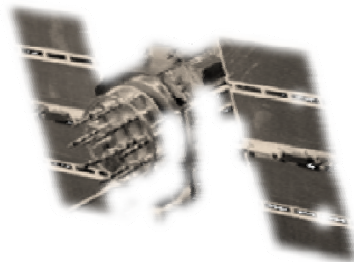




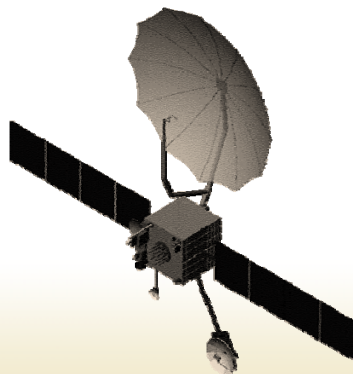
SPACE-BASED POSITIONING  
NAVIGATION & TIMING  
NATIONAL COORDINATION OFFICE

# GPS Constellation, Modernization Plans and Policy

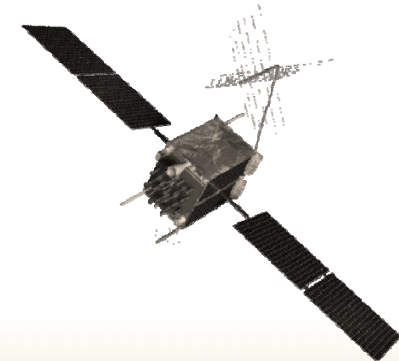


**Anthony J. Russo**  
Director, National Coordination Office  
United States of America

**NaviForum 2010**



Shanghai, China  
September 1, 2010



# GPS enables a diverse array of applications



**Satellite Operation**



**Surveying & Mapping**



**Power Grids**



**Precision Agriculture**



**Transit Operations**



**NextGen**



**Disease Control**



**IntelliDrive**



**TeleComm**



**Trucking & Shipping**



**Personal Navigation**



**Oil Exploration**



**Fishing & Boating**



# GPS Constellation Status



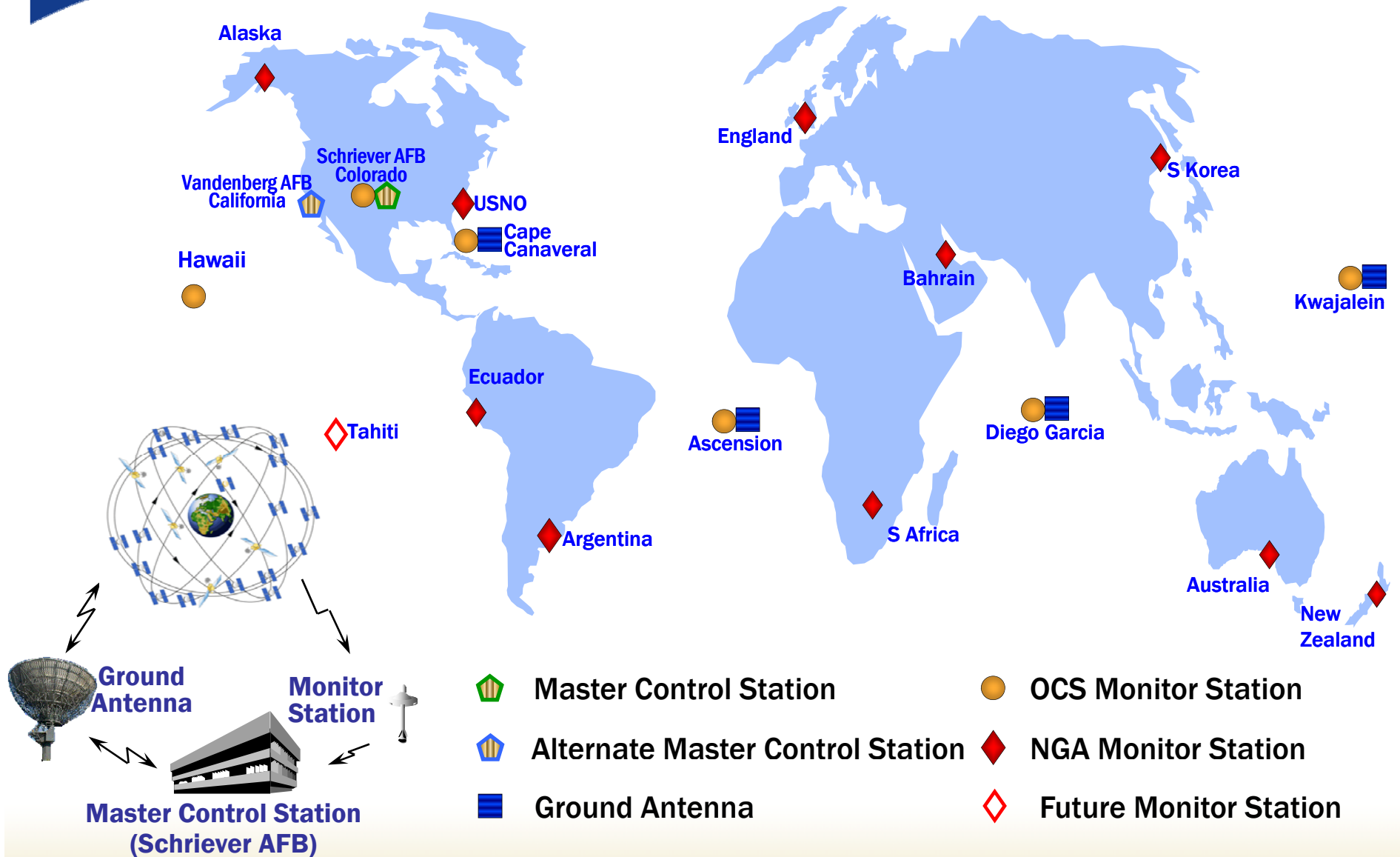
**Baseline Constellation = “24 Expandable”**

