Discontinuation of VOR Service

Federal Aviation Administration

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

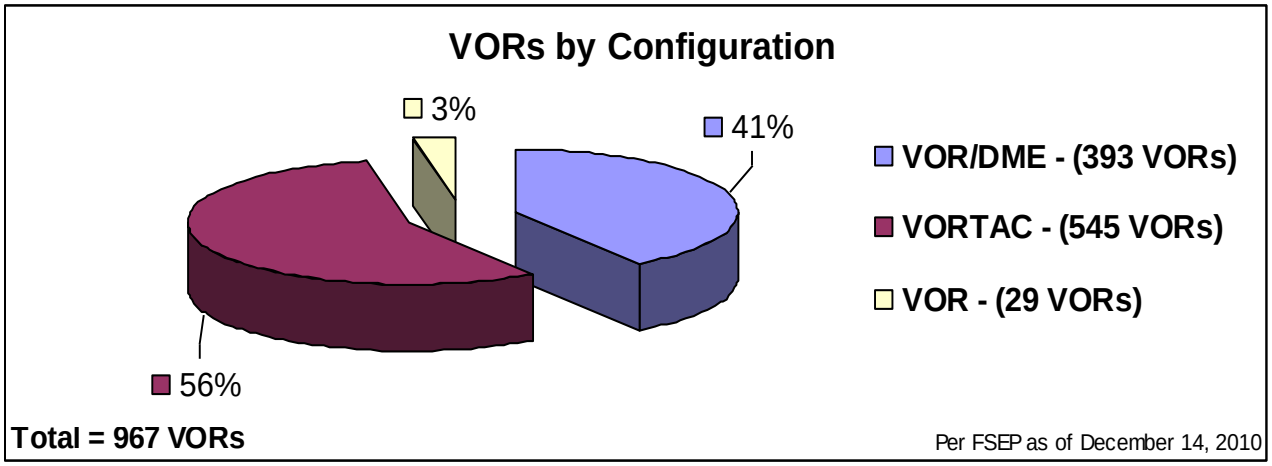
- **To make everyone aware of the transition of the navigation infrastructure and solicit comments**
- **Published December 15, 2011, closed March 7, 2012. 330 comments from variety of users, manufacturers, organizations being assessed and a notice summarizing comments and their inclusion in planning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

