GPS III: Building on 200 years of On-Orbit PNT Excellence

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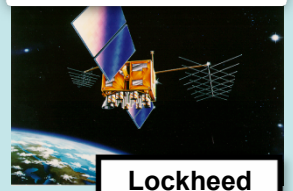
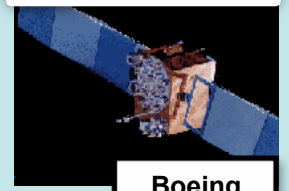
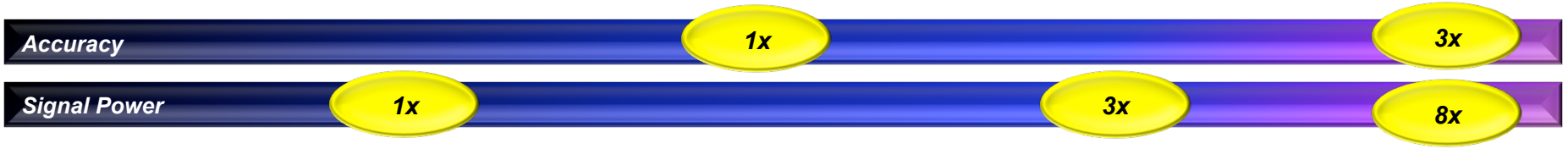
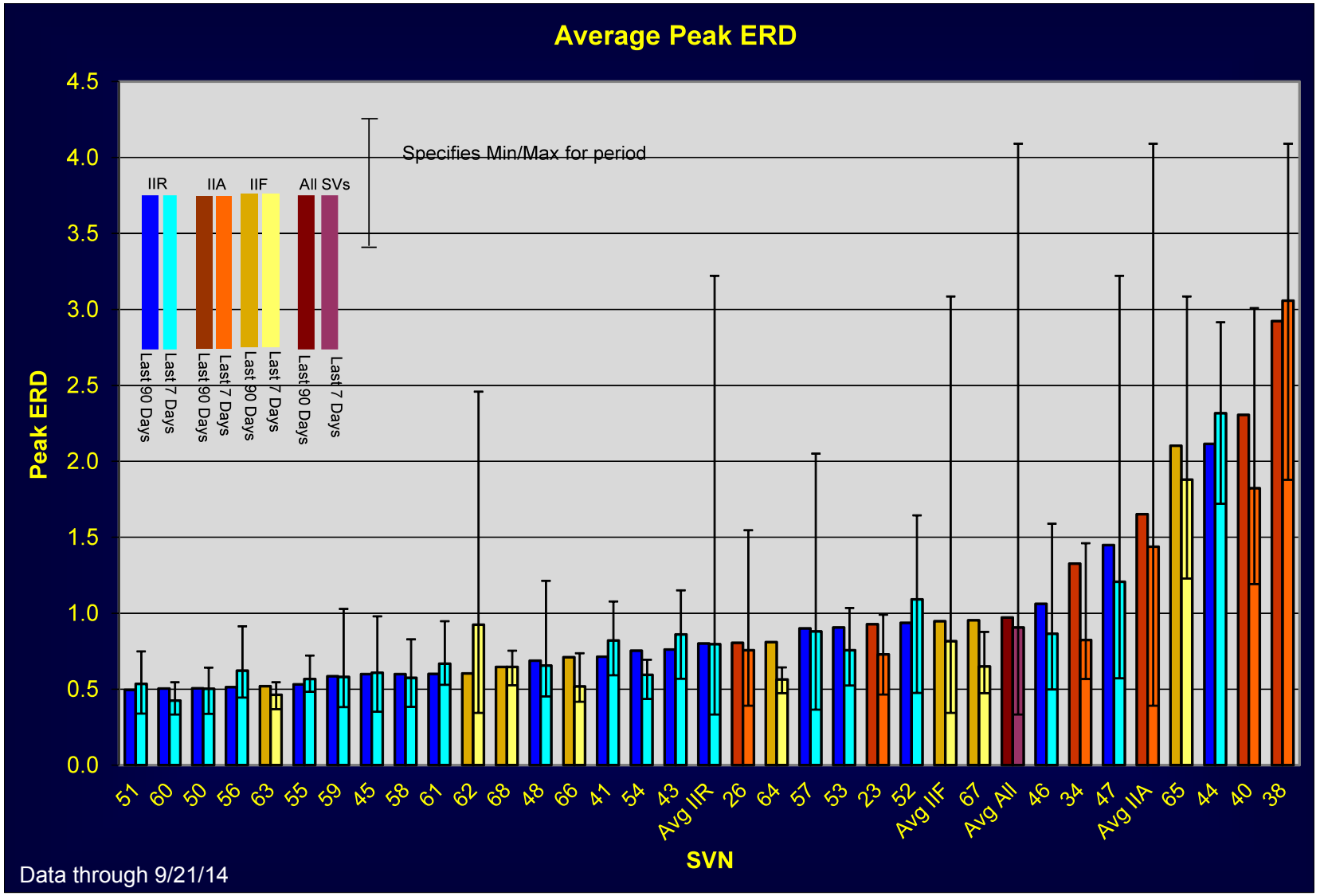
GPS Evolution—Space Segment

