Performance-Based Navigation Update

Presentation to: EWG Ops SC

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RNAV and RNP Implementation in the National Airspace System

Purple – RNAV SIDs/STARs
Yellow – RNAV Routes
Green – Airports with RNAV or RNP approaches

% of Operations With RNAV/RNP

Current FAA Approved RNP SAAAR Operators
RNAV Implementation of OPD

- Three OPD (conventional) procedures implemented at Los Angeles (LAX)
- Other Procedures published:
  - Atlanta (ATL) - One full OPD Published 8/2009
  - Phoenix (PHX) - Two OPDs published
  - Las Vegas (LAS) - Four published with vertical profiles
  - San Diego (SAN) - Two OPD published
- OPD demonstrations:
  - Louisville (SDF) 2004-2005
  - Atlanta (ATL) 2007-2009
  - Miami (MIA) 2008
  - Anchorage (ANC) 2009
- Other OPD developments are:
  - Denver (DEN) - OPD RNAV STARs under development
  - Louisville (SDF) - Joint effort with UPS. Five RNAV STARs under development. Publication date TBD
  - Charleston (CHS) - FAA/Air Mobility Command/DAL effort; Four procedures developed. C-17 flight sim work 8/2009. January 2010 demo. FY11 publication
  - Hawaii (HNL) - Five Honolulu/Hilo STARs developed. Pub date 6/10, 11/10 and 3/11
  - Reno (RNO) - Three OPD RNAV STARs developed. Pub date 6/10, 7/10 and 1/11
  - Anchorage (ANC) - Five OPD RNAV STARs. Pub dates 7/10. Demo ongoing.
  - Las Vegas optimization of RNAV STARs. Pub date TBD
  - Atlanta (ATL) - Additional OPDs planned.
  - Charlotte (CLT) - OPD Demo WG meeting 04/10
  - Chicago (ORD) - En Route vertical profile developed for 5 RNAV STARs; Pub date TBD

*Several RNAV STAR Workgroups Ongoing*

- Tailored Arrival Demonstrations:
  - Los Angeles (LAX)
  - Miami (MIA)
  - San Francisco (SFO)

Additional coastal sites pending for FY11
Airspace Design and Analyses

- **Chronic delays** in several terminal areas continue to increase
- **New runways** increase capacity for some areas but are not an option for others

**Ongoing Airspace Activities**

- NY/NJ/PHL Metro Area Redesign
- Chicago Airspace Project
- Houston Area Air Traffic System Airspace
- Las Vegas Airspace Optimization/SNSA Airspace
- **Southern California Airspace**
- Denver Airspace
- North Texas Airspace Review

**Top Metropolitan Areas in US**

- Congestion and complexity impact capacity and efficiency
- Special activity airspace and other restrictions may limit access
Where are we going and How will WE get there?

<table>
<thead>
<tr>
<th>Airspace Design and PBN Procedures</th>
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<tbody>
<tr>
<td><strong>Change Sectors</strong></td>
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<tr>
<td>Modify the shape of existing sectors or add new sectors</td>
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<tr>
<td><strong>Change Routes</strong></td>
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<tr>
<td>Modify or add routes for normal use or for flexibility during weather</td>
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<tr>
<td><strong>Change Restrictions</strong></td>
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<tr>
<td>Modify altitude or spacing restrictions to protect congested sectors</td>
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<tr>
<td><strong>Integration of procedures</strong></td>
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<tr>
<td>RNAV and RNP</td>
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<tr>
<td>SID/STAR, OPDs, Decouple Adjacent Airport Flows, City-Pair</td>
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<tr>
<td>Overlays and Non-overlays</td>
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<tr>
<td><strong>Add Technology</strong></td>
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<tr>
<td>Examples: Broadcast Services, Data Link, Conflict Probe, RPI, Metering Tools</td>
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</tbody>
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Federal Aviation Administration
Integrated Airspace and Procedures: PBN Focus Areas 2010-2018

Connecting corridor

Key metropolitan area
FAA is Assessing, Funding, and Planning

- Integrated Procedures
- Benefits Focus
RTCA Task Force Recommendations

Overarching recommendations include:
- Consideration of government financial equipage incentives
- Streamlined procedures/equipment deployment & approvals

Cross-Cutting
- Data Comm
- Integrated ATM

NAS Access
- LPV approaches
- Low altitude services

Surface
- Improved situational awareness
- Shared surface data

Runway Access
- Parallel runway operations
- Converging runway operations

Metroplex
- Integrated airspace procedures

Cruise
- Special Activity Airspace
- Time-based metering

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Federal Aviation Administration
Focus on Streamlining

• RNAV/RNP Group, Airspace, AJW-3, AFS
  ▪ Improve procedure planning design and implementation
  ▪ NAV Lean Process
• Realigning to meet TF5 and NextGen Goals
• National Airspace Counsel
  ▪ Streamlining to meet commitment
  ▪ Improve procedure planning and prioritization
  ▪ Resources
• Changes in motion
• Articulate changes
  ▪ Transparency of plan
  ▪ Processes
  ▪ Responsibilities
  ▪ Resources
FAA PBN Implementation Planning

Collaborative planning, priorities, sites, resources, especially for 2011 and beyond

We need to optimize in 2010-11 and prioritize for public use, benefits, and integration for 2011 and beyond

Develop 2011 and beyond Implementation plan
RNAV and RNP Implementation and Challenges

**Takeoff and Departure Challenges**
- Complex flows include satellite airport traffic
- Terrain avoidance
- Environmental and noise restrictions
- Operator readiness and approvals
- Training
- Avionics equipage variations

**En Route Challenges**
- Multi-facility coordination
- Terminal transitions to/from en-route
- Reducing separation while maintaining safety
- Avoiding restricted airspace
- Integrating with automation

**Arrival and Approach Challenges**
- Adjacent airport flow interactions
- Environmental and noise restrictions
- Controlling and managing a mixed equipage environment
- Availability of controller decision support tools
Challenges

**FAA**
- Mixed Equipage
- Separation Standards
- Environmental
- Surveillance & Automation
- Safety Assessments

**Operators**
- Flight Management Computer (FMC) Variations & Capabilities
- Procedure Coding Database
- Charting
- Cockpit Displays
- Equipage

**Aircraft Capabilities**
- Phraseology
- Procedure Design
- International Harmonization
- Benefits & Analysis
- Training
- Human Factors Criteria
Thank You!

Questions and Comments