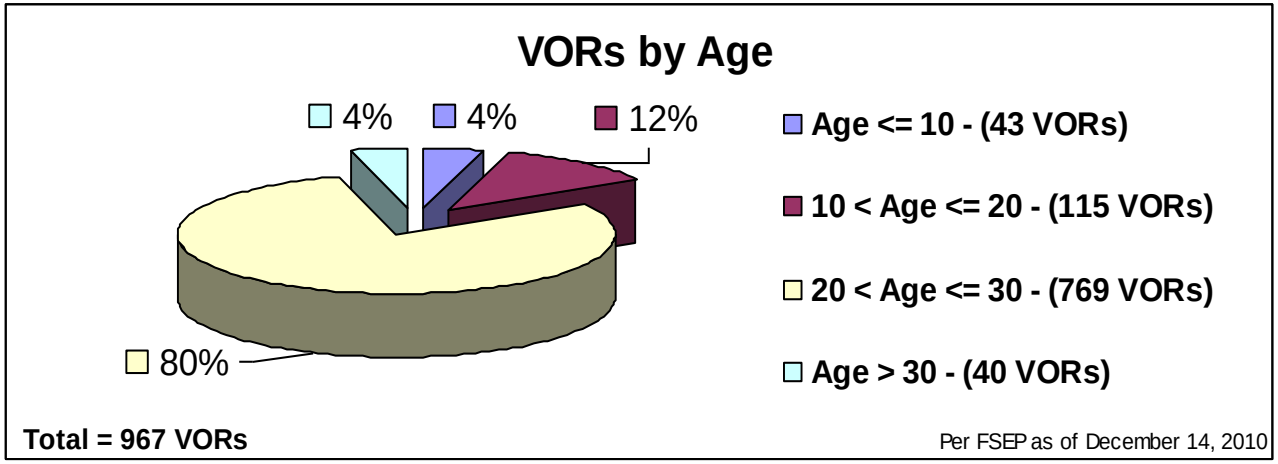
Minimum Operating Network

- **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**

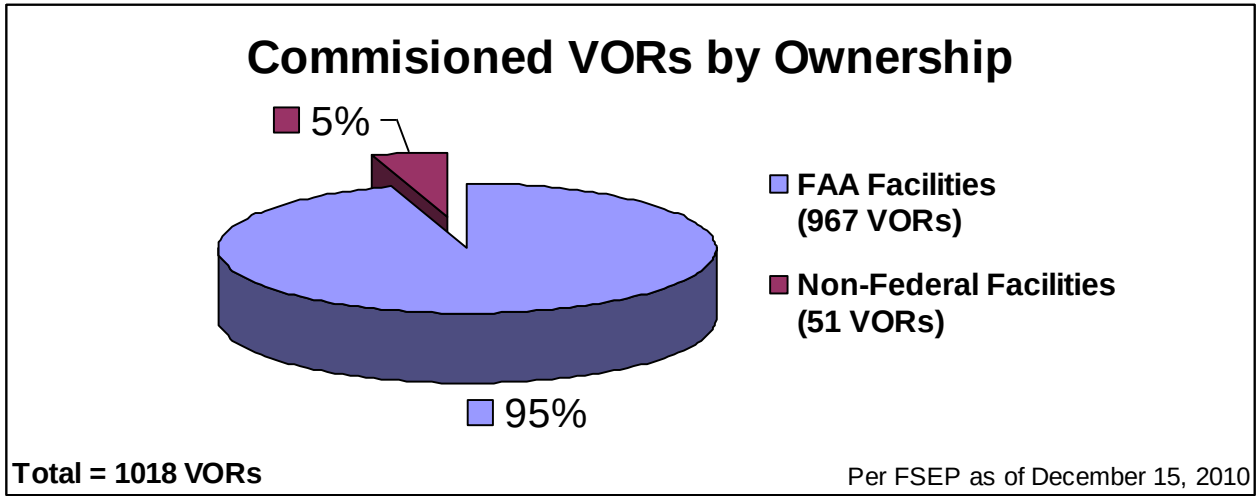
Back-Up Slides

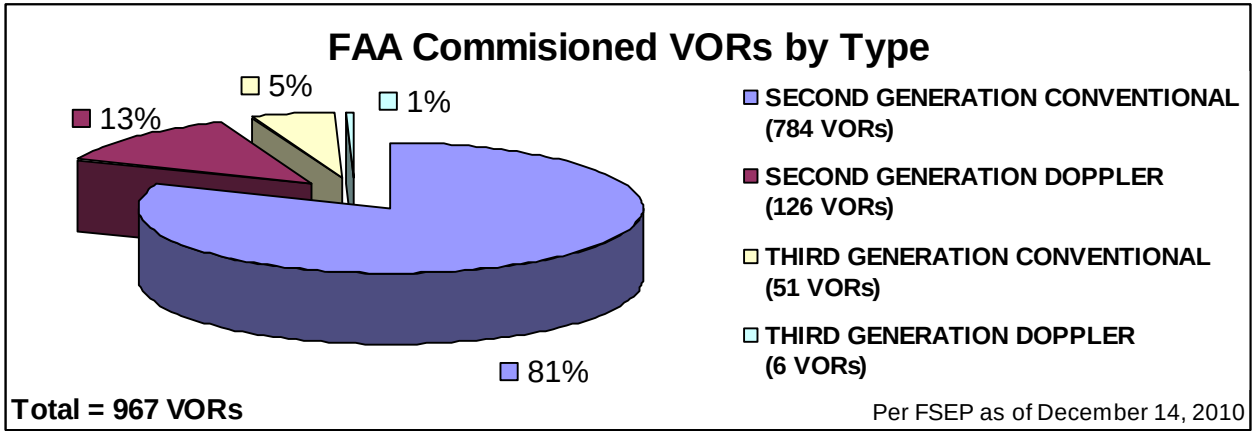
FAA Commissioned VORs





Current VOR Network





