



U.S. COAST GUARD

NAVIGATION CENTER

THE NAVIGATION CENTER OF EXCELLENCE



GLOBAL POSITIONING SYSTEM Status

CGSIC

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Introduction

- **Like the Internet, GPS has become a critical component of the global information infrastructure**
 - **Applications that enable broad new capabilities**
 - **Facilitating innovations in efficiency, safety, environmental, public security, and science**
- **Over the past decade, GPS has grown into a global utility providing space-based positioning, navigation and timing (PNT)**
 - **Consistent, predictable, dependable performance and policy**
 - **Augmentations improve performance even further**



GPS: Global Public Service

- **Global GPS civil service performance commitment continuously met/exceeded since 1993**
- **Access to civilian GPS service is free of direct user charges**
 - **As well as USG augmentation services**
- **Public domain documentation**
 - **Free and equal availability to all users and industry**
 - **Equal opportunity to develop user equipment and compete on the world market**
- **Owned and operated by the U.S. Government**
 - **Managed at national level as multi-use asset**
 - **Acquired and operated by U.S. Air Force on behalf of USG**



Overview

- **GPS Constellation Status**
- **Recent GPS Accomplishments**
- **Status of GPS programs**
 - **GPS Block IIR/IIR-M**
 - **GPS Block IIF**
 - **GPS Block III**
- **Summary**



The Global Positioning System

- **Baseline 24 satellite constellation in medium earth orbit**
- **Global coverage, 24 hours a day, all weather conditions**
- **Satellites broadcast precise time and orbit information on L-band radio frequencies**
- **Two types of signals:**
 - **Standard (free of direct user fees)**
 - **Precise (U.S. and Allied military)**
- **Three segments:**
 - **Space**
 - **Ground control**
 - **User equipment**

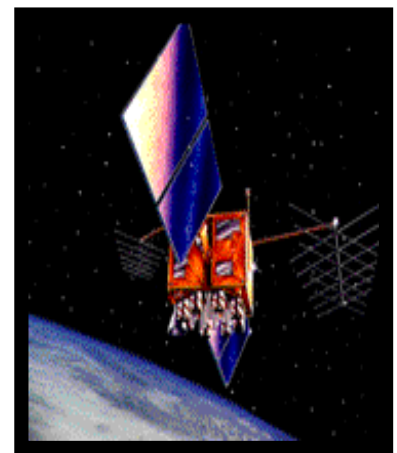
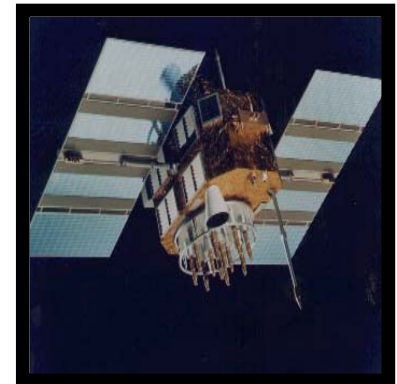