- Very robust constellation; exceeds user requirements
  - **31 satellites currently in operation**
    - 11 GPS IIA
    - 12 GPS IIR
    - 7 GPS IIR-M
    - **1 GPS IIF (set healthy 26 Aug 2010)**
  - 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



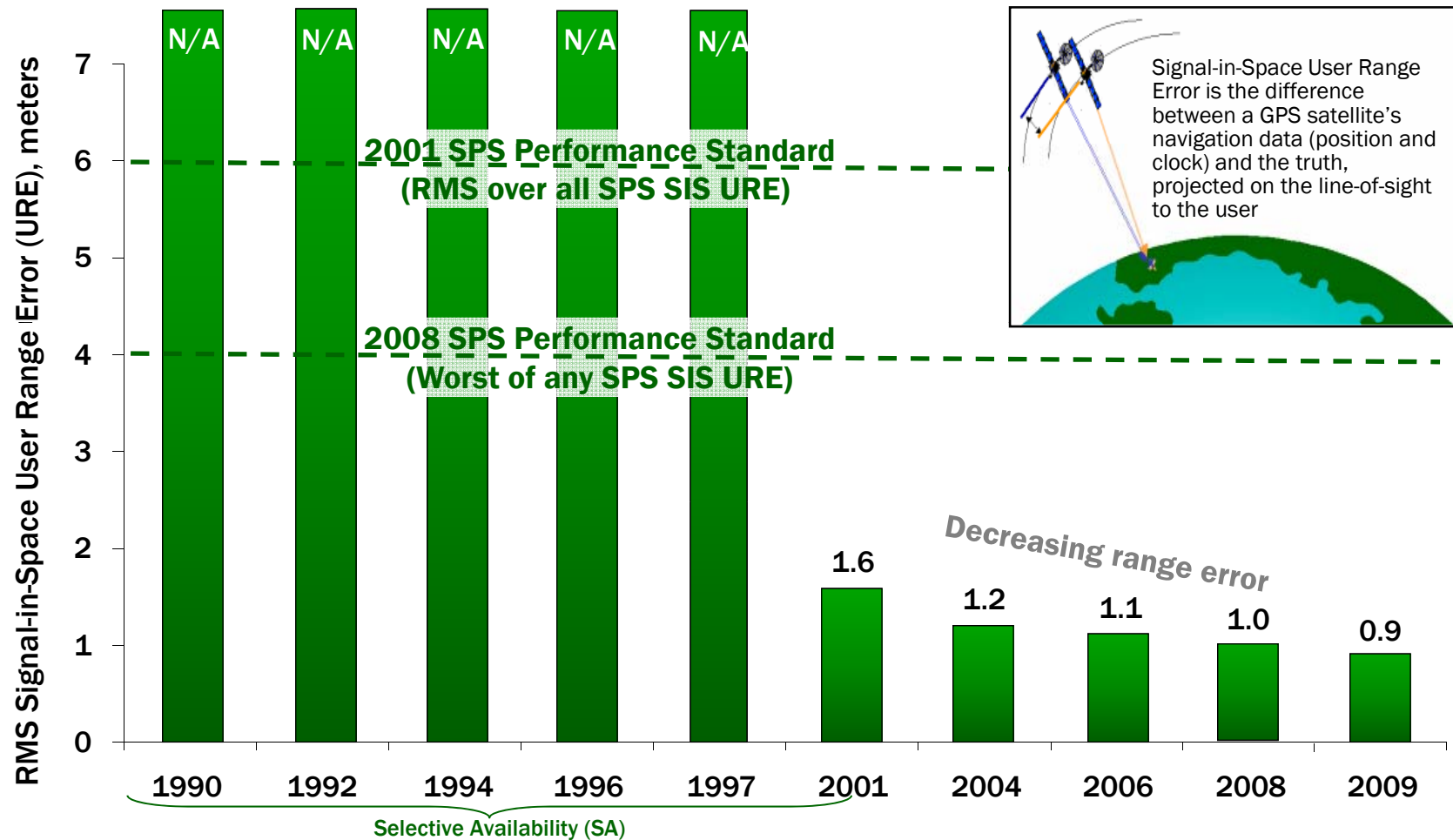


# GPS Operational Control Segment (OCS)





# Current GPS Accuracy



**System accuracy exceeds published standard**



# GPS Modernization



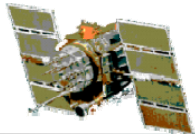
1995

2005

2010

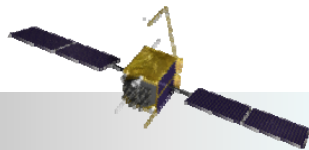
2014 - 2025

## 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

Legacy Control System

Architecture Evolution Plan (AEP)

Next Generation Control Segment (OCX)



## Latest U.S. Policy



- Provide continuous worldwide access for peaceful uses, free of direct user charges
- Encourage compatibility and interoperability with foreign GNSS services
- Operate and maintain constellation to satisfy civil and national security needs
  - Foreign PNT may be used to strengthen resiliency
- Invest in domestic capabilities and support international activities to detect, mitigate and increase resiliency to harmful interference



## Summary



- **GPS performance is better than ever and will continue to improve**
  - Augmentations enable even higher performance
  - New civil GPS signal available now
  - Many additional upgrades scheduled
- **U.S. policy encourages worldwide use of civil GPS and augmentations**
  - Permits U.S use of foreign PNT to increase resiliency
- **International cooperation is a priority**
  - Compatibility and interoperability are critical





# For Additional Information...



Global Positioning System

http://www.gps.gov/chinese.html

English | Español | Français | 普通话 | العربية

