



U.S. AIR FORCE

GLOBAL POSITIONING SYSTEM STATUS

CGSIC

27 April 2011

Benjamin Barbour
Major, United States Air Force
Schriever AFB
Colorado Springs CO.

GPS: FREE – DEPENDABLE – RELIABLE - ACCURATE



U.S. AIR FORCE

Overview

- **Who We Are**
- **Constellation Snapshot**
- **Space Segment**
- **Ground Segment**
- **User Segment**



U.S. AIR FORCE

Who We Are

■ 2 SOPS

- 127 Personnel

■ 5 Crews conducting GPS operations

- 7 Military
- 1 Civilian
- Navigation Warfare Officer (NWO) on-call

■ GPS User Operations Center (GPSOC)

■ AF Technical Application Center (AFTAC) Det 46

■ 19 SOPS reserve squadron partner with 2 SOPS

- Fully integrated into 2 SOPS mission
- Maintain certified operators in all crew positions
- Modernization efforts (GPS IIF, OCX, and GPS III)



GPS: FREE – DEPENDABLE – RELIABLE – ACCURATE

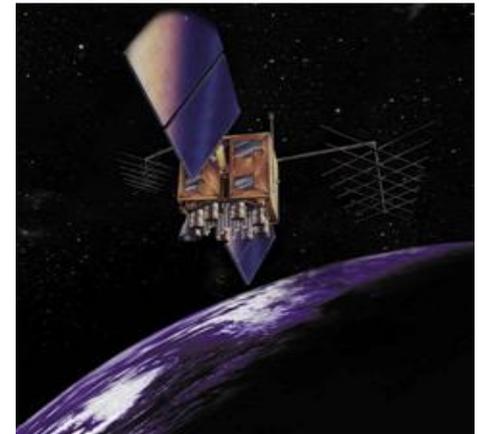


U.S. AIR FORCE

Constellation Snapshot

31 Operational Satellites (Baseline Constellation: 24)

- 11 Block IIA satellites operational
- 12 Block IIR satellites operational
- 7 Block IIR-M satellites operational
- 1 Block IIF satellite operational
- U.S. Government continuously assessing constellation health to determine launch need
 - Newest satellites launched
 - IIR-20 (M)/SVN 49 -- 24 March 2009
 - IIR-21 (M)/SVN 50 -- 17 August 2009
 - IIF-1/SVN 62 -- 27 May 2010
 - IIF-2 launch scheduled for July 2011
- Global GPS civil service performance commitment met continuously since 1993



GPS: FREE – DEPENDABLE – RELIABLE – ACCURATE



U.S. AIR FORCE

Space Segment SVN62, SVN49, and SVN 25

- **IIF SV-1 (SVN 62) launched 27 May 2010 under SMC/GP Satellite Control Authority (SCA)**
 - Agreement signed between 50th SW/CC and SMC/GP laying out the roles and responsibilities during the On-Orbit Test (OOT) period
 - SMC/GP retained SCA during OOT
 - 2/19 SOPS operators perform commanding under GPSW direction
 - 50th SW/CC obtained SCA after OOT completion
 - SVN 62 set healthy to users on 26 Aug 10, 2210 hrs Mountain Time
 - L5, L2C, M-Code, and Flex Power
- **SVN 49 remains beneficial for constellation operations but unhealthy to users**
 - Vehicle remains unhealthy due to well-documented multipath anomaly
 - 50 SW and GPSW continue mitigation efforts
 - Used for initial capabilities demonstration: L5, OB 12 , L2C, and Flex Power
- **SVN 25 vehicle disposal**
 - Digital Control Electronics Assembly B-Side failure on 21 Mar 10
 - Launched on 18 March 1992, final disposal on 29 Mar 10
 - Vehicle was just over 18 years old

GPS: FREE – DEPENDABLE – RELIABLE - ACCURATE



■ Architectural Evolution Plan (AEP)

- Day-to-Day C2 of 32 Satellites
- 4 Dedicated Ground Antennas and AFSCN Capability
- 6 Dedicated and 10 NGA Monitor Stations
- Operating on version 5.6:
 - Brings SAASM capability on-line
 - Adds Nav Warfare Operator (NWO) position
 - Flex Power Testing

