

# Navigation Evolution Roadmap Update

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Administration



# FAA Mission

- **Provide the safest, most efficient aerospace system in the world**

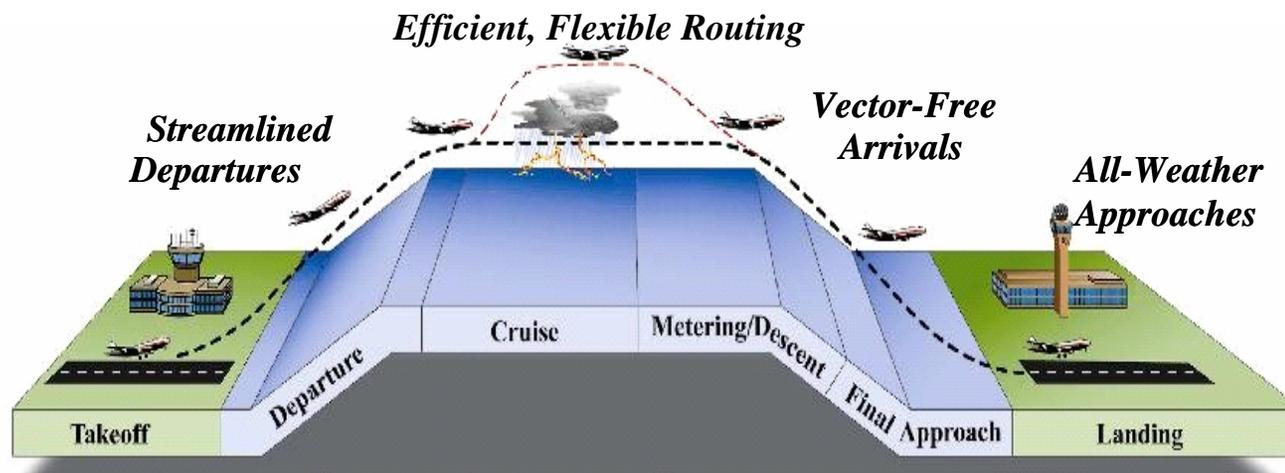
## Navigation Services Goal

- **To provide safe, cost effective navigation services to meet operational needs of the aviation customer**



# Performance-Based Navigation

- Complete Transition By 2025
- Consistent With ICAO Global Vision
- Operational Capability Based On GPS And Augmentations
- Enhance Safety, Capacity, Efficiency
- Reduce Cost For Legacy Navigation Systems



# Why do this?

- **Technology now exists to move towards performance based navigation**
- **Future FAA budgets will remain constant and will require us to become more efficient**
- **The existing navigation infrastructure is:**
  - Aging and becoming more expensive
  - Incapable of meeting future requirements



