

Space and Missile Systems Center

Global Positioning Systems Directorate



16 Sep 2015

Col Steve Whitney
Director, SMC/GP



SMC SPACE OV-1



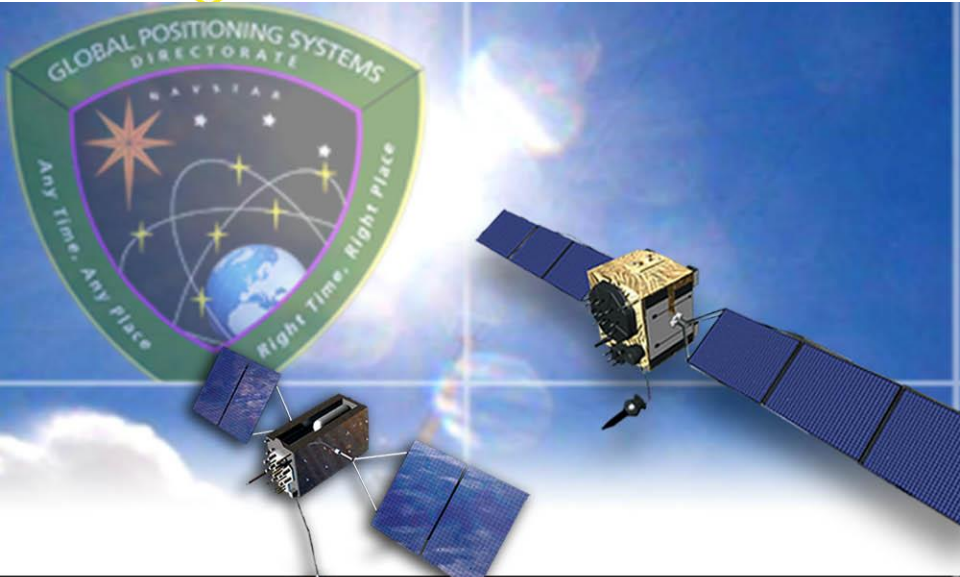
AEHF = Advanced Extremely High Frequency System, AFSCN = Air Force Satellite Control Network, CCAFS = Cape Canaveral Air Force Station, DMSP = Defense Meteorological Satellite Program, DSCS = Defense Satellite Communications System, DSP = Defense Support Program, EPS = Enhanced Polar System, GEODSS = Ground-based Electro-Optical Deep Space Surveillance System, GPS = Global Positioning System, GSSAP = Geosynchronous Space Situational Awareness Program, JSpOC = Joint Space Operations Center, ORS = Operationally Responsive Space, SBIRS = Space-Based Infrared System, SBSS = Space-Based Space Surveillance System, SSA = Space Situational Awareness, SST = Space Surveillance Telescope, VAFB = Vandenberg Air Force Base, WGS = Wideband Global Satellite Communications

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Global Positioning Systems Directorate

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"We are... the Green Monsters!"



**Col Steve Whitney
Director**

Mission:

Professionals acquiring, delivering and sustaining reliable GPS capabilities to America's warfighters, our allies, and civil users





GPS Overview

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Civil Cooperation

- 1+ Billion civil & commercial users worldwide
- Search and Rescue
- Civil Signals
 - L1 C/A (Original Signal)
 - L2C (2nd Civil Signal)
 - L5 (Aviation Safety of Life)
 - L1C (International)

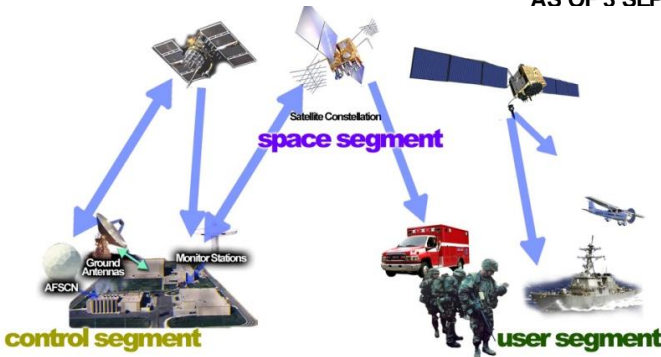


40 Satellites / 31 Set Healthy

Baseline Constellation: 24 Satellites

Satellite Block	Quantity	Average Age	Oldest
GPS IIA	2	23.3	24.8
GPS IIR	12	13.7	18.1
GPS IIR-M	7	8.1	9.9
GPS IIF	10	2.0	5.3
Constellation	31	9.3	24.8

