

Very High Frequency Omnidirectional Range (VOR) Minimum Operational Network (MON) Program

Program Update

Presented to: Aeronautical Charting Meeting (ACM)

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Prepared by: VOR MON Program Office, AJM-324

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**Federal Aviation
Administration**



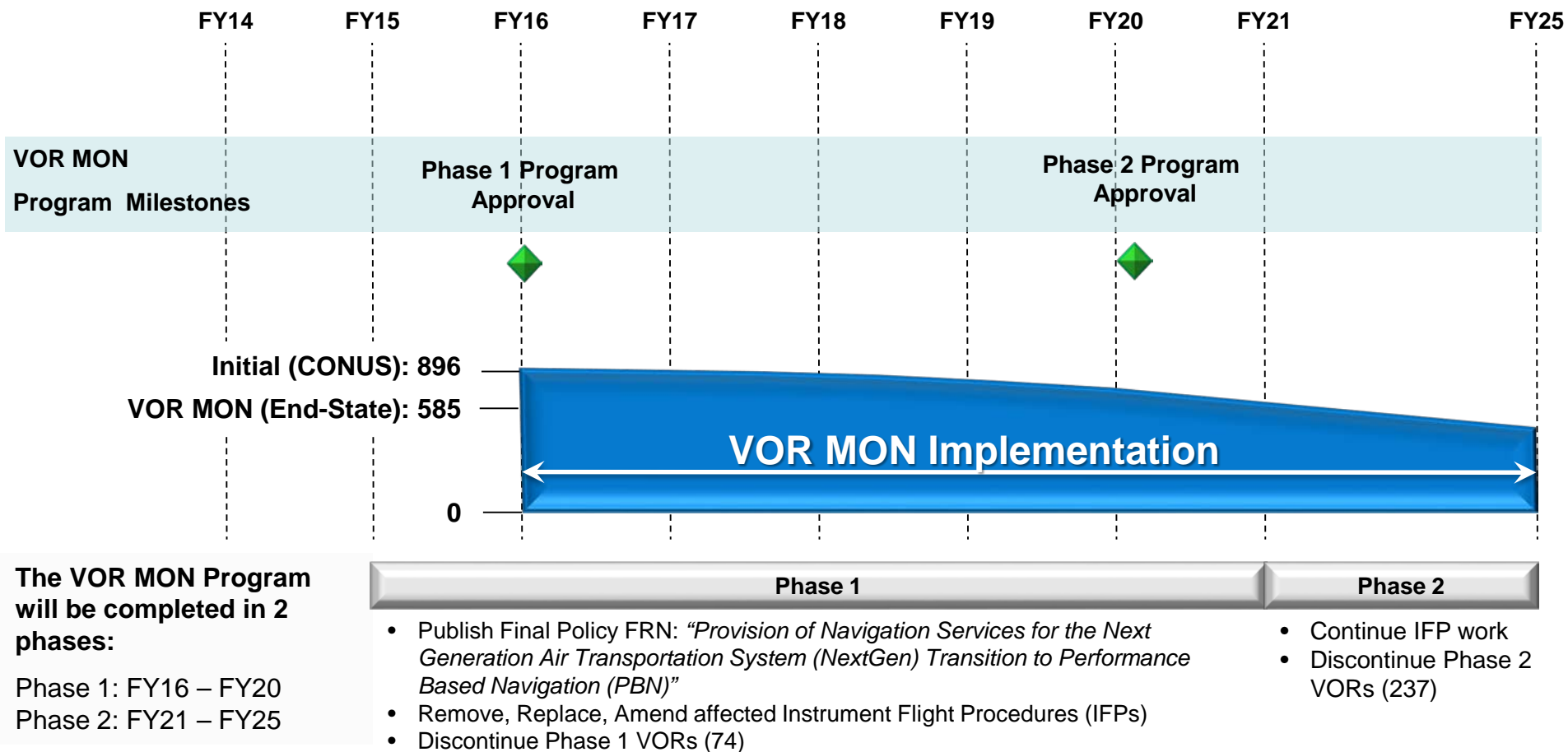
Agenda

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- Adding VOR Standard Service Volume (SSV) Classes
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VOR MON Program Objectives