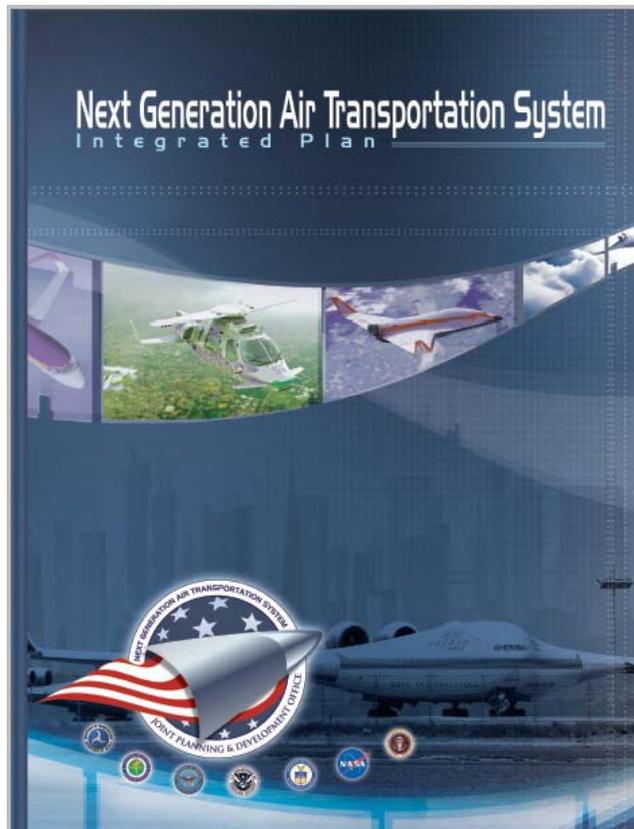
# Service Affordability

- **F&E and operations budget shortfalls**
- **15,000 facilities/\$389M annual sustainment cost\* -- fluctuates and grows yearly**
- **Annual earmarks exceed 60% of total GBNA budget**
  - Focused on hardware procurement
- **No clear service provision relationship in acquisition**

\* Source: FY05 Actual Ops



# The Next Generation Air Transportation System (NextGen) Plan Defines A System That Can Meet Demands For The 21<sup>st</sup> Century



Trajectory-Based Operations

Performance-Based Operations and Services

***Precision Navigation***

Weather Integration

Network-Centric Information Sharing

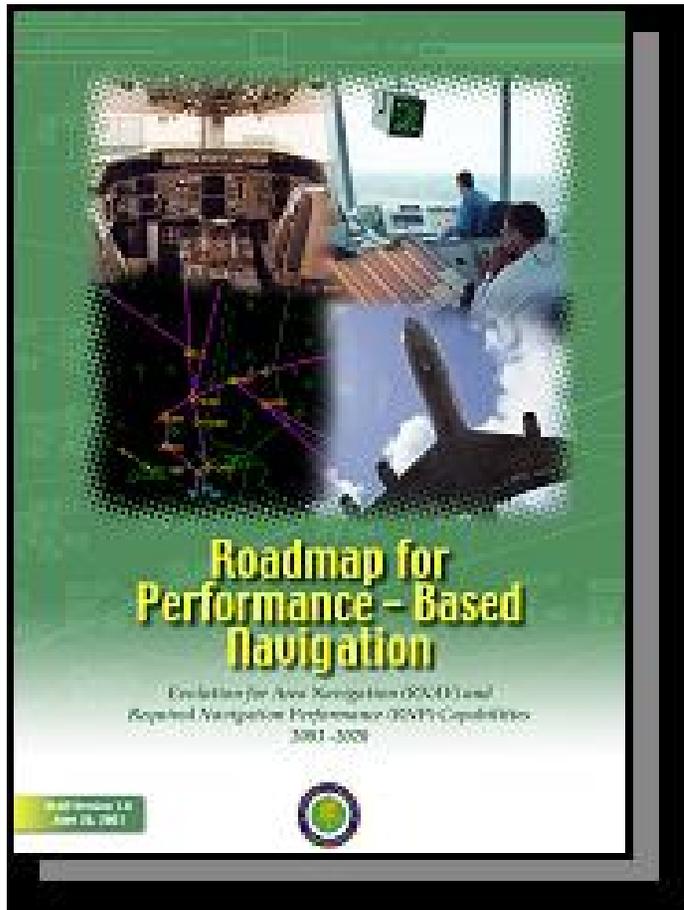
Surveillance Services

Equivalent Visual Operations

Super Density Operations

Layered, Adaptive Security

# RNP/Roadmap



- The RNAV/RNP roadmap v 2 was published this year
- We are developing a navigation roadmap that enables implementation of RNAV, RNP and NextGen

# Navigation Evolution Roadmap

- **Supports the RNAV/RNP Roadmap**
- **Informal Outreach since March 2005**
  - Included RAA, ATA, AOPA, and AVS SME, international ...
- **Formal Outreach**
  - Performance Based Aviation Rulemaking Committee (PARC)
  - DOD – Policy Board on Federal Aviation (PBFA)
  - AOPA
  - ATA
  - RTCA
    - ATMAC Requirements and Planning Working Group
- **Public Outreach Meeting July 25-26, 2006**
- **Roadmap released to Industry via PARC on Nov. 1st, 2006**
- **Target date for comments Dec 22, 2006**



