VOR MON Program

Presented to: Aeronautical Charting Forum

Presented by: Rowena Mendez (AJM-324)
Leonixa Salcedo (AJM-324)

Date: October 28-30, 2014

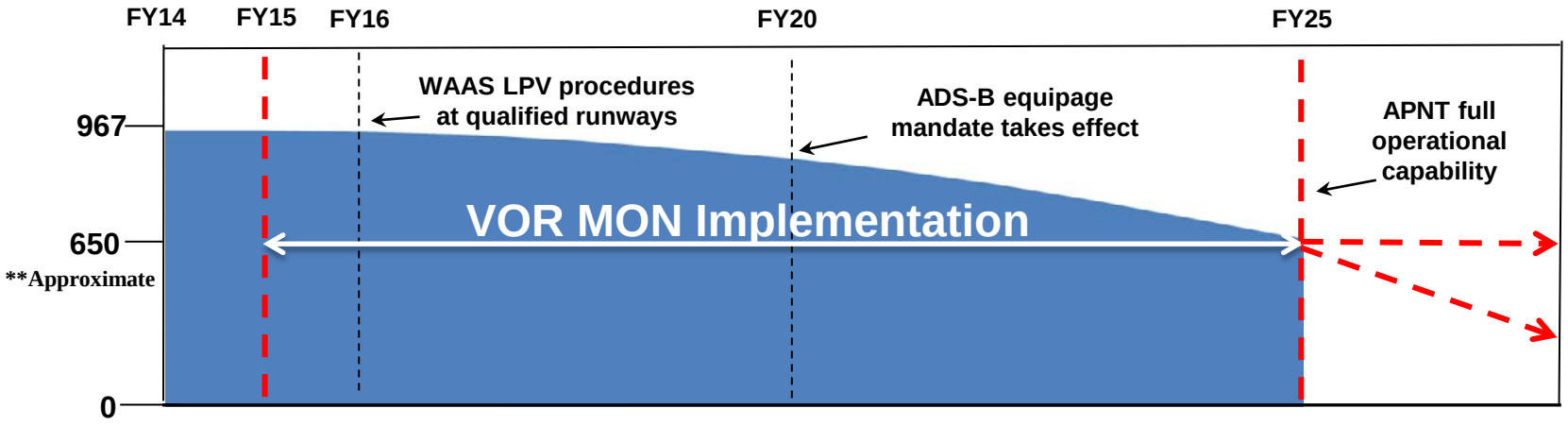
Agenda

- Program Goals
- Notional Timeline & Dependencies on VORs
- Program Accomplishments
- Program Status
- External Coordination
- VOR MON Selection Criteria
- Current ATS Routes & Routes Affected by VOR MON
- Dependencies & Touch Points
- VOR MON Challenges
- IAP Impacts
- Affected SIDs/STARs/ODPs
- Efficient Implementation Dependencies
- Next Steps

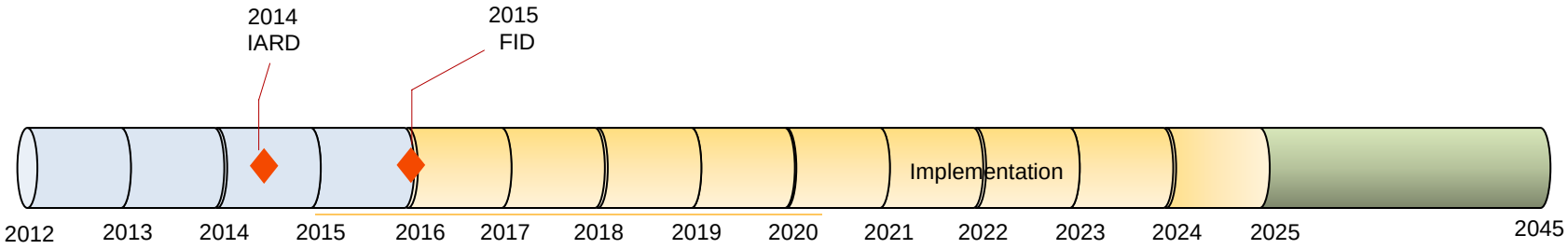
VOR MON Program Goals

- **The FAA will transition to Performance-Based Navigation (PBN) from the conventional VOR-defined routes and procedures**
- **PBN provides an opportunity to reduce the aging infrastructure**
  - The FAA currently has ~967 federally-owned and operated VORs (including VORTACs and VOR/DMEs)
    - Most are **30+** years old
- **The VOR MON Program will implement the MON by discontinuing approximately 30-50% of the VORs in the NAS**
  - VOR MON will provide backup coverage during a GPS outage as well as basic navigation capability
  - Support Right Sizing Initiatives