1978 - 1985	1989 – 1997	1997- 2004	2005 - 2009	2010 - Present	2014 - 2024
					
Rockwell	Boeing (Rockwell)	Lockheed Martin	Lockheed Martin	Boeing	Lockheed Martin
Block I	Block II/IIA	Block IIR	Block IIR-M	Block IIF	Block III
11 (10) Satellites	28 Satellites	13 (12) Satellites	8 Satellites	12 Satellites	Up to 32 Satellites
Demonstration system	**Basic GPS Provides Initial Navigation Capabilities**	**IIA/IIR Capabilities "Plus"**	**IIR -M Capabilities "Plus"**	**IIF Capabilities "Plus"**	
• L1 (CA) Navigation signal • L1 & L2 (P Code) Navigation signal • 5 Year Design Life	• Std Service • Single Frequency (L1) • C/A code navigation • Precise Service • Two frequencies (L1 & L2) • P (Y) -Code navigation • 7.5 Year Design Life • Reprogrammable Nav. Processor on Block IIR	• 2nd Civil Signal L2 (L2C) • Earth Coverage M-Code on L1/L2 • L5 Demo • Anti-Jam Flex Power • 7.5 Year Design Life	• 3rd Civil Signal L5 • Increased Accuracy requirement • 12 Year Design Life	• Increased accuracy • Increased M-code Earth Coverage power • 4th Civil Signal (L1C) • Increased Integrity • 15 Year Design Life • Dual Launch-able	



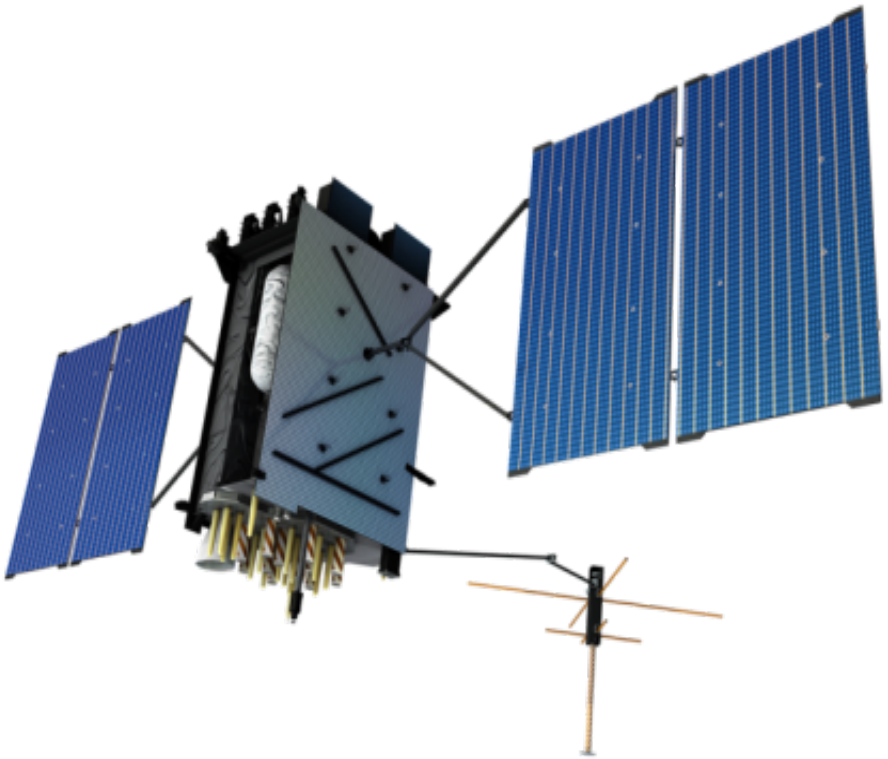
Evolution has increased Space System capabilities and user benefits

Average Accuracy by Space Vehicle



90 Day average ERD: GPS IIR 0.8m, GPS IIF 0.95m, GPS IIA 1.65m

Modernization - GPS III Program

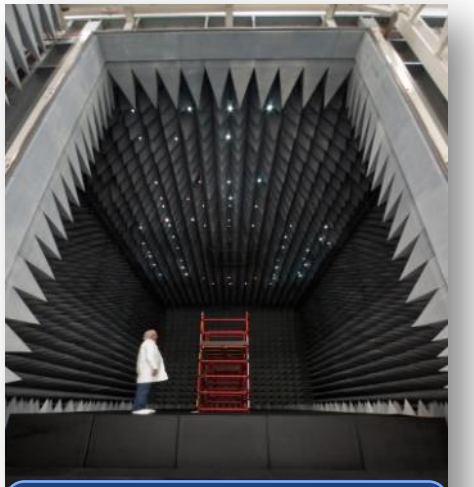


- ***Next Generation GPS***
  - **Improved performance for both military and civilian users**
  - **Superior system security, accuracy, and reliability**
- ***Strategic Teammates***
  - **U.S. Air Force**
  - **Lockheed Martin Space Systems Company**
  - **Exelis Corporation**
  - **General Dynamics**
  - **Honeywell**
- ***Heritage of Success***
  - **GPS IIR/IIR-M success**
  - **Time-tested A2100 bus**