# Navigation Evolution Customer Council (NECC)

- **Council made up of Government and Industry members**
- **Created by Director of Navigation Services to:**
  - Implement the Navigation Evolution Roadmap to include review of business and financial plans
  - Adjudication of Navigation Evolution Roadmap Comments
  - Develop updates for future versions of the Roadmap
    - Assure viability of the implementation process
  - Liaison between policy-makers and the aviation community
    - Guarantee concerns are heard and addressed



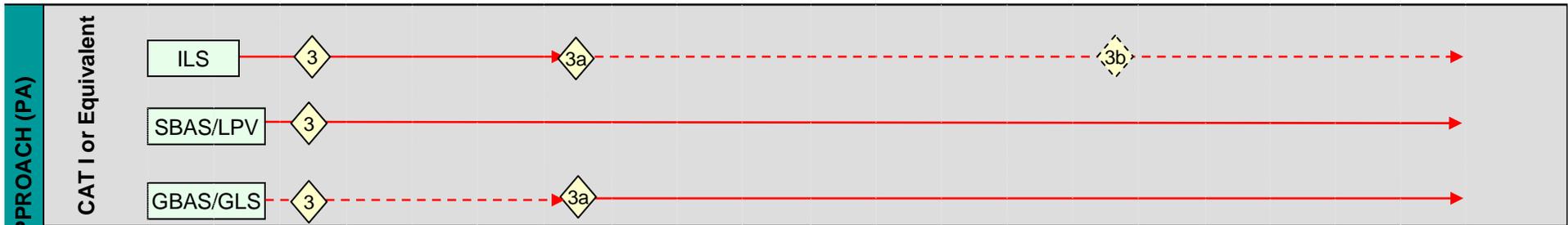
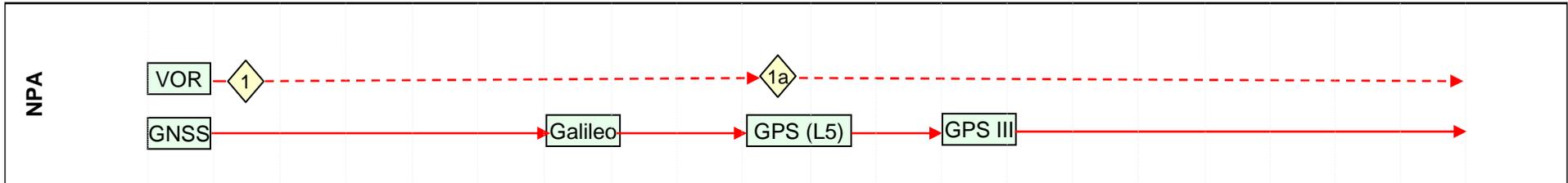
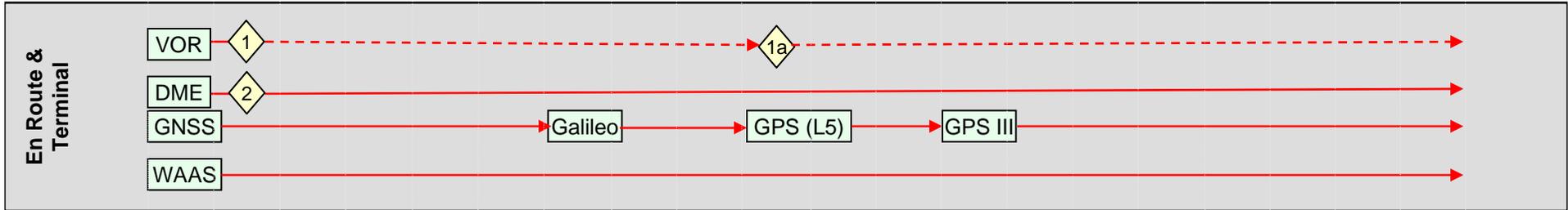
# Navigation Roadmap Assumptions