Current Constellation

30 Operational Satellites (Baseline Constellation: 24)

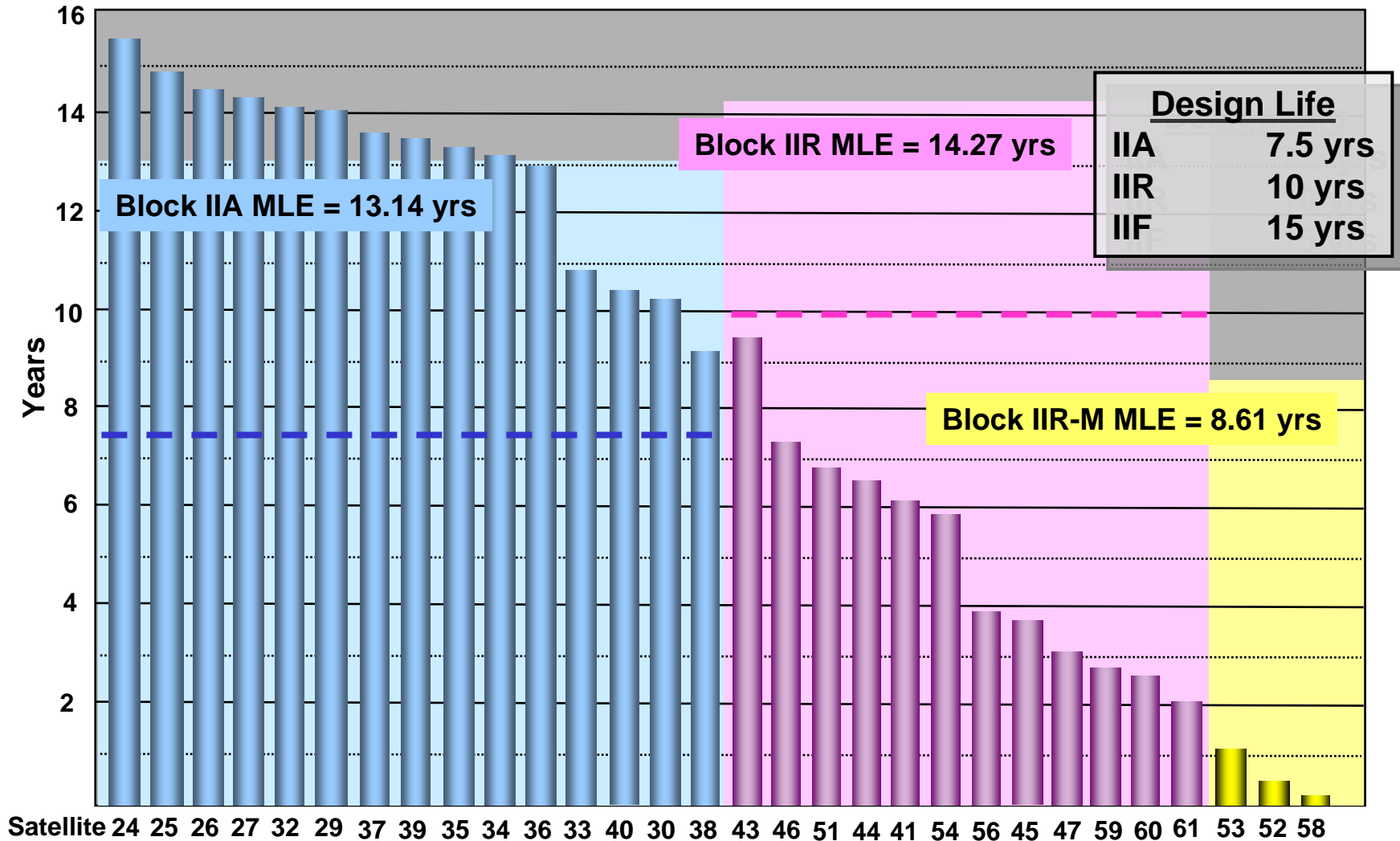
- 15 Block IIA satellites operational
- 12 Block IIR satellites operational
 - 5 remaining Block IIR satellites are modernized
- 3 Block IIR-M satellite operational
 - Transmitting new civil signal (L2C codeless)
- U.S. Government continuously assessing constellation health to determine launch need
 - New IIR-M satellite launched
 - Sep 05, Sep 06, Nov 06
 - Next launches: Sep 07
- Global GPS civil service performance commitment met continuously since Dec 2003





GPS Constellation Status

Satellite Age as of March 2007





Recent GPS Accomplishments

■ Launched a new era of GPS services

- First GPS IIR-M (14) launched 25 Sep 05, operational 16 Dec 05
- New military signal (M-Code) and new civil signal (L2C)
- GPS IIR-M (15) launched 25 Sep 06; IIR-16(M) launched 17 Nov 06

■ New acquisition strategies for next generation GPS

- GPS IIF Satellites
- GPS Block III satellites



Modernized GPS – Civil Signals

- **Second civil signal (“L2C”)**
 - **Designed to meet commercial needs**
 - Higher accuracy through ionospheric correction
 - Higher effective power and improved data structure reduce interference, speed up signal acquisition, enable miniaturization of receivers, may enable indoor use
 - **Began with GPS Block IIR-M in Sep 2005; 24 satellites: ~2014**

- **Third civil signal (“L5”)**
 - **Designed to meet demanding requirements for transportation safety (safety-of-life)**
 - Uses highly protected Aeronautical Radio Navigation Service (ARNS) band
 - **Begins with GPS Block IIF**
 - **First launch: ~2007; 24 satellites: ~2016**