- Support the NAS transition from VOR navigation to a more efficient Performance Based Navigation (PBN) structure consistent with NextGen goals.
- Within the contiguous 48 states (CONUS), enable pilots to:
 - Revert from PBN to conventional navigation in the event of a Global Positioning System (GPS) outage;
 - Tune and identify a VOR at and above 5,000 feet above ground (coverage may be available at lower altitudes)
 - Navigate to a MON airport within 100 nautical miles to fly a Localizer (LOC), Instrument Landing System (ILS) or VOR instrument approach without Distance Measuring Equipment (DME), Automatic Direction Finder (ADF), surveillance, or GPS where the capability currently exists
 - Navigate along VOR Airways especially in mountainous terrain where surveillance services are not available and Minimum En Route Altitudes (MEAs) offer lower altitude selection for options in icing conditions.
- Discontinue approximately 35% (311) VORs in CONUS by 2025.

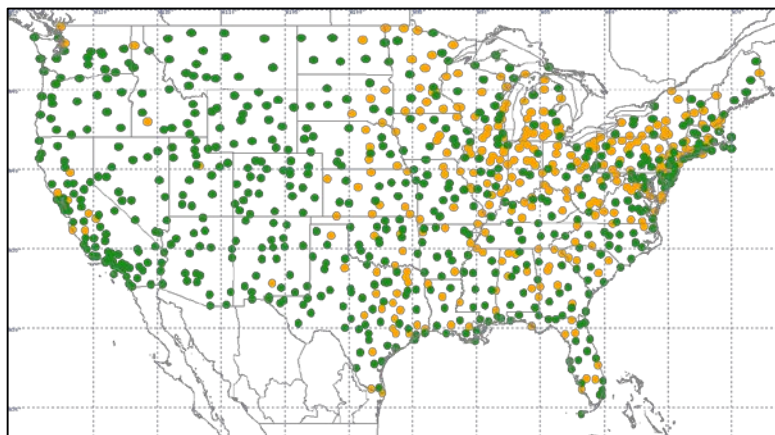
Program Timeline



As of February 28, 2018



Candidate Discontinuance VORs & MON Airports

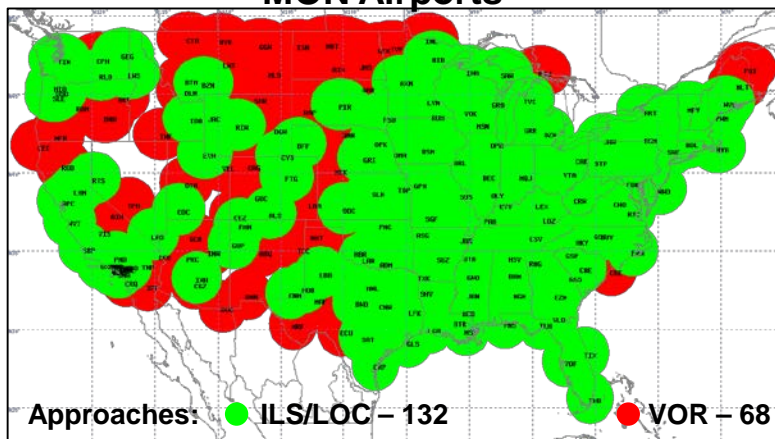


● Retained VORs (585)

● Candidate Discontinuance VORs (311)

Candidate Discontinuance VORs	
Service Area	VOR #
Western	15
Central	163
Eastern	133
Total	311

MON Airports



MON airports ensure that an aircraft is within 100 nm of a location where an LOC, ILS or VOR approach may be flown.