- **The FAA requires an aggressive transition to performance-based service**
  - Decisions need to be made with the aviation community.
    - define standard services provided by FAA
    - define public use special services
    - define non-public services provided by the airport operator/user
- **FAA will provide NAS-wide performance-based service**
  - RNAV/RNP (primarily GNSS)
  - LPV at all runway ends
  - LPV-200 where needed
  - Determination if CAT II minima is the appropriate requirement at specific airports
  - CAT III service requirements become responsibility of the airport operator/user
- **A Policy will exist for mitigating a loss of GNSS**
  - Mitigation strategy supports RNAV/RNP
  - FAA will provide Cat I ILS as backup at OEP airports (~55 airports)
- **Fleet Equipage**
  - Today = Mixed Fleet – GNSS, D/D and D/D/I
  - Future = Fleet equipped with GNSS
    - Decision/specification of “operational” mitigation
- **GPS modernization and sustainment is crucial**



# Navigation Roadmap

2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025



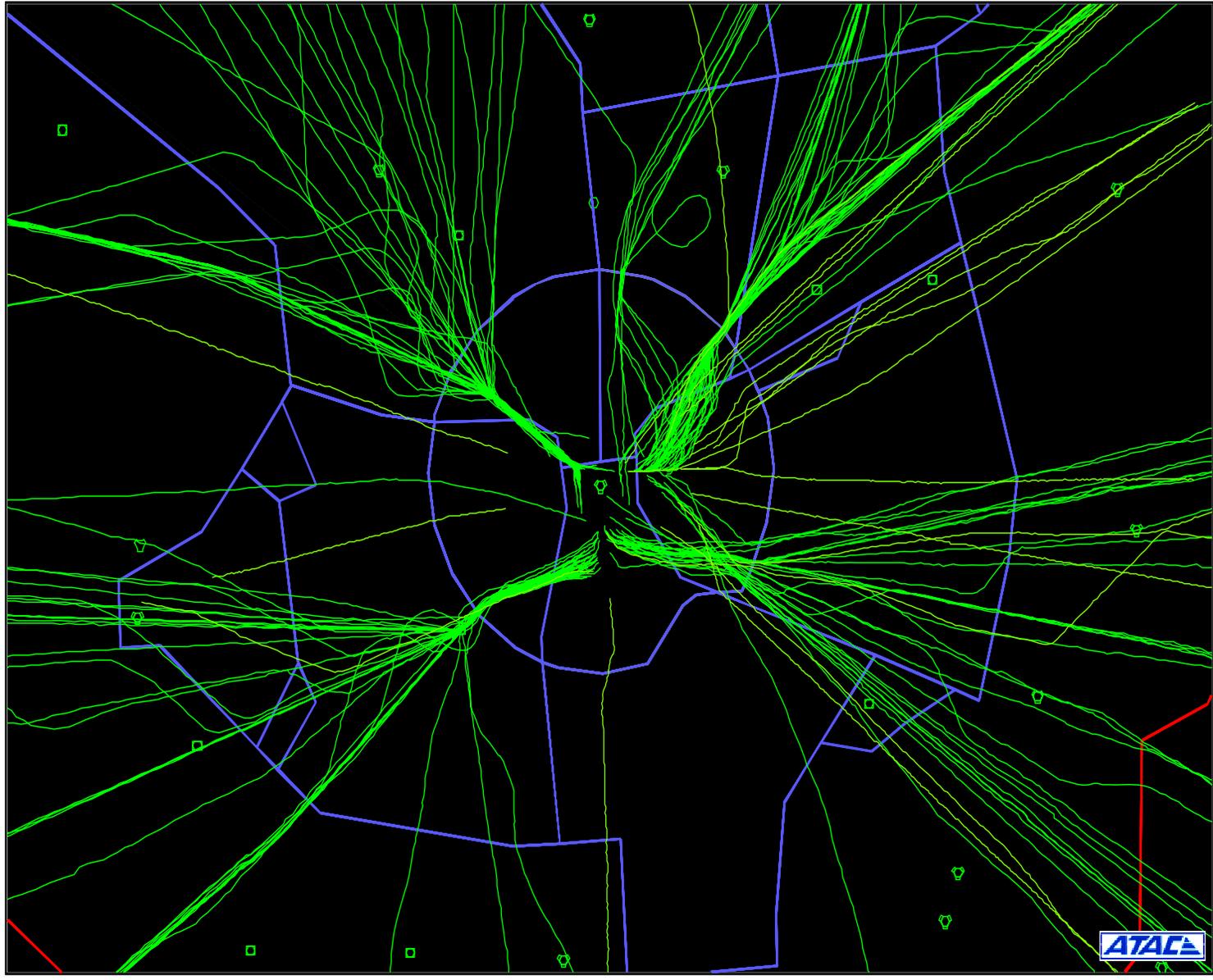
# Navigation Roadmap Decisions

- ◆ **1 2007 - VOR decision for drawdown based on GNSS**
  - ◆ 1a 2015 - VOR decision on remaining drawdown
  
- ◆ **2 2007 - Develop rightsizing DME Requirements, e.g., service volume, architecture, pathway**
  
- ◆ **3 2008 - Decision on next generation Cat I landing system**
  - ◆ 3a 2012 - Begin ILS Cat I drawdown - limited backup at OEP airports