■ Launch, Anomaly and Disposal Operations (LADO)

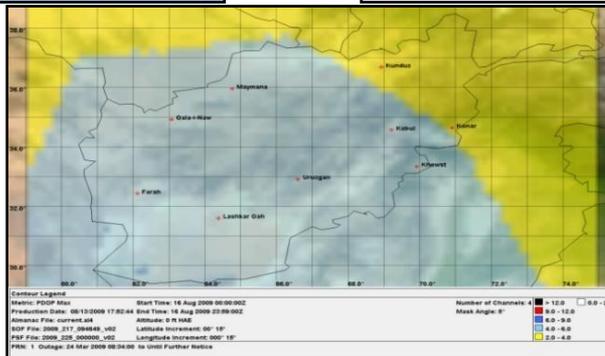
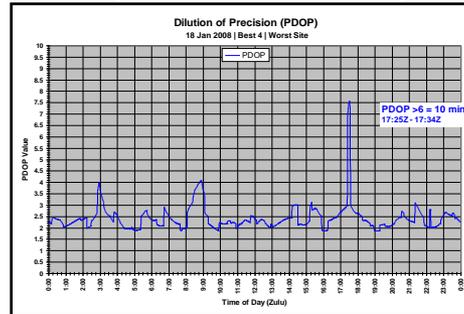
- Day-to-Day C2 of 3 Residual SVs (SVNs 32, 35, and 37)
- AFSCN capability only
- Leverage for some vehicle emergencies
- Launch prep and initial post launch operations



U.S. AIR FORCE

User Segment GPSOC Mission

- **DoD's focal point for operational issues concerning military use of GPS**
 - Constellation Ops
 - User Ops
- **DoD's interface to military and civil community**
 - 24/7 support -- 911 for GPS user emergencies
 - Solving global GPS user's toughest challenges



Military applications

- Force location
- Navigation
- Force employment
- Weapon guidance
- Satellite positioning
- Comm network timing
- Plus Many Others

Civilian applications

- Aviation / Civil Navigation
- Space Shuttle
- Search and Rescue
- Geodetic Measurements
- Drilling / Mining / Agriculture
- Commercial
- Plus Many Others

GPS: FREE – DEPENDABLE – RELIABLE – ACCURATE



U.S. AIR FORCE

User Segment L2C and L5 Signals

■ Second civil signal “L2C”

- Designed to meet commercial needs
- Provides dual-frequency users with a more robust, coded signal to aid in ionospheric correction
- All 8 IIR (M) satellites and IIF-1 are broadcasting a developmental L2C signal now



■ Third civil signal “L5”

- Designed to meet demanding requirements for transportation safety-of-life and is available to all users
- Uses highly protected Aeronautical Radio Navigation Service (ARNS) band
- SVN 49 and SVN 62 broadcasting a developmental L5

- **Once L2C/L5 are online, USG will not support semi-codeless access to military GPS signals (~2020)**

GPS: FREE – DEPENDABLE – RELIABLE - ACCURATE



U.S. AIR FORCE

User Segment Expandable 24

- **Optimize GPS assets to improve operational effectiveness for global users & terrain challenged environments**
 - Increase the number of vehicles over head for better access/coverage
- **Consistent with the current Standard Positioning Service Performance Standard**
 - Adjust position of satellites in 3 of 6 orbital planes
 - Provides better GLOBAL coverage
 - Coordinated with international community
- **Estimated completion date: Jun/Jul 2011**