## 全球定位系统 为全世界服务

全球定位系统 (GPS) 是美国以空间为基地的无线电导航系统, 在全世界范围内为民间用户提供不间断的定位、导航和定时服务, 而且对所有人免费。任何人只要有一个接收机, 这个系统就可以为他提供位置和时间。GPS可在任何气候条件下, 在白天或夜间, 在世界任何一个地方为无限数量的人提供准确的位置和时间信息。

GPS由三部分组成: 围绕地球的卫星; 地面上的监控站; 以及用户拥有的接收机。GPS卫星从空间发射可由接收机收到和识别的信号。每个接收机可以给出三维位置 (经度, 纬度和海拔) 外加时间。

人们可以从商店里随时买到GPS手持机。配备有这种GPS接收机, 用户就可以精确地知道他们的位置并且很容易找到他们要去的地方, 不论是步行、驾车、飞行或开船。GPS已经成为全世界交通系统的支柱, 为航空、地面交通及航海提供导航。救灾和紧急救援的救生任务也依赖GPS的定位和定时能力。日常的活动比如银行业务、行动电话甚至电力网控制都受益于GPS提供的精确时间。农民、测绘人员、地质学家和不计其数的其他人利用免费和开放的GPS信号来更有效地、安全地、经济地和准确地完成他们的工作。

如果需要更多有关GPS的信息, 请参看这个网站的其他部分以及本页提及的其他外部网站。

系统信息

- 全球定位系统
- GPS的增强系统

应用

- 定时
- 道路和高速公路
- 空间的应用
- 航空
- 农业
- 海运
- 铁路
- 环境
- 公共安全和灾难救援

[GPS.gov](http://www.gps.gov)

National Executive Committ...

http://pnt.gov/

## SPACE-BASED POSITIONING, NAVIGATION & TIMING NATIONAL EXECUTIVE COMMITTEE

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The National Executive Committee for Space-Based Positioning, Navigation, and Timing (PNT) is a U.S. Government organization established by Presidential directive to advise and coordinate federal departments and agencies on matters concerning the Global Positioning System (GPS) and related systems.

Get GPS status info and other user support at the [Navigation Center](http://www.gps.gov)

Learn more about the uses of space-based PNT at [www.gps.gov](http://www.gps.gov)

FY 2011 Funding Status & Other Info for Hill Staff  
UPDATED JUL 30

### What's New

- Joint Statement on Combined Performance of GPS and Galileo
- Website Update: Sharing Control of GPS?
- New Presidential Space Policy
- Presentations from APEC GNSS Implementation Team
- Press Release on GPS L5 Signal
- Presentation from JNC 2010

An Advisory Board provides independent advice to the National Executive Committee through its sponsor agency, NASA.

[PNT.gov](http://www.pnt.gov)