VOR MON Strategy and Notional Timeline



** The number of VORs comprising the MON may increase or decrease depending on the requirements for DoD



Program Accomplishments

- **FRN Released – 2011**
  - Volume 76, Number 241, December 15, 2011
- **Final FRN – 2012**
  - Volume 77, Number 162, August 21, 2012
- **VOR MON Analysis - July 2012**
- **Concept of Operations - January 2014**
- **Investment Analysis Readiness Decision (IARD) – March 2014**
- **Signed Charter – April 2014**

Program Status

- **Detailed program planning on going**
- **Final Investment Decision (FID) artifacts are being initiated and approach coordinated with focal points**
- **Continuing internal and external outreach**
    - Supporting TOC tasking
    - Coordinating with DoD
    - Coordinating with other programs and FAA initiatives

External VOR MON Coordination

- **FAA, MITRE, and DoD engaged in identifying necessary VORs for DoD use.**
  - DoD resolution anticipated for end of October 2014
- **Continued discussion with the US Coast Guard**
- **RTCA/TOC Tasks**
  - Task 1 Review and validate selection criteria - Completed
  - Task 2 Review and validate draft MON list - Completed
  - Task 3 Recommendations to waterfall schedule
  - Task 4 Recommendations on education and outreach - Completed

VOR MON Selection Criteria

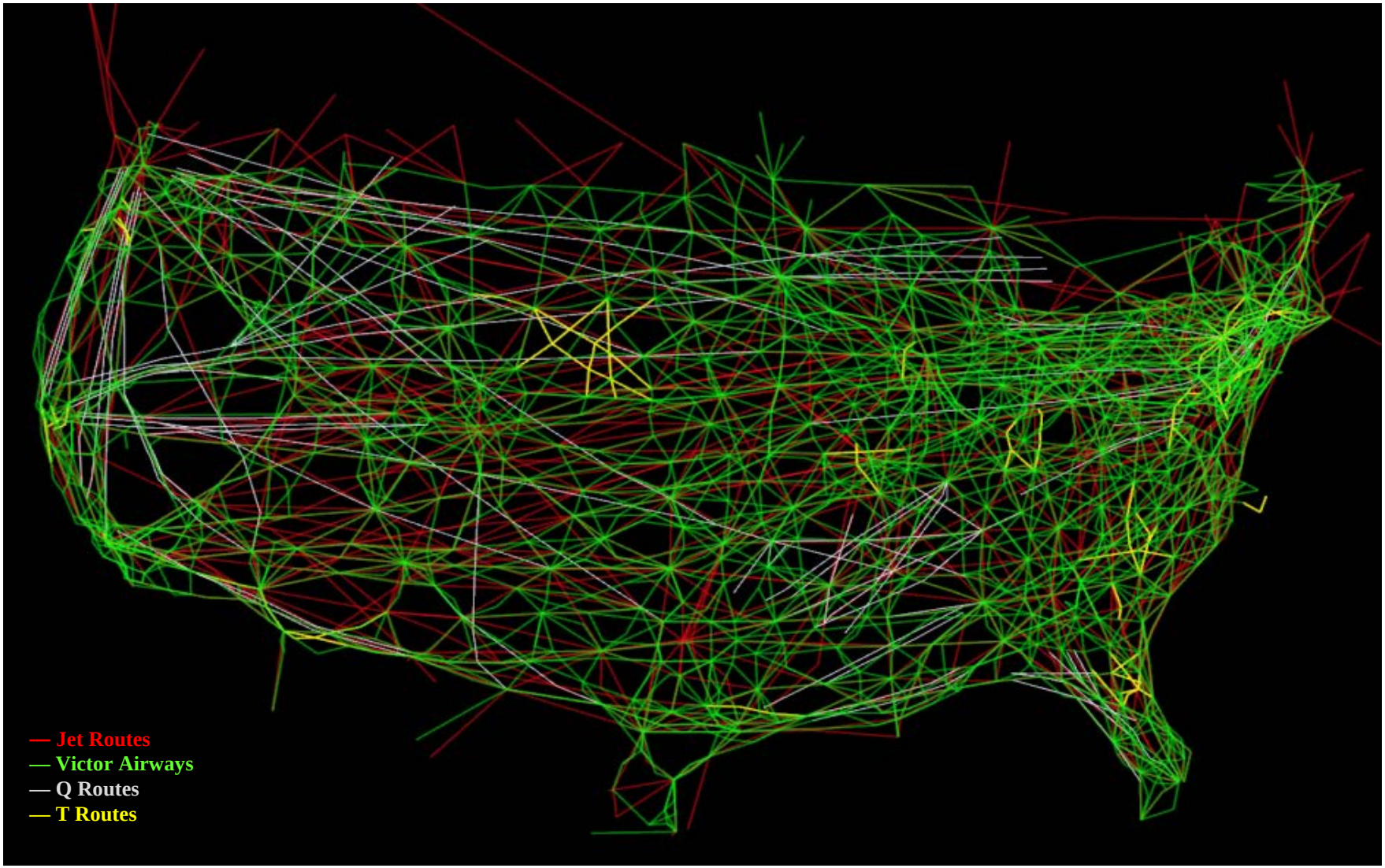
General Criteria

- Retain sufficient ILSs, LOCs, and VORs to support “safe-landing” at a suitable destination with a GPS-independent approach (ILS, LOC or VOR) within 100 NM of any location within CONUS
  - Without a requirement for DME at the “Safe Landing Airports”
- Retain most VORs in western designated mountainous area and outside of CONUS
- Retain VORs to support international arrival airways from the Atlantic, Pacific, the Caribbean, and at the Core 30 airports
- Provide seamless coverage at and above 5000 ft AGL
  - Note: Substantial coverage will exist below 5000 ft AGL

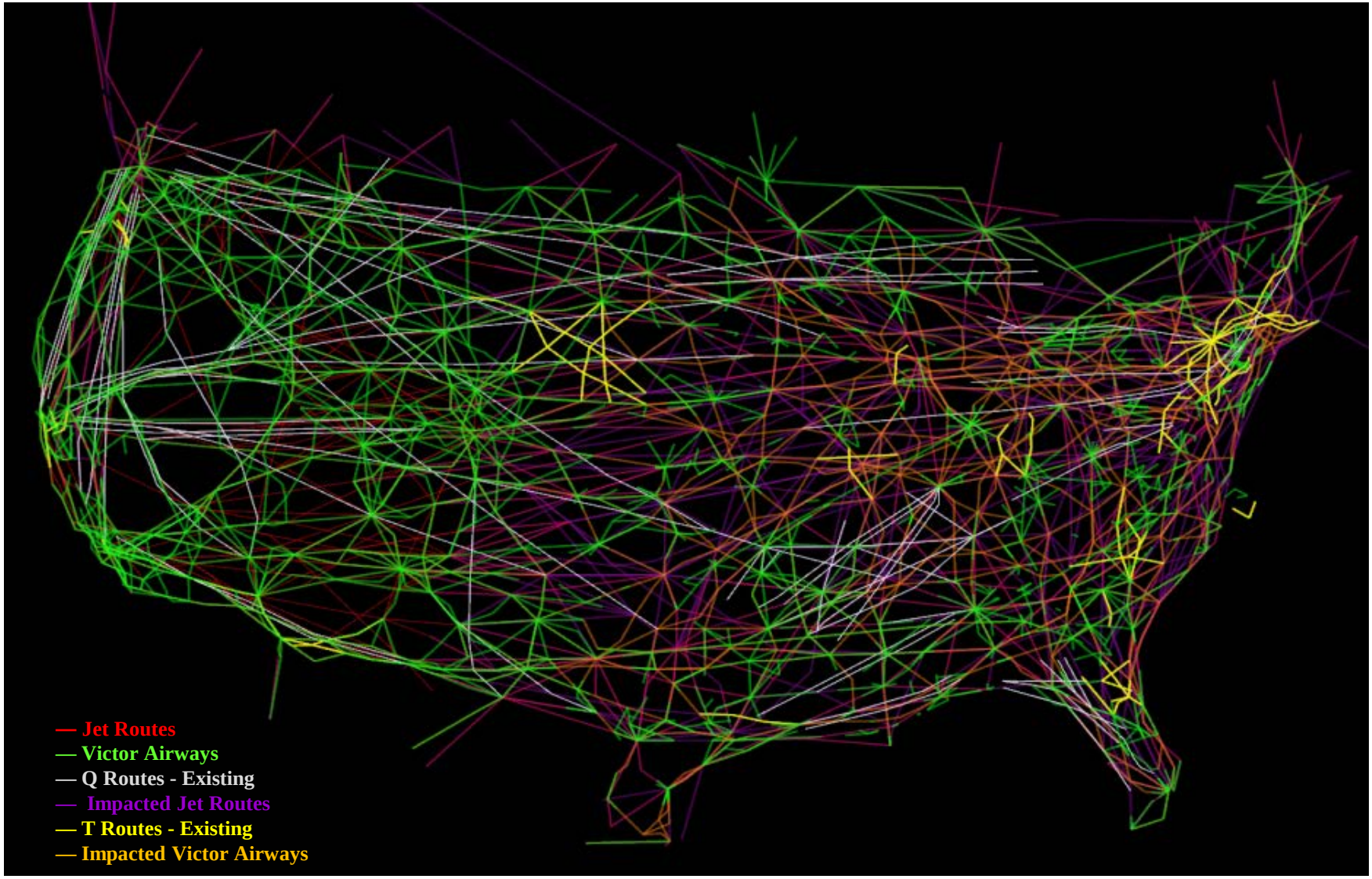
VOR MON Selection Criteria:
Other Considerations