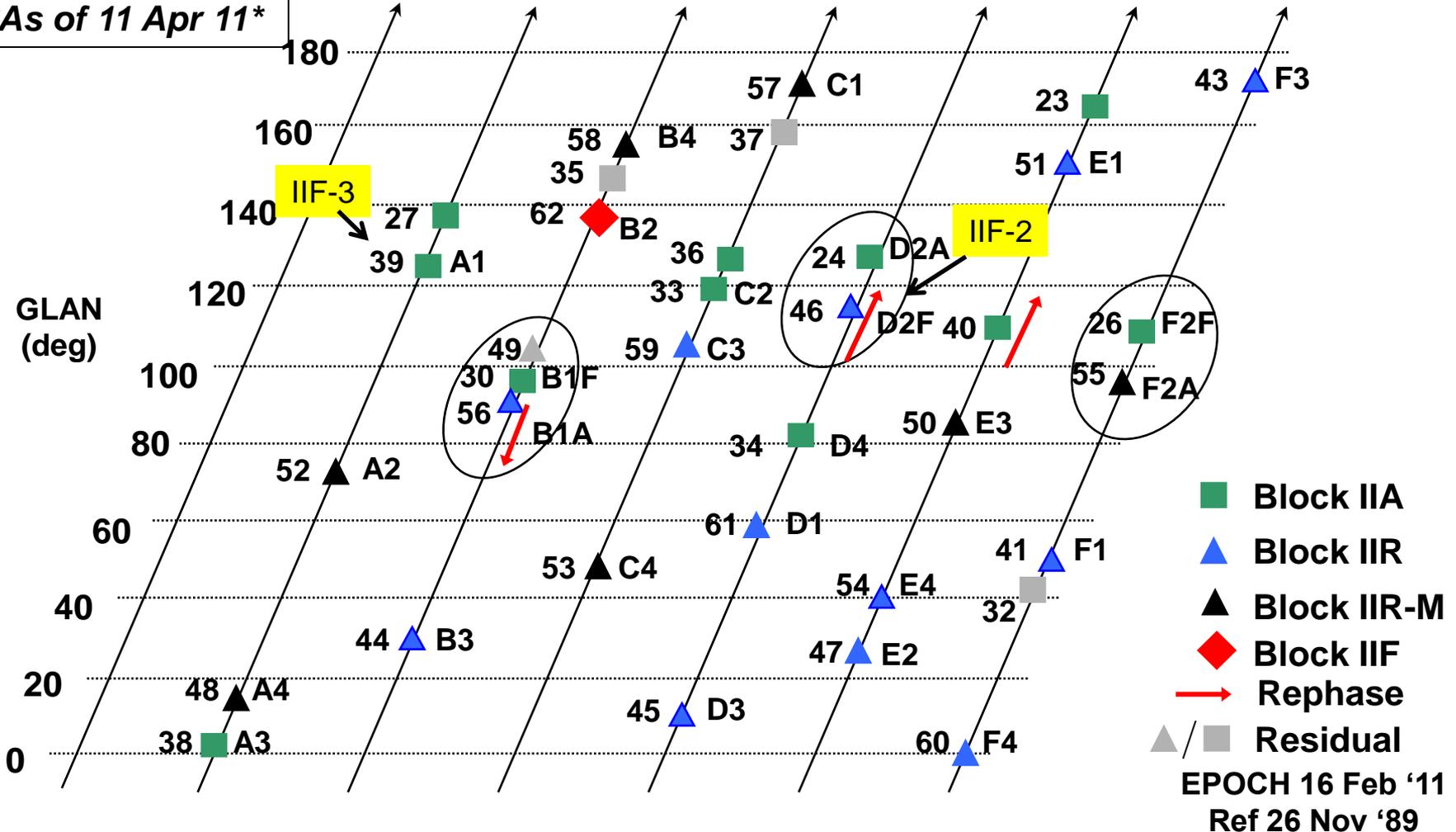
GPS: FREE – DEPENDABLE – RELIABLE – ACCURATE



U.S. AIR FORCE

User Segment Expandable 24 (cont.)

