Discontinuation of VOR Service

For: Aeronautical Charting Forum 12-01

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Outline

• Description
• Progress to Date
• Current/Near Future
Description

• NAS is transitioning to RNAV based system with PBN and RNP where needed/required

• Supporting both the traditional system of airways and routes defined with VOR/DME/TACAN plus RNAV *as well as* an RNAV, PBN and RNP based national airspace may be inefficient and costly

• A part of the transition is discontinuing service from VORs that are not needed as the transition occurs. This avoids Operations expense for services and procedures/airspace design as well as the cost of recapitalization
Concept of Operations

• Remove or modify VOR based procedures to use RNAV terminal and enroute procedures. RNP where needed.
• Usual RNAV systems/services are DME/DME/IRU or GNSS (GPS). In case of a GPS outage, a VOR-equipped aircraft without DME/DME/IRU would:
  – Climb, if necessary, to obtain VOR service with ATC radar assistance if available
    • Coverage at 5,000 AGL in CONUS, in western mountainous area VORs will be retained
    • VORs retained to be no more than 77nm from any point in CONUS
  – Proceed direct to VOR and then VOR to VOR through the outage or to an airport served by a retained VOR or ILS will be no more than 100nm away.
• Full DME coverage will be retained for D/D/I equipped aircraft
• In the long term future (2030+) concept of Alternate Positioning, Navigation and Timing (APNT) being investigated
Progress to Date

• VOR Discontinuance Program
• Federal Register Notice
• Minimum Operating Network
VOR Discontinuance Program

• Program is cross-organizational effort to reduce number of operational VORs to a minimum operating network by 2020
• Different organizations have roles and responsibilities
• Development and approval of Charter in process
Federal Register Notice

- To make everyone aware of the transition of the navigation infrastructure and solicit comments
- Published December 15, 2011, closed March 7, 2012. 330 comments from variety of users, manufacturers, organizations being assessed and a notice summarizing comments and their inclusion in planning process being prepared. See www.regulations.gov, docket FAA-2011-1082
Minimum Operating Network

• Analysis indicates about half the VORs could be discontinued and provide a level of the service with no point further than 77nm from a VOR, no airport with a VOR/ILS approach more than 100nm from any point. VORs in western mountainous area, Alaska, Hawaii, other islands/territories retained

• Exactly which VORs and when they will be discontinued is another and more difficult question

• Each Service Center developing lists, Navigation Programs doing national analysis, prioritization and planning
Back-Up Slides
FAA Commissioned VORs

VORs by Configuration
- VOR/DME - (393 VORs)
- VORTAC - (545 VORs)
- VOR - (29 VORs)
- Total = 967 VORs

Per FSEP as of December 14, 2010

VORs by Age
- Age <= 10 - (43 VORs)
- 10 < Age <= 20 - (115 VORs)
- 20 < Age <= 30 - (769 VORs)
- Age > 30 - (40 VORs)
- Total = 967 VORs

Per FSEP as of December 14, 2010
Current VOR Network

Commisioned VORs by Ownership

- FAA Facilities (967 VORs)
- Non-Federal Facilities (51 VORs)

Total = 1018 VORs
Per FSEP as of December 15, 2010

FAA Commisioned VORs by Type

- SECOND GENERATION CONVENTIONAL (784 VORs)
- SECOND GENERATION DOPPLER (126 VORs)
- THIRD GENERATION CONVENTIONAL (51 VORs)
- THIRD GENERATION DOPPLER (6 VORs)

Total = 967 VORs
Per FSEP as of December 14, 2010
Assumptions

• **Policy may be required to**
  – encourage/direct users to shift from dependence on ground-based NAVAIDS
  – Facilitate airspace redesign
  – require avionics suitable for RNAV in Class A and B Airspace

• **Exclusions**
  – Non-Fed and DoD VORs are excluded from the analysis
Assumptions – Operational

VORs will provide:

- An operational contingency, and not the robust network of current VORs
- A transitional network of VORs to allow users time to equip with new avionics to transition to RNAV and RNP
- A transitional backup capability where GPS interference could affect IFR RNAV operations
Assumptions- Airspace Reconfiguration

• An RNAV route structure of Q & T routes may eventually replace existing Victor (V) airways and Jet (J) routes structure
• Users will use RNAV direct routings more
• Temporary Flight Restrictions (TFR) and Special Use Airspace (SUA) may need to be redefined
Assumptions – MON Criteria

• VORs providing coverage to the Core 30 public airports including airports with ILSs
• Coverage at 5,000 feet AGL accounting for terrain, obstacles, and signal strength
• VORs in Western mountainous area retained as is Alaska, Hawaii, islands and territories
• Coverage such that no point in counterminous U.S. (48 states) is more than 77 nm from a VOR facility. No airport with VOR or ILS approach more than 100nm
Designated Mountainous Areas (CONUS)
Supporting Resources

• Previous Studies
  – 1997 Skeleton Network
    • 65 busiest airports, 6,000’ AGL backup for GNSS
  – 2002 Transition Strategy
    • 200 busiest airports, 5,000’AGL backup for GNSS

• Evolution of the NAS to RNAV, PBN based reduces the need for VORs
Processes and Policy

• Order 7400.2J Procedures for Handling Airspace Matters
  – En-Route and Oceanic Services and Terminal Services ensure Navaids are allocated to benefit the greatest number of users consistent with safety and operational efficiency
  – Flight Procedures Office - ensure allocation as above and evaluate need for retention of terminal Navaids
  – ARN-1 recommend facilities to Director, SysOps Airspace and AIM for decommissioning
Other Process and Policy References

- JO 7100.XX PBN Implementation Process (draft)
- 8240.52 Aeronautical Data Management
- 8200.1 Flight Inspection
- 8260.19 Flight Procedures and Airspace
- 8260.43 Flight Procedures Management Program
- AC 90-100A U.S. Terminal and Enroute RNAV Operations
- 9840.1 U.S. National Standard for VOR/DME/TACAN