  - ◆ 3b 202X - Decision on CAT I ILS drawdown
  
- ◆ **4 2008 - Decision on next generation Cat II/III service mandate, pending feasibility & schedule of potential ABAS/GBAS solutions and risk mitigation strategies**
  - ◆ 4a 2012 Determination if CAT II minima is the appropriate requirement at specific airports



**Memphis (MEM)**

# FedEx Arrivals (night push)



# MEMPHIS AOC

## •TERMINAL AREA

<ul style="list-style-type: none"><li>• TMA</li><li>• CONFLICT RESOLUTION</li><li>• COLLABORATIVE ATM</li><li>• OPTIMUM RUNWAY ASSIGNMENTS</li><li>• TIME BASED METERING</li></ul>	<ul style="list-style-type: none"><li>• SURFACE MANAGEMENT ADVISORY</li><li>• OPTIMUM TAXIWAY ASSIGNMENTS</li><li>• SPACING AND SEQUENCING</li></ul>
<ul style="list-style-type: none"><li>• TERMINAL PROCEDURES<ul style="list-style-type: none"><li>– ADS-B SURVEILLANCE</li><li>– LAAS GUIDANCE</li><li>– RNAV/RNP</li><li>– TAP/CDA</li><li>– AIRSPACE REDESIGN</li></ul></li></ul>	<ul style="list-style-type: none"><li>• AIRCRAFT EQUIPPAGE</li><li>• GNSS APPLICATIONS</li><li>• CTAS</li><li>• DATA LINKING</li><li>• DATA MESSAGING</li></ul>

## •SURFACE AREA

## •PROCEDURES

## •AIRCRAFT



# GBAS (LAAS/JPALS)

- **Intend to have a Category I, non-fed, certifiable LAAS by 2008**
- **There is money in the 08 budget to begin development of Cat II/III LAAS**
- **FAA LAAS project team and JPALS project team currently have regularly scheduled technical meetings**
- **Working towards a national GBAS program review**
  - Operational, technical, and programmatic aspects