- **Only FAA owned/operated VORs will be considered**
- **DMEs and TACANS will generally be retained (and/or enhanced)**
  - DME/TACAN service would, in general, be retained if VOR service is removed
- **Support for VOR-to-VOR navigation capability**
  - VOR standard service volume (SSV) will become 77 NM radius at 5000 ft AGL
  - Conventional navigation VOR-to-VOR direct without airways
  - Retain existing VORs and airways in the western mountain area

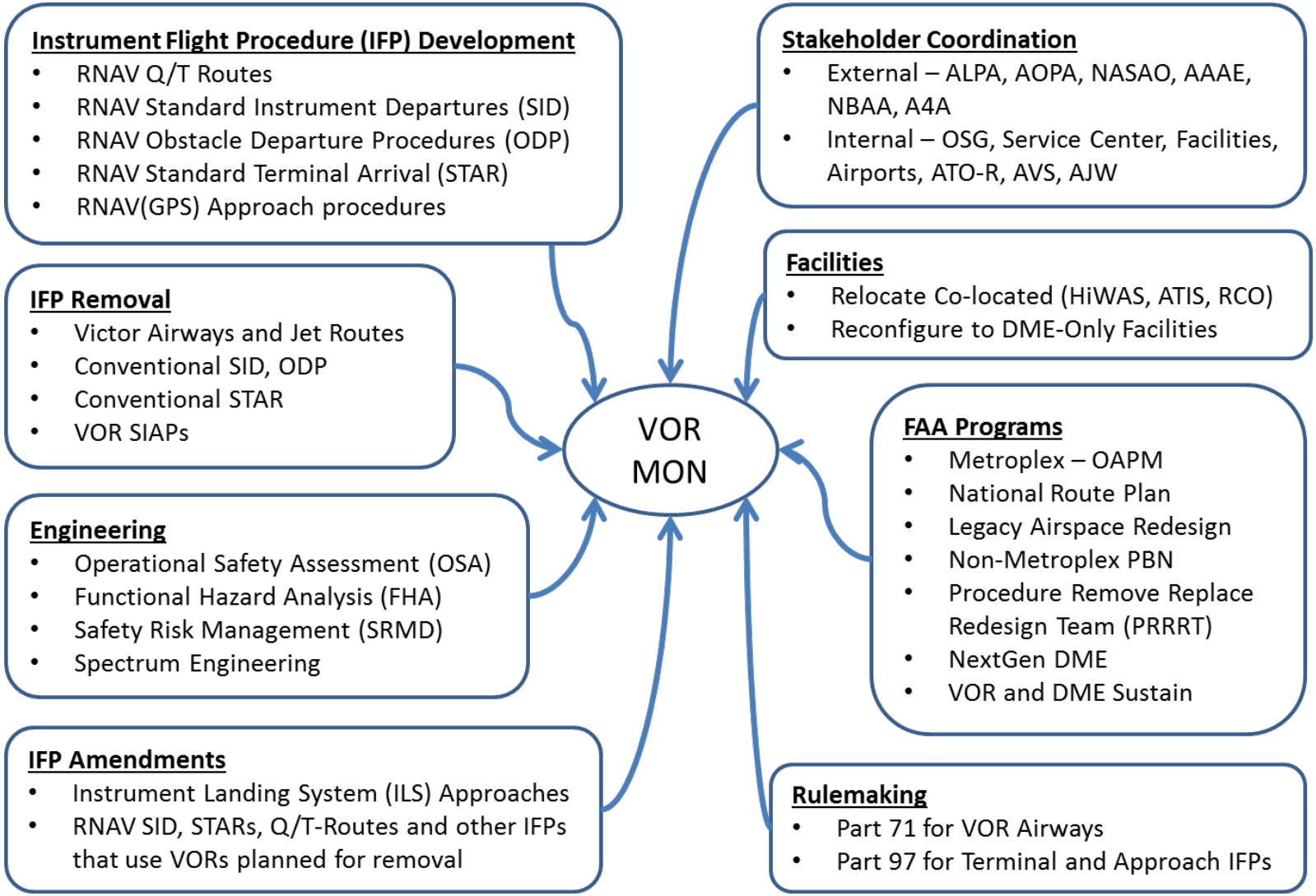
Current ATS Routes



ATS Routes Affected by VOR MON



Dependencies and Touch Points



VOR MON Challenges