AS OF 3 SEP 15



Department of Defense

- Services (Army, Navy, AF, USMC)
- Agencies (NGA & DISA)
- US Naval Observatory
- PNT EXCOMS
- GPS Partnership Council

Maintenance/Security

- All Level I and Level II
 - Worldwide Infrastructure
 - NATO Repair Facility
- Develop & Publish ICDs Semi-Annually
 - ICWG: Worldwide Involvement
- Update GPS.gov Webpage
- Load Operational Software on over 970,000 SAASM Receivers
- Distribute PRNs for the World
 - 120 for US and 90 for GNSS

International Cooperation

- 57 Authorized Allied Users
 - 25+ Years of Cooperation
- GNSS
 - Europe - Galileo
 - China - COMPASS
 - Russia - GLONASS
 - Japan - QZSS
 - India - IRNSS



Spectrum

- World Radio Conference
- International Telecommunication Union
- Bilateral Agreements
- Adjacent Band Interference



Department of Transportation

- Federal Aviation Administration

Department of Homeland Security

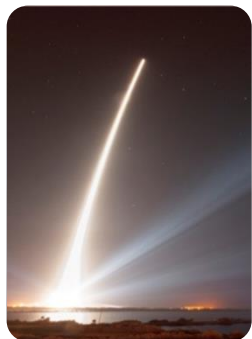
- U.S. Coast Guard



GPS IIF

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- 10 total GPS IIFs on-orbit
- 2 more GPS IIFs in the pipeline
 - GPS IIF-11 in launch processing at Cape (30 Oct 15)
 - GPS IIF-12 preparing to ship (3 Feb 16)



20 Feb 14: IIF-5



16 May 14: IIF-6



1 Aug 14: IIF-7



29 Oct 14: IIF-8



25 Mar 15: IIF-9



15 Jul 15: IIF-10

Most aggressive GPS launch schedule since 1993



GPS III

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Status

- GPS III is the newest block of GPS satellites
 - 4 civil signals: L1 C/A, L1C, L2C, L5
 - First satellites to broadcast common L1C signal
 - 4 military signals: L1/L2 P(Y), L1/L2M
 - Prime Contractor: Lockheed Martin (Waterton, CO)
- SV01-SV08 on contract; SV09 & SV10 options approved
- SV01 System Module Core Mate completed 7 Apr 15
 - 2 year delay from baseline due to technical challenges w/ payload
- Mission Data Unit software qualification complete 6 Aug 15
- SV-level thermal vacuum scheduled for Fall 2015
- SV01 available for launch Aug 2016





GPS III SV11+

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Status

- Competing GPS III SV11-32 Production
 - Drive down space vehicle costs by promoting effective competition
 - Reduce production cost and schedule risk with minimal design phase
- Two-phase acquisition approach allows contractors time to mature designs
 - Phase 1: Production readiness feasibility assessment
 - Phase 1 RFP release 1QFY16 with award in 3QFY16
 - Gain insight into contractor-funded space vehicle and navigation payload production design maturity and risk
 - Full and open competition not to exceed \$6M per source for up to 3 sources via firm fixed price contract
 - Phase 2: Full & open competition for GPS III SV11-32 production
 - Projected award in FY18
 - Acquisition strategy to be informed by Phase 1 performance and results



GPS Next Generation Operational Control System (OCX)

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- Modernized command & control system
 - GPS III command & control
 - M-Code
 - Robust cyber security infrastructure
 - Modern civil signals & monitoring
 - Improved PNT performance
- Prime: Raytheon (Aurora, CO)
- OCX Block 0: launch & checkout for GPS III
 - Currently in test
 - Successfully completed seven launch exercises/simulations
- OCX Block 1: replaces AEP and LADO, operate & manage GPS constellation; control modernized civil (L1C, L2C, L5) & military signals “core capability” (L1M, L2M)
 - Currently in design and risk reduction testing
- OCX Block 2: adds advanced NAVWAR and Civil Signal Performance Monitoring capabilities