As of 11 Apr 11



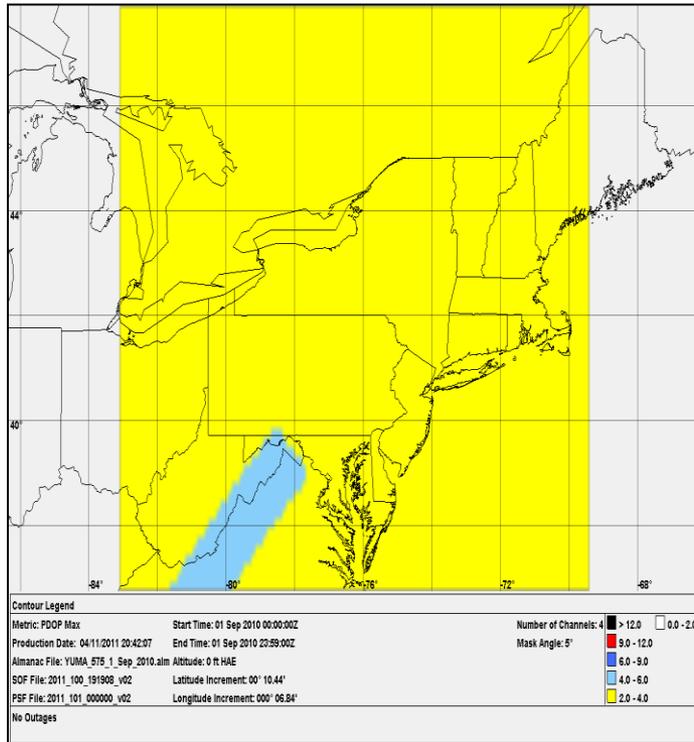
GPS: FREE - DEPENDABLE - RELIABLE - ACCURATE



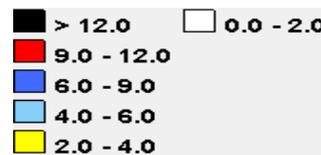
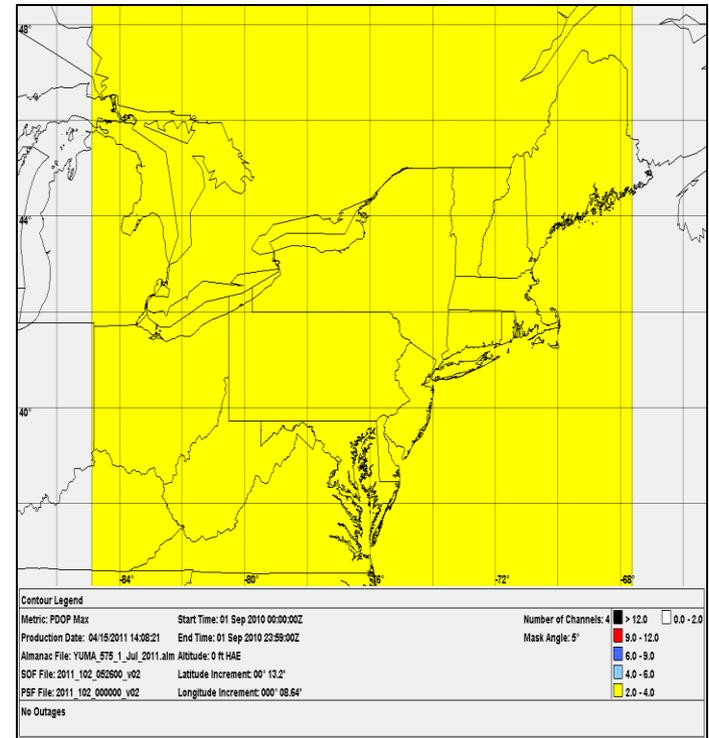
U.S. AIR FORCE

Expandable 24 Benefits on Eastern Seaboard

Current Operations



Expandable 24 Constellation



Lighter Colors = Less Positional Error

GPS: FREE – DEPENDABLE – RELIABLE – ACCURATE



Delivering the Best Space-based PNT

U.S. AIR FORCE

- ***Sustaining*** capabilities for civil and military users worldwide
 - Maintain ground systems/on-orbit satellites, launch new satellites
 - Fielding GPS enhancements
- ***Modernizing*** constellation with new signals and capabilities
 - New civil and military GPS signals and control capabilities
 - Continuing work with international GNSS community
 - Maintains Backward Compatibility
- ***Managing*** GPS systems and supporting stakeholders

Committed to responsible stewardship of GPS as a global utility

GPS: FREE – DEPENDABLE – RELIABLE – ACCURATE