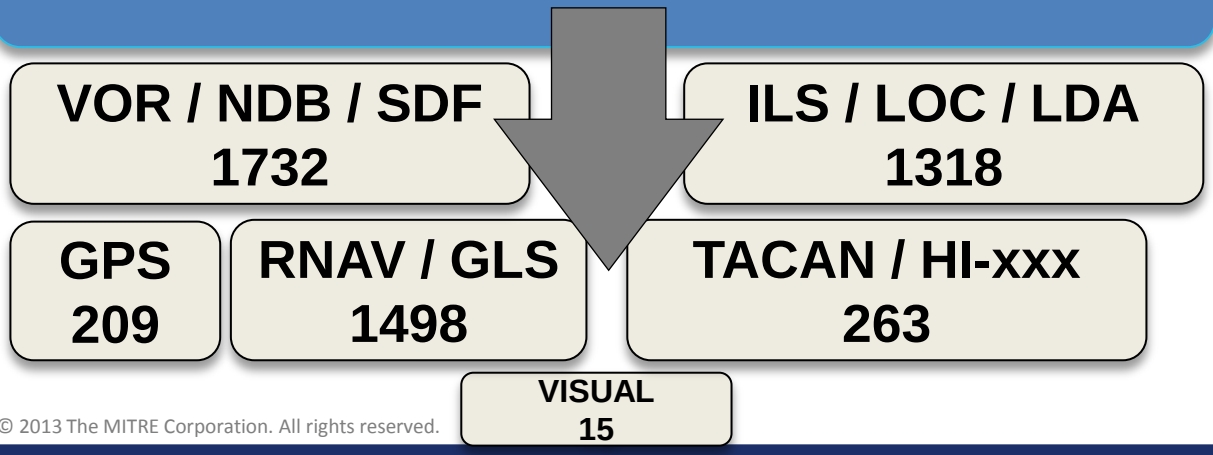
- **Instrument Flight Procedure (IFP) Impacts**
- **PBN Route Structure Implementation**
- **Engineering Analysis**
- **Stakeholder Coordination**
- **Co-Located Facilities (HIWAS,RCO, ATIS, DME)**
- **Rulemaking**

Overall Instrument Approach Procedure (IAP) Impact Summary (As of 9/30/2014)

11798 IAPs identified in CONUS*

5035 IAPs may be affected by VOR MON

6763 IAPs are unaffected by VOR MON



*From digital - Terminal Procedures Publication (d-TPP) Volume 1310

Affected SIDs/STARs/ODPs (As of 9/30/2014)

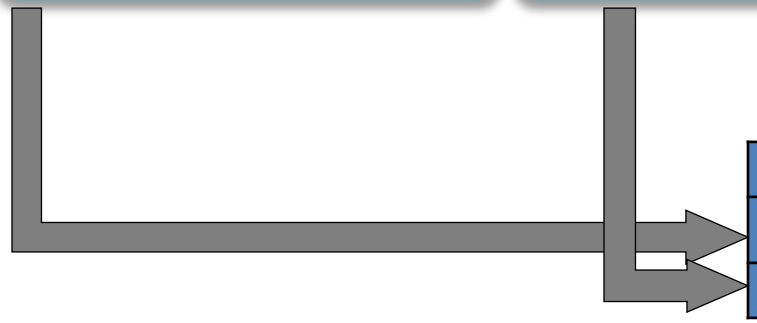
2084 ODPs/SIDs/STARs identified in CONUS*