VOR Configurations (as of February 28, 2019)

	Retention #	Discontinuance (Remaining) #	Current Total	Total Discontinued
VOR	17	8	25	4
VOR/DME	215	133	348	23
VORTAC	353	128	481	15
Total	585	269	854	42

Program Accomplishments

- 42 VORs discontinued to date:
 1. [EDS] Edisto, in Orangeburg, SC – February 4, 2016
 2. [BUA] Buffalo, in Buffalo, SD – July 21, 2016
 3. [PNN] Princeton, in Princeton ME – July 21, 2016
 4. [PLB] Plattsburgh, in Plattsburgh, NY – September 15, 2016
 5. [AOH] Allen County, in Lima, OH – September 15, 2016
 6. [ABB] Nabb in Nabb, IN – January 5, 2017
 7. [SYO] Sayre in Sayre, OK – April 27, 2017
 8. [ENW] Kenosha in Kenosha, WI – June 22, 2017
 9. [BTL] Battle Creek in Battle Creek, MI – June 22, 2017
 10. [HRK] Horlick in Racine, WI – June 22, 2017
 11. [HUW] Hutton in West Plains, MO – August 17, 2017
 12. [RIS] Riverside in Kansas City, MO – September 14, 2017
 13. [DDD] Port City, in Muscatine, IA – October 12, 2017

Program Accomplishments cont'd

14. [JKS] Jacks Creek, in Jacks Creek, TN – October 12, 2017
15. [MXW] Maxwell in Maxwell, CA – October 12, 2017
16. [STE] Stevens Point in Stevens Point, WI - October 12, 2017
17. [GHM] Graham in Centerville, TN – December 7, 2017
18. [DKK] Dunkirk in Dunkirk, NY – December 7, 2017
19. [DUC] Duncan in Duncan, OK – February 1, 2018
20. [AOO] Altoona in Altoona, PA – March 29, 2018
21. [MMJ] Montour in Pittsburg, PA – March 29, 2018
22. [HZL] Hazleton in Hazelton, PA – March 29, 2018
23. [ECA] Manteca in Stockton, CA – March 29, 2018
24. [BRD] Brainerd, in Brainerd, MN – July 19, 2018
25. [DAK] Drake, in Fayetteville, AR – September 13, 2018
26. [FLP] Flippin, in Flippin, AR - September 13, 2018

Program Accomplishments cont'd

27. [HLL] Handle, in Panama City, FL - September 13, 2018
28. [HVN] New Haven, in New Haven, CT - September 13, 2018
29. [IJX] Jacksonville, in Jacksonville, IL - September 13, 2018
30. [LAN] Lansing, in Lansing, MI - September 13, 2018
31. [LJT] Timmerman, in Milwaukee, WI - September 13, 2018
32. [LWV] Lawrenceville, in Lawrenceville, IL - September 13, 2018
33. [PNE] North Philadelphia, in Philadelphia, PA - September 13, 2018
34. [PSI] Pontiac, in White Lake, MI - September 13, 2018
35. [BUU] Burbon, in Burlington, WI – Nov. 8, 2018
36. [TVT] Tiverton, in Tiverton, OH – Nov. 8, 2018
37. [RID] Richmond, in Richmond, IN - January 3, 2019
38. [RUT] Rutland, in Rutland, VT - January 3, 2019
39. [VNN] Mount Vernon, in Mount Vernon, IL - January 3, 2019
40. [GNP] Glenpool, in Tulsa, OK – Feb. 28, 2019
41. [MTW] Manitowoc, in Manitowoc, WI – Feb. 28, 2019
42. [ORD] Chicago O'Hare, in Chicago, IL – Feb. 28, 2019

Charting of MON Airports

- MON airports will be identified on FAA En Route charts, the airport entry of the FAA Chart Supplements, and included in the National Airspace System Resource (NASR) Subscriber File data set