Lockheed Martin GPS Processing Facility (GPF)

GPF High Bay

Thermal Vacuum Chamber



Anechoic Chamber

- 40,000 Sq. Ft.
- Supports six (6) vehicles in flow
- Class 100K Clean Room
- TVAC Capability +/- 150^{0}C
- Anechoic Chamber
  - Operational frequency range 30 MHz-60 GHz for PIM testing and 10 kHz-40 GHz for EMI/EMC testing

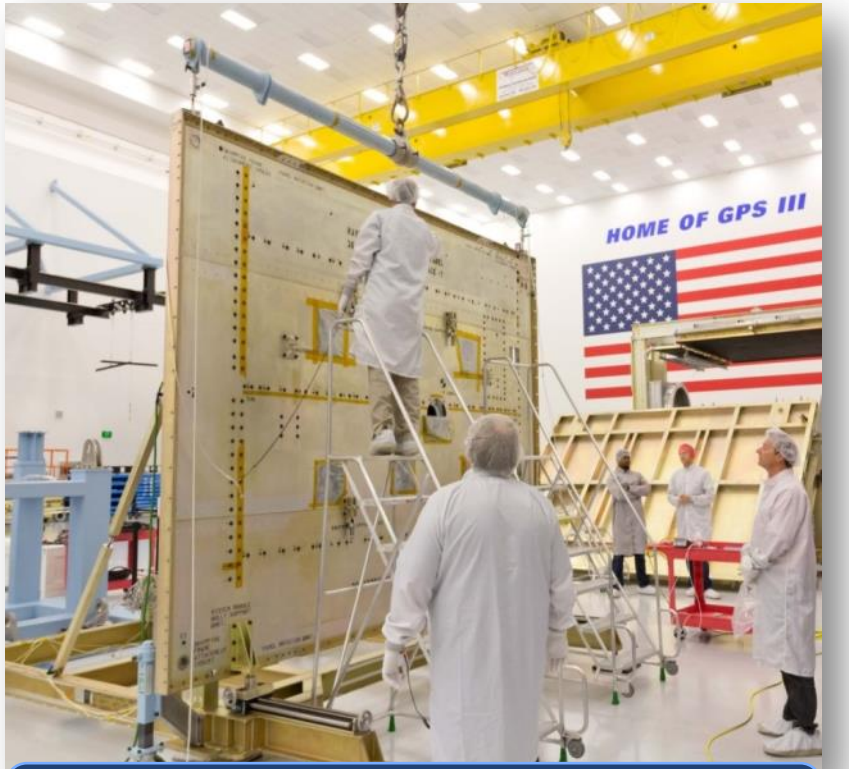
GPS Non-Flight Satellite Testbed

GNST GPF Return

- ✓NDS V-sensor Boom and Solar Array deployment
- ✓Navigation Payload regression testing
- ✓Shipment to Cape Canaveral
- ✓Launch base pathfinding
- ✓OCX Compatibility & Integration Test
- ✓Crosslink demonstration with IIR/M and IIF
- ✓Modernized receiver and NDS downlink compatibility
- ✓Return to GPF – Dec 2013

GNST Integration & Test Pathfinding all Activities Ahead of SV01

Navigation Payload



SV01 Navigation Payload in Denver GPF

- **SV01**
  - ✓ Navigation Payload arrived in Denver 14 September 2014
  - ❑ Navigation Payload TVAC testing in process: Q4 2014 completion projected
- **SV02**
  - ✓ Navigation Payload panel delivered to Exelis 02 October 2014
  - ❑ Completion and ship projected Summer 2015

GPS III Space Vehicle 01-02

- ✓ SV01 Space Vehicle Bus Qualification Complete
- ✓ SV01 Launch Exercise #4 completed
- ✓ SV02 Bus deliveries nearly complete
- ✓ SV02 Transmitter assemblies complete
- ❑ SV01 Available for Launch - December 2015
- ❑ SV02 Available for Launch - December 2016

GPS III Space Vehicle 03-08

- ✓Prod ATP: Jan ‘12
- ✓SV03 Structure: Jul ‘13
- Start SV03 A&IT; Jan ‘15
- SV03 Launch Avail; Aug ‘17
- SV04 Launch Avail; Jan ‘18
- ✓SV05-08 LL ATP; Feb ‘13
- ✓SV05-06 Prod ATP; Dec ‘13
- ✓SV07-08 Prod ATP; Apr ‘14
- SV05-08 Integrated Baseline Review; Feb ‘15

Summary

- GPS space segment is achieving unprecedented accuracy
- GPS III bringing more new capabilities
  - Higher Power
  - Greater Accuracy
  - Additional Signals
- SV01 Navigation Payload currently in Thermal Vacuum test
- SV02-04 currently in production
- SV05-08 long lead items in process and production planning has begun
- On-ramps in the production program for additional capabilities at SV09