



GPS Status and Modernization

*Munich Satellite Navigation Summit
Munich, Germany
10 March 2010*

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Overview

- GPS Overview
- Recent Events
- Modernization Improvements





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- A collage of images representing various defense and military technologies. The collage includes a tank in a desert environment, a stealth bomber in flight, a soldier in combat gear, a fighter jet in flight, a submarine on the surface, and a worker in a hard hat. The background of the collage is a dark, starry space with a large, blue and white planet (Earth) visible in the upper left corner.

Available, reliable, accurate, and free of charge



GPS – Serving the World

- Very robust constellation
 - 31 satellites currently in operation
 - 11 GPS IIA
 - 12 GPS IIR
 - 7 GPS IIR-M
 - 4 additional satellites in residual status
 - 1 additional IIR-M waiting to be set healthy
- Global GPS civil service performance commitment met continuously since December 1993
- Next Launch – IIF-1, May 2010





GPS Control Segment

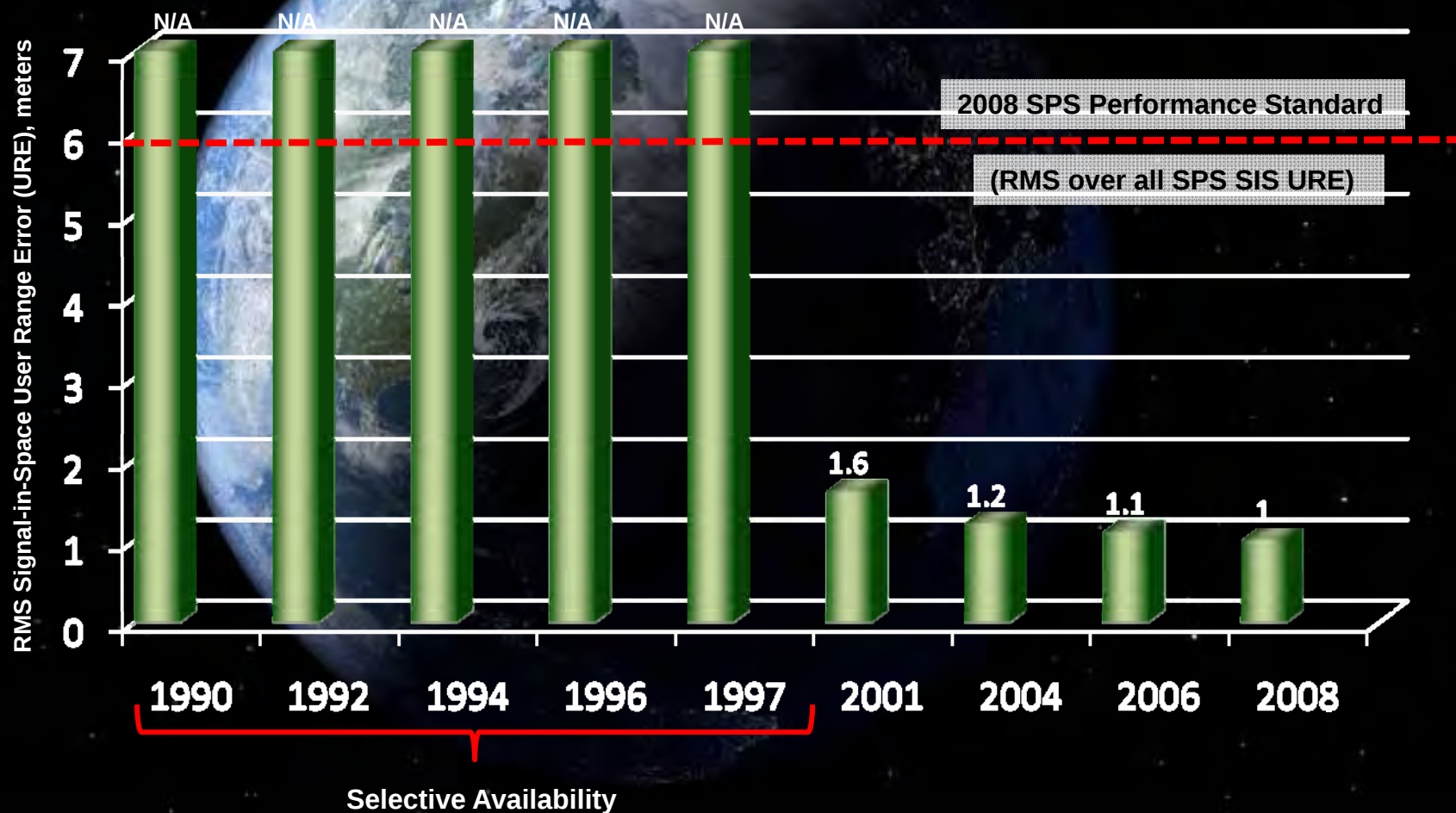


- Operated by Space Professionals in 2d Space Operations Squadron at Schriever AFB, CO
- Backup facility at Vandenberg AFB, CA
- Global monitoring and antenna networks





SPS Signal in Space Performance



System accuracy exceeds published standard



GPS Modernization – Space and Control Segments

1995

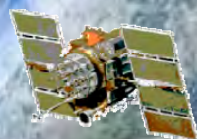
2005

2010

2014 - 2025

Space Segment

GPS IIA



- Standard Service
 - Single frequency (L1)
 - Coarse acquisition code navigation
- Precise Service
 - Y-Code (L1Y & L2Y)

GPS II R / IIR-M



- IIA/IIR capabilities plus
- 2nd civil signal (L2C)
- M-Code (L1M & L2M)

GPS IIF



- IIR-M capability plus
- 3rd civil signal (L5)
- 12 year design life

GPS III



- Backward compatible
- 4th civil signal (L1C)
- Increased accuracy
- Increased integrity

Control Segment

**Legacy
Control
System**

**Architecture
Evolution Plan
(AEP)**

**Next Generation
Control Segment
(OCX)**



GPS Modernization – Ground

- Architecture Evolution Plan (AEP)
 - Transitioned in 2007
 - Modern distributed system replaced 1970's mainframes
 - Increased capacity for monitoring of GPS signals
 - Increased worldwide commanding capability
- Next Generation Control Segment (OCX)
 - Controls more capable GPS constellation
 - Monitors all GPS signals
 - \$1.5B contract awarded 25 February 2010



GPS Modernization – New Civil Signals

- Second civil signal “L2C”
 - Designed to meet commercial needs
 - Higher accuracy through ionospheric correction
 - 1st launch: Sep 2005 (GPS IIR-M); 24 satellites: ~2016
- Third civil signal “L5”
 - Designed to meet demanding requirements for transportation safety-of-life
 - 1st launch: ~ 2010 (GPS IIF); 24 satellites: ~2018
- Fourth civil signal “L1C”
 - Designed with international partners for GNSS interoperability
 - Begins with GPS Block III
 - 1st launch: ~2014; 24 satellites: ~2021



GPS Expandable

- Optimize GPS assets to improve operational effectiveness for global users & terrain challenged environments
 - Increase the number of vehicles over head for better availability/coverage
 - Constellation expansion feasible with robust number of satellites now on-orbit
- Consistent with the current Standard Positioning Service (SPS) Performance Standard
 - Adjust position of satellites in 3 of 6 orbital planes to create expanded constellation
 - Expanded constellation provides better GLOBAL coverage



Summary

- Largest constellation in history with best accuracy ever
- Modernized Command and Control System allows more signal monitoring and quicker satellite commanding than ever before
- Constant improvements through constellation management
- And we're continuing to modernize and improve GPS even more!

GPS -- Serving the World



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