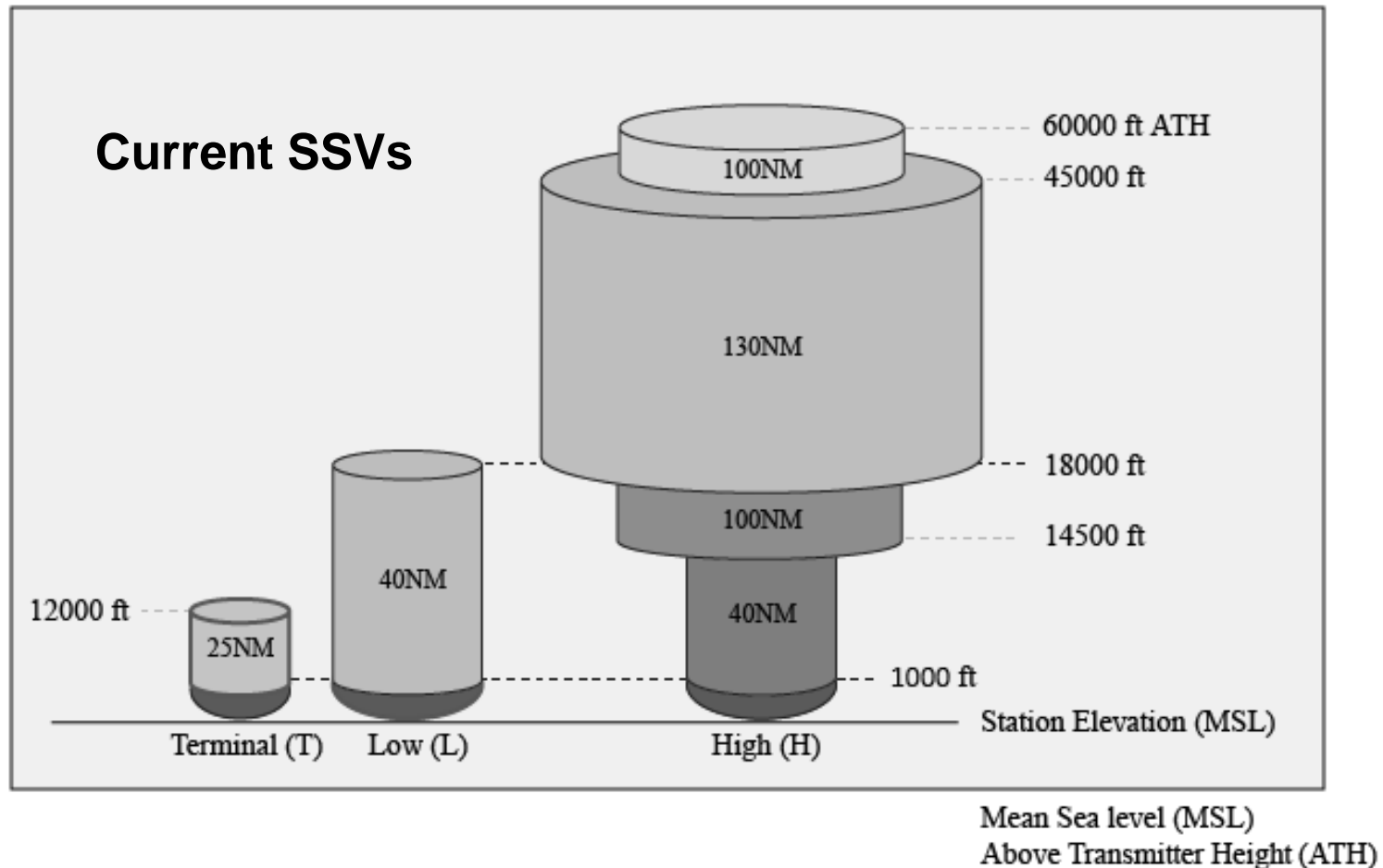
Adding VOR Standard Service Volume (SSV) Classes

- A key aspect of the VOR MON Operational Plan is the requirement to implement geometrically larger SSVs than the current legacy SSV classes of Low (L) and High (H)
- Geometrically larger SSVs take advantage of current Radio Frequency (RF) signal-in-space, without modification to existing ground-based equipment
- This allows for the overall reduction of ground-based equipment as fewer ground-based stations are required to cover the same area with RF signal-in-space