- **Fourth civil signal (“L1C”)**
 - **Designed with international partners to enable GNSS interoperability**
 - **Begins with GPS Block III**
 - **First launch: ~2013; 24 satellites: ~2021**



GPS Block IIR/IIR-M Status

- **21 satellite procurement; 13 IIRs, 8 IIR-Ms**
 - 12 IIRs operational; 1st IIR launch, 22 Jul 97
 - 3 IIR-Ms operational; 1st IIR-M launch, 25 Sep 05
 - Includes M-Code capability
 - Broadcasting new civil signal (L2C) – w/o Nav Message
 - Provides improved accuracy for civil users with L2C receivers

- **Five Block IIR-M launches remain**
 - Next launch planned for Sep 07
 - FY08 launches: Dec/Mar/Jun/Sep



GPS Block IIF Status

- **12 satellite procurement**
 - **Adds third civil signal – L5**

- **IIF-1 available for launch**
 - **Objective Jan 09**

- **Current estimate for IIF-1 launch is Jul 08**



GPS Block III Capabilities

- **GPS III includes IIR-M/IIF capabilities, plus**
 - L1C (fourth civil signal) compatible with Galileo
 - +10dB earth coverage military signal power increase
- **Civil benefits:**
 - Provides operational capability for L2C and L5
 - In combination with GPS IIR-M and IIF satellites
 - **Delivers L1C for interoperability with Galileo, QZSS**
 - Significant increase in system accuracy
 - Improved availability of accuracy with integrity



Interference Reporting

- **The Navigation Center appreciates your reports regarding service degradations, outages, or other incidents or anomalies.**
- **Please report problems via our GPS Problem Report Page.**
- **After a GPS user completes these forms, they are sent to a database for tracking, analysis, and resolution.**
- **Reports may be received via phone/fax**





Interference Reporting Process

- User contacted for additional information, if necessary.
- If the report is aviation related it will be directed to the FAA for tracking, analysis, and resolution.
- Maritime and terrestrial related reports will be processed simultaneously by the USCG GPS Liaison to the GPS Operations Center at Schriever AFB and NIS personnel for resolution.
 - Check for constellation events during reported outage period by using NANU.
 - Perform analysis of constellation activity during reported outage times.



Homeland
Security

U.S. Department of
Homeland Security
**United States
Coast Guard**





Summary

- ***Sustaining*** capabilities for military and civil users worldwide
 - Maintain ground systems/on-orbit satellites, launch new satellites
 - Fielding GPS enhancements
- ***Modernizing*** constellation with new signals and capabilities
 - First IIR-M launch Sep 05, first IIF launch 2008, first GPS III launch 2013
 - New civil and military GPS signals
 - Continuing work with Galileo and international community
- ***Managing*** GPS systems & supporting stakeholders
 - Technical baselines, interfaces, performance

Department of Defense and Air Force are committed to responsible stewardship of GPS as a global utility



Constellation Summary

- **31 satellites on-orbit**
 - **30 satellites set healthy to users in the operational almanac**
 - **0 satellites launched**
- **1 satellite decommissioned (PRN 15)**
- **1 satellite disposed (PRN 15)**
- **Constellation changes since Mar 2007**
 - **PRN 15 Disposed 6 Apr 07**
 - **SVN 23 L-Band enabled (good clock, PRN32 issue)**
 - **PRN 05 single-burn re-phase arrival 15 Apr 07**
 - Provides b/u for PRN-30 (in plane)
 - **PRN 25 re-phase ongoing, stop burn scheduled for 11 Jun 07**
 - Provides b/u for PRN 27 (in plane)
 - **PRN 01 re-phase ongoing, stop burn scheduled for ~2 Oct 07**
 - Clears recurring COLA w/ PRN 31



Navigation Information Service

- <http://www.navcen.uscg.gov>
- <http://www.navcenter.org> (mirror site)
- GPS.GOV or PNT.GOV (US PNT sites)
- E-mail: TIS-PF-NISWS@uscg.mil
- Phone: +1 703 313 5900
- Fax: +1 703 313 5920

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