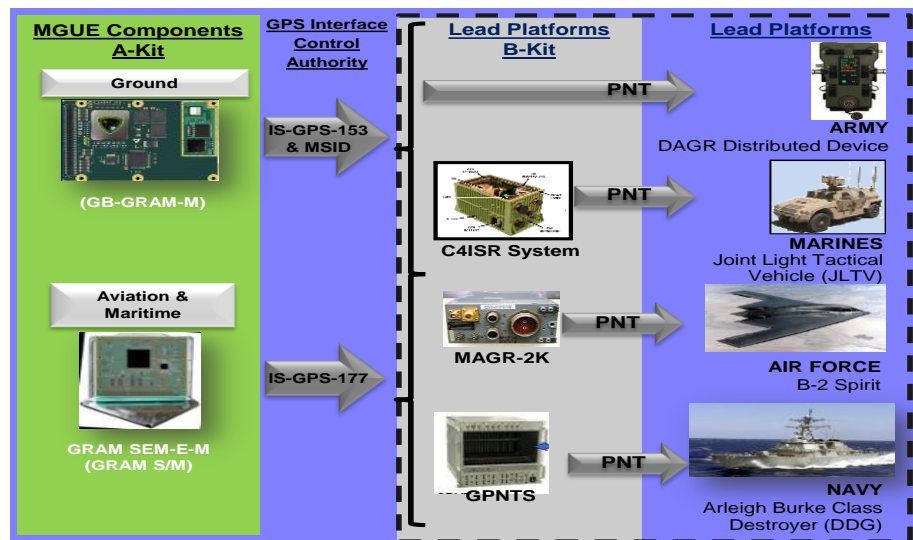


Military GPS User Equipment (MGUE)

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Status

- Three vendors developing modernized receiver cards (RCI, Raytheon L-3)
- Pursuing commercial market-driven acquisition
- Initial test articles delivered Jul 2015
 - Developmental test started 24 Aug 2015
- MGUE program is in process of completing work to support a Milestone B decision
- Draft MGUE Increment 2 Capability Development Document in coordination; defined as space receiver, hand-held, and Precision Guided Missile (PGM)





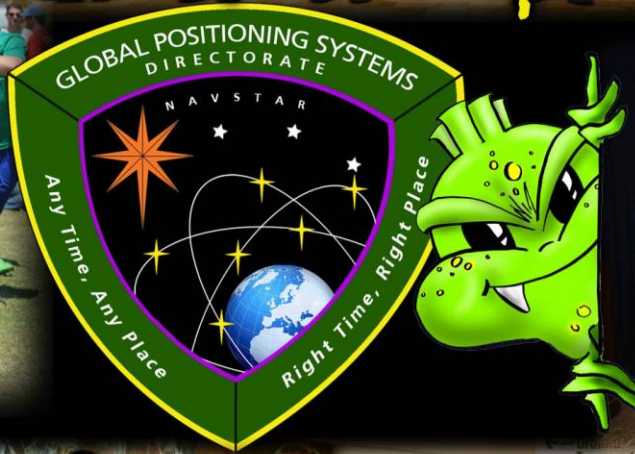
Perspectives

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- Everyone loves GPS capabilities
- Engaged in modernization of the entire GPS Enterprise
 - MGUE fielding is being accelerated via commercial market strategy
 - Key driver -- statute for Services to field in FY17 & user equipment vulnerability to spoofers / jammers
 - Next-Generation Operational Control System (OCX) addressing cost and schedule challenges
 - Final GPS IIF Launch Campaigns underway
 - GPS III first satellite is in the final stages of assembly and test, while work is underway to ensure future production capability
- Modernized Civil Navigation messages being broadcast today!
 - Improved accuracy with new systems
 - Better safety of life with multiple systems