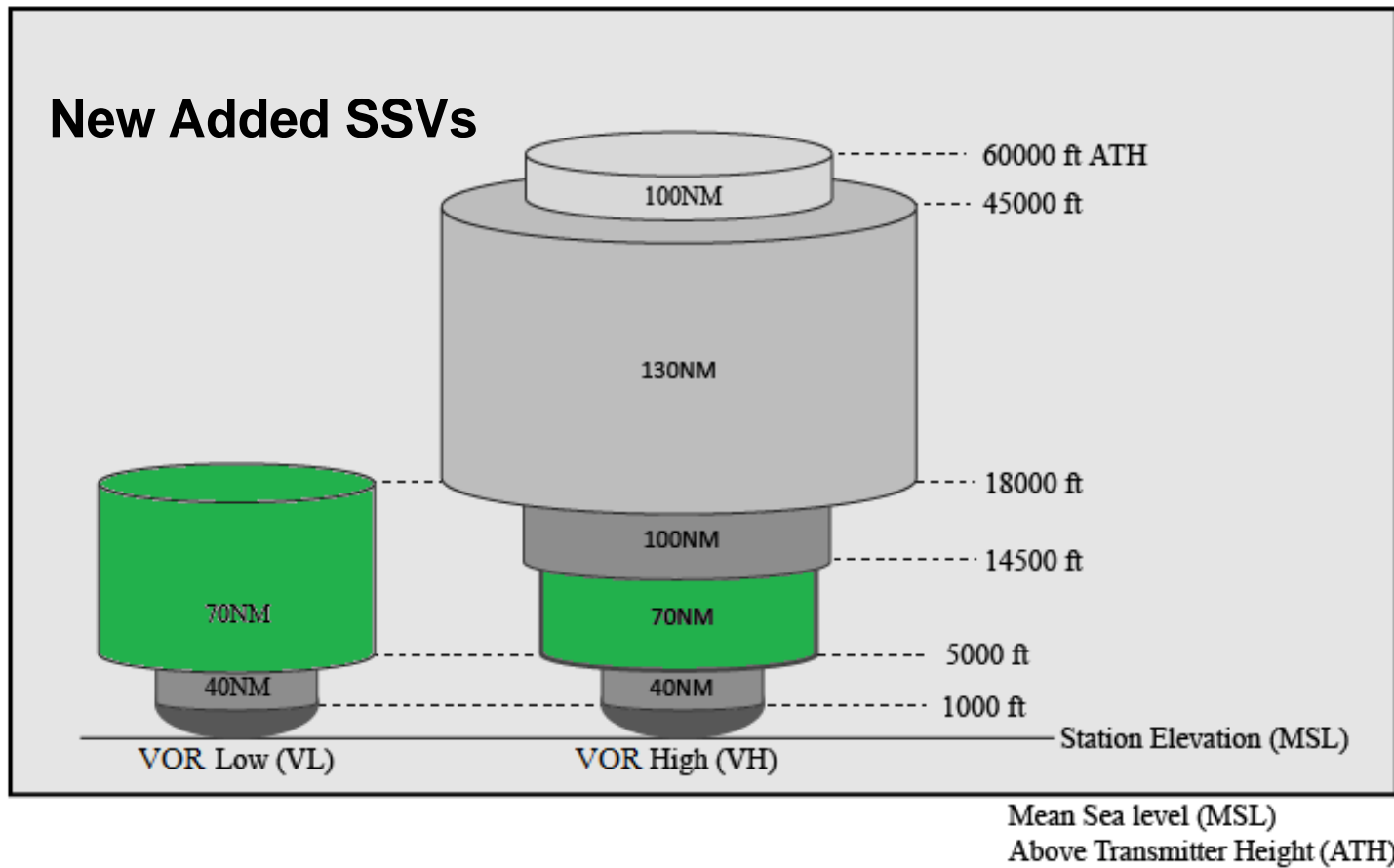
Adding VOR SSV Classes cont'd

- The new VOR SSV classes can be technically described by their geometric increase of the legacy L and H classes from 40NM to 70NM beginning at 5,000' Above Ground Level (AGL)
- However, they should be thought of as two new *Standard SV* classes and not as “extensions” of the legacy L and H classes, as “Extended Service Volumes (ESVs)” have a long-standing definition and usage, and are handled as exceptions