# GBAS cont.

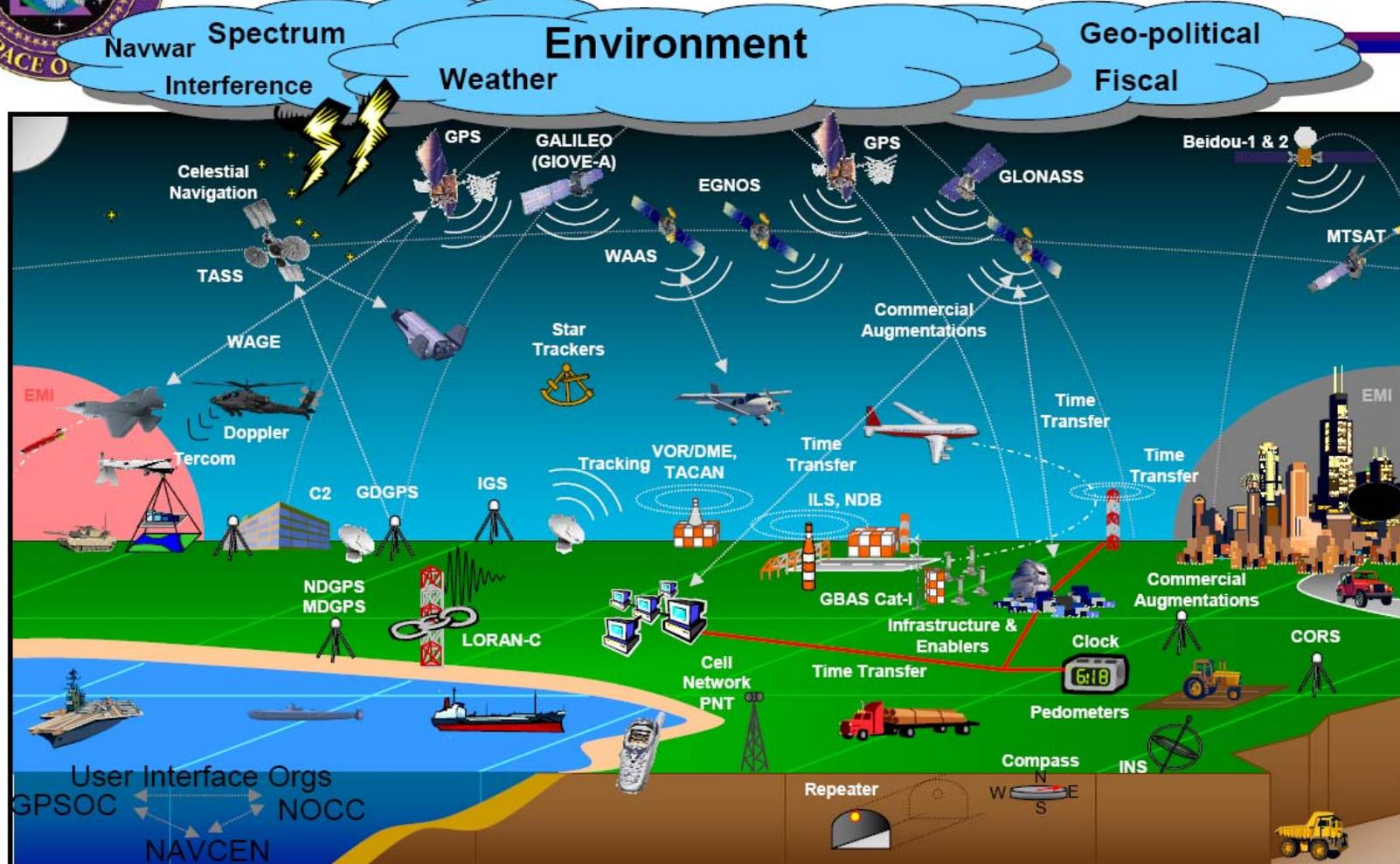
- **Commonality**
  - Between LAAS and land based JPALS
- **International Efforts**
  - MOC with Australia
  - International working group
    - Next meeting is July 17<sup>th</sup> in Seattle, WA





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# Draft "As-Is" PNT Architecture (2007)



Standards	Reference Frames	Cryptography	Science & Technology	USNO	NIST	NGA	NGS
Star Catalogs	Launch	<b>ENABLERS &amp; INFRASTRUCTURE</b>			NSA	Industrial Base	
Electro Optical Info.	Modeling	Mapping/Charting/Geodesy	Laser Ranging Network	Policies		Testing	

Version 15 Mar 2007

# Approach 5



startrack5.exe





**SATNAV Provides precision guidance where ILS can not be installed**

# Conclusion

- **Importance of Navigation Services role in setting the stage for performance-based system**
  - NAV is setting the stage for communications and surveillance
  - Work collaboratively to define and achieve NextGen
- **Navigation Services is changing**
- **Collaboration with user community paramount to a successful transition**
- **Maximize service delivery, reduce costs and improve or maintain safety**
- **Collaboration is paramount**



# QUESTIONS?

- **IF YOU DON'T KNOW YOUR DESTINATION, THEN ANY ROAD WILL DO.**