The men and women of the GPS Directorate





Back-Up

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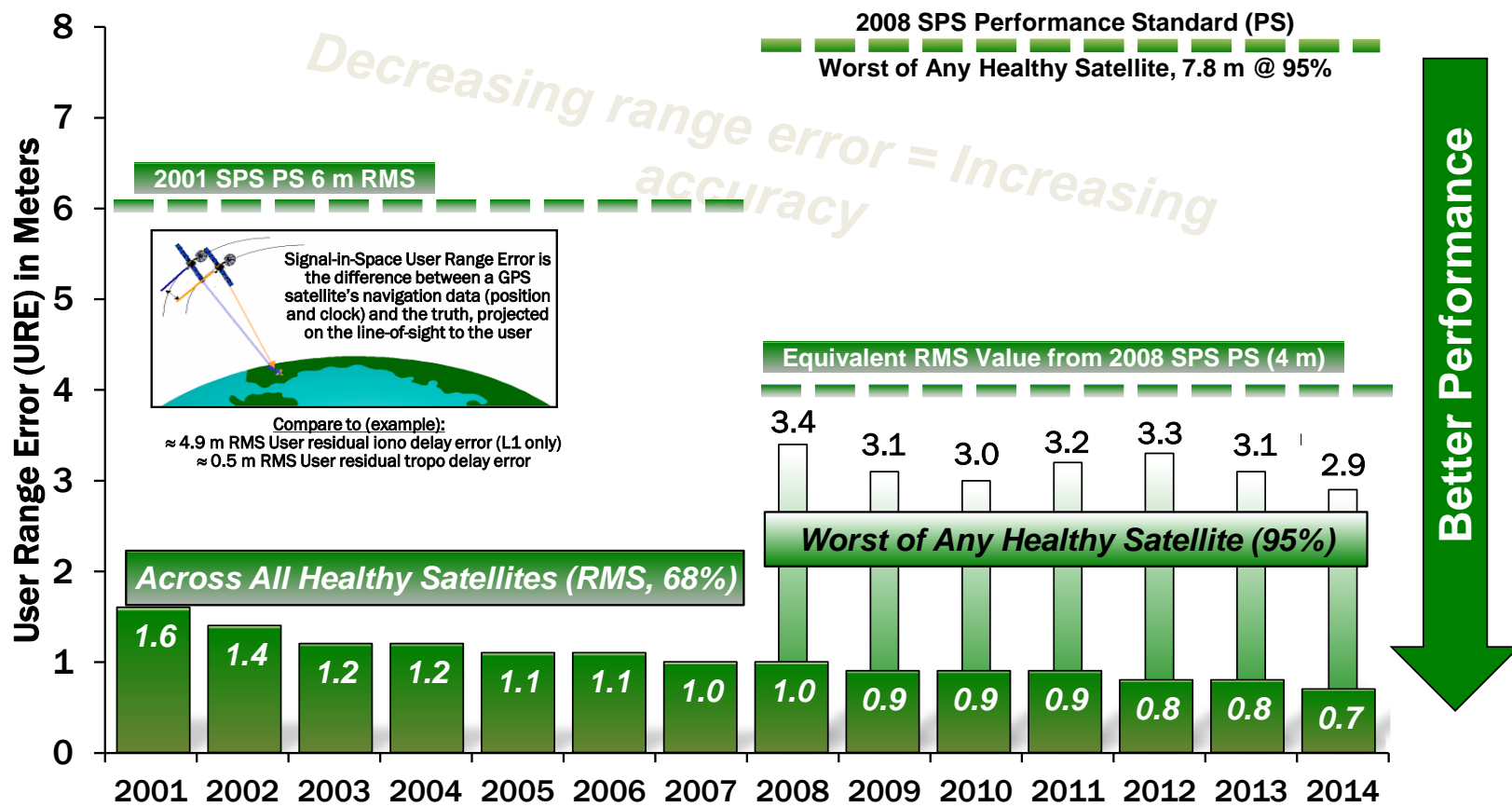