1287 may be affected by VOR MON

997 are unaffected by VOR MON

893 SIDs & ODPs

394 STARs**



* From digital - Terminal Procedures Publication (d-TPP) Volume 1405

** Duplicate STAR listings removed as single graphic and textual plate serves multiple airports

Category	Conventional	RNAV
Affected SIDs & ODPs	691	202
Affected STARs	239	155

Efficient Implementation is Dependent on:

- **Collaboration**
  - National Route Structure Plan (NRSP) Concept
  - PBN Programs
    - METROPLEX, non-METROPLEX, Procedure Review Refine Remove Team (PRRRT), Review Refine and Remove (RRR)
  - Airspace Regulations
  - Aeronav Products
  - Flight Inspection Services
  - Service Areas
- **Coordination during planning and implementation**
  - National strategy
- **Communication and Outreach**
  - Internal and external

Next Steps

- **Continue detailed program planning**
- **Final Investment Decision ~ September 2015**
- **Finalize coordination with DoD/DHS**
- **Continue stakeholder outreach**

VOR MON Charting Issues

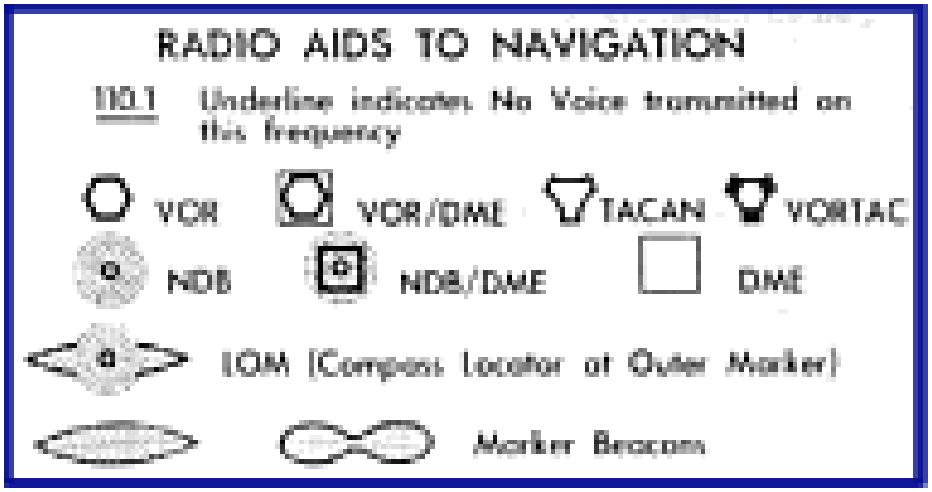
ACF October 28-30

Issues

- **Charting DME-only NAVAIDs**
- **Use of DME-only facilities as “Reference NAVAID”**

Charting DME-only facilities

- As VORs are discontinued, DME and TACAN will be retained for RNAV and military aircraft
- Three-letter facility IDs have geographic meaning contributing to pilot/controller situational awareness
  - Should DME-only facilities be charted for RNAV purposes



Magnetic Variation (Mag Var)

- TERPs reference: 8260.19, paragraph 2-5-3f(2)

(a) Instrument Approach Procedures (IAPs)/DPs/STARs. Magnetic variation is applied to any track/course used in an RNAV instrument procedure and it must be the magnetic variation of the aerodrome of intended landing or departure. Some aircraft navigation systems use a "reference NAVAID" for obtaining magnetic variation information based on course (Cx) leg types and track from fixes (Fx) leg types. For IAPs, specify in the ARINC Record (for RNAV Departure Procedures, specify in the Remarks section of Form 8260-15C), a NAVAID that has the *same* assigned magnetic variation as the airport magnetic variation.

- After the VORs are discontinued, some DME-only NAVAIDs will exist
- It makes sense to keep using the DME facility as the reference NAVAID

Recommendations

- **Chart DME-only facilities and retain the familiar 3-letter IDs for pilots and controllers to use for RNAV operations**

- **Use DME-only facilities as “reference NAVAIDs” to obtain MagVar values for RNAV aircraft**