IS-GNSS 2015 (Kyoto)

More News for GPS Professionals

- Public ICWG and Open Forum on Dec 9-10, 2015
- Request for Public Comments on NDGPS Downsizing (federalregister.gov)
- DOT Hosts GPS Adjacent-Band Compatibility Assessment Workshops
- Public Comments on eLoran as a PNT Complement to GPS (regulations.gov)

Report/Lookup GPS Service Outages

Guidance for Critical Infrastructures

- Best Practices for Leap Second Event Occurring on 30 June 2015 (PDF)
- Best Practices for Improved Robustness of



Summary



- **GPS performance continues to improve beyond published commitments**
- **Ongoing GPS modernization is adding new capabilities for user benefits**
- **U.S. policy upholds longstanding commitments to free, continuous, worldwide GPS access**
- **U.S. Government gives GPS national-level attention and guidance**
- **Stay informed and in touch: www.gps.gov/pros**