Accuracy: Civil Commitments

Standard Positioning Service (SPS) Performance Standard

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



System accuracy better than published standard

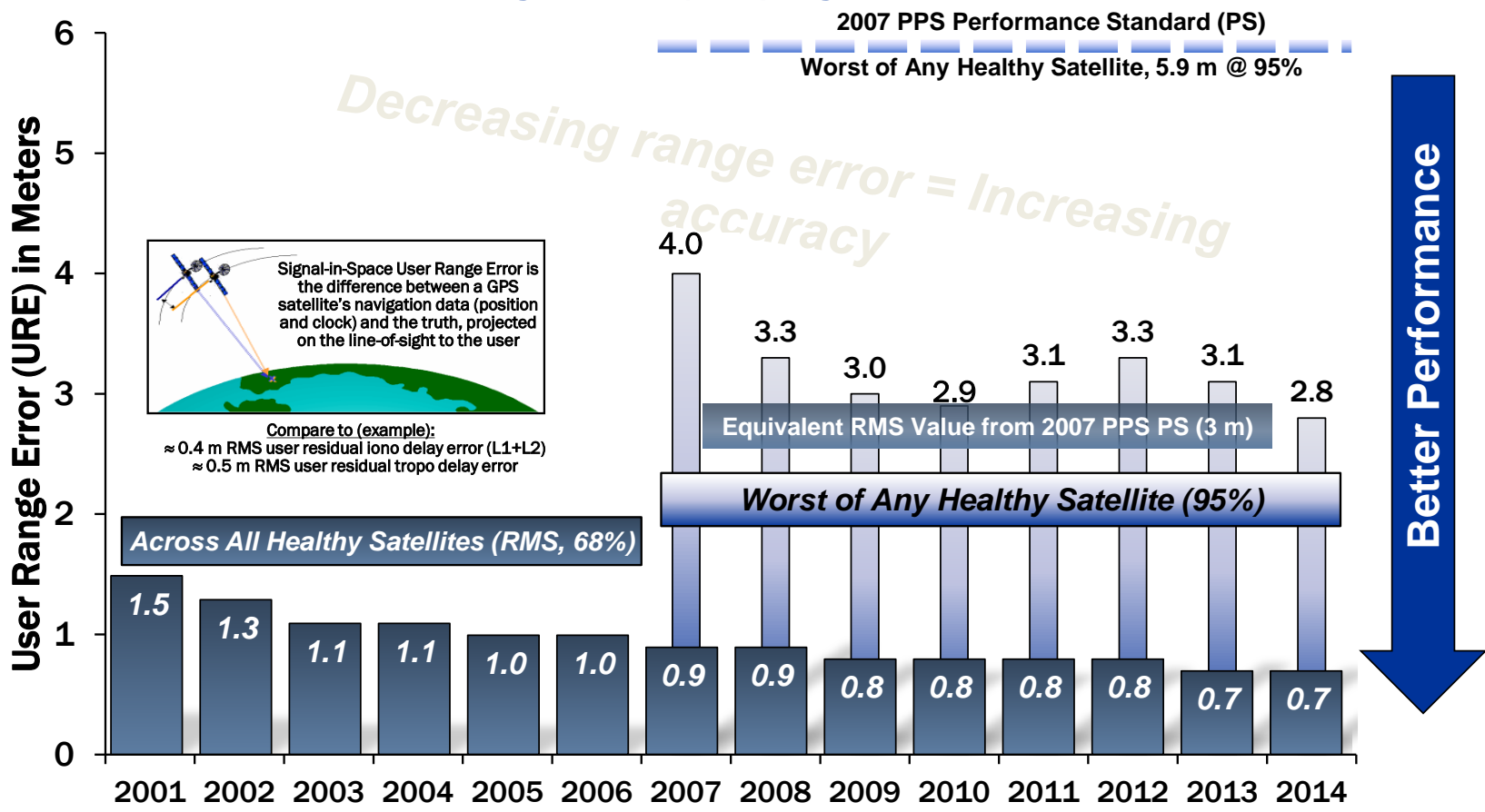


Accuracy: Military Commitments

Precise Positioning Service (PPS) Performance Standard

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Precise Positioning Service (PPS) Signal-in-Space Performance



System accuracy better than published standard