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

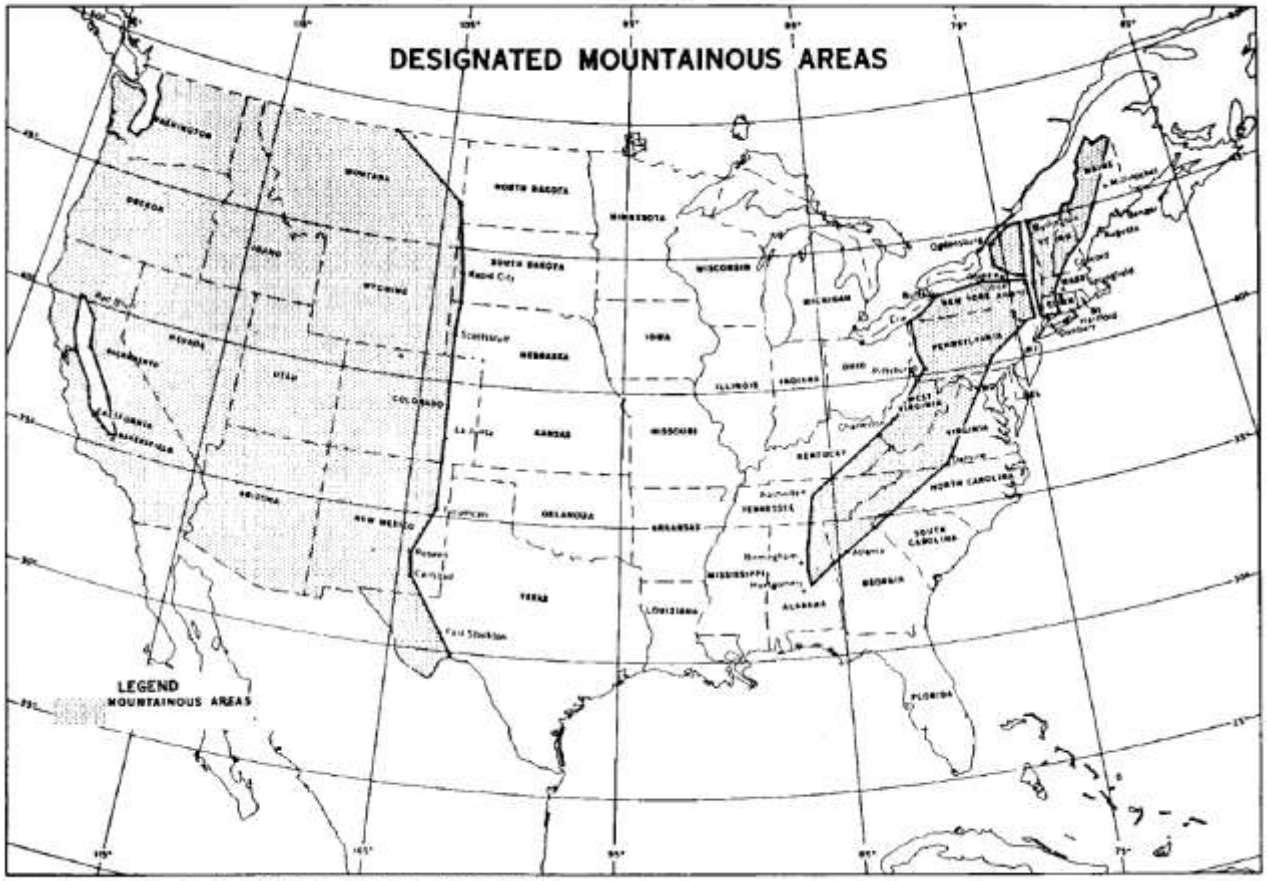
Assumptions- Airspace Reconfiguration

- **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)



[Doc. No. 13284, Amdt. 95-255, 40 FR 2578, Jan. 14, 1975]

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