Adding VOR SSV Classes cont'd

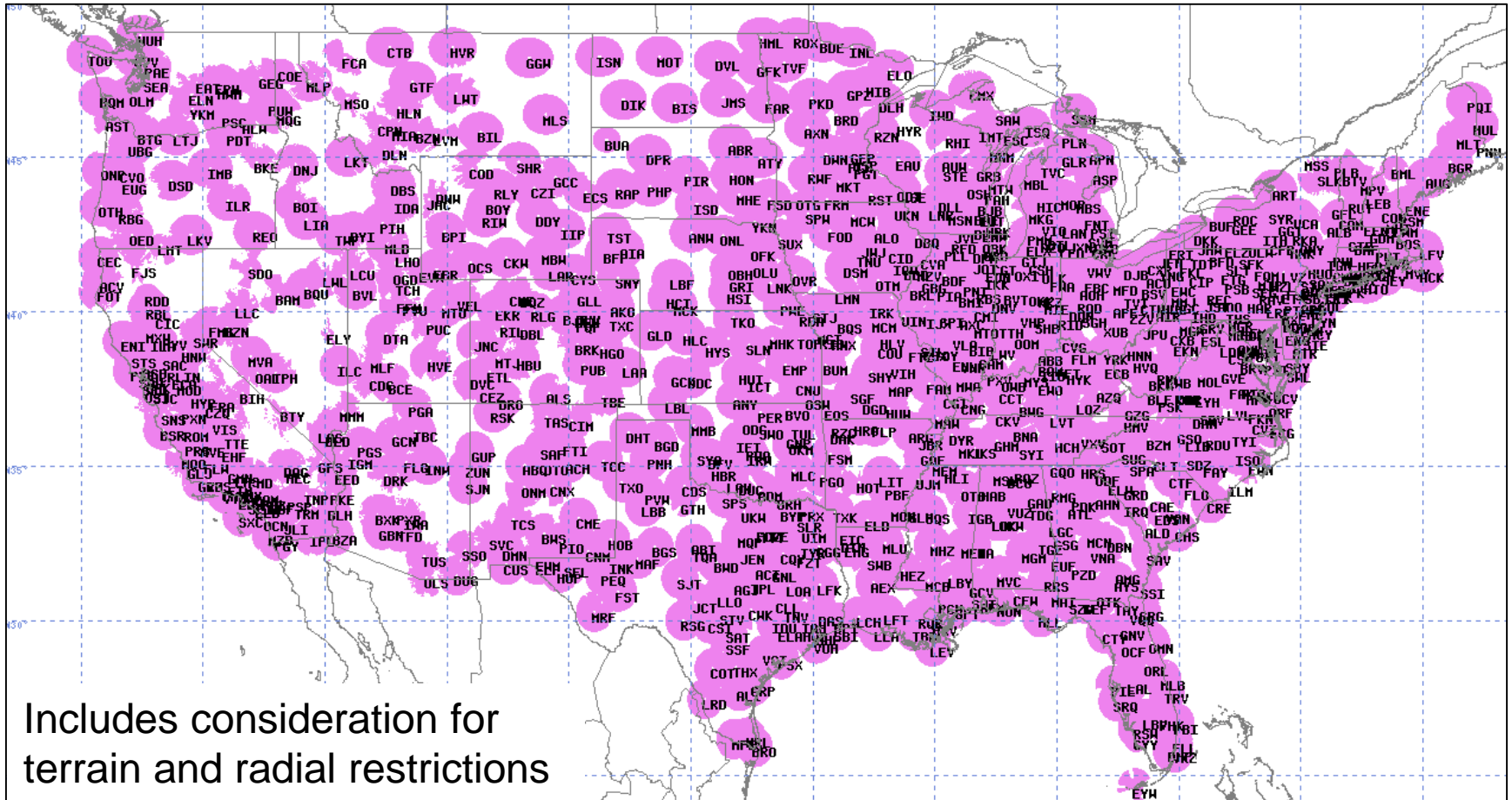


VOR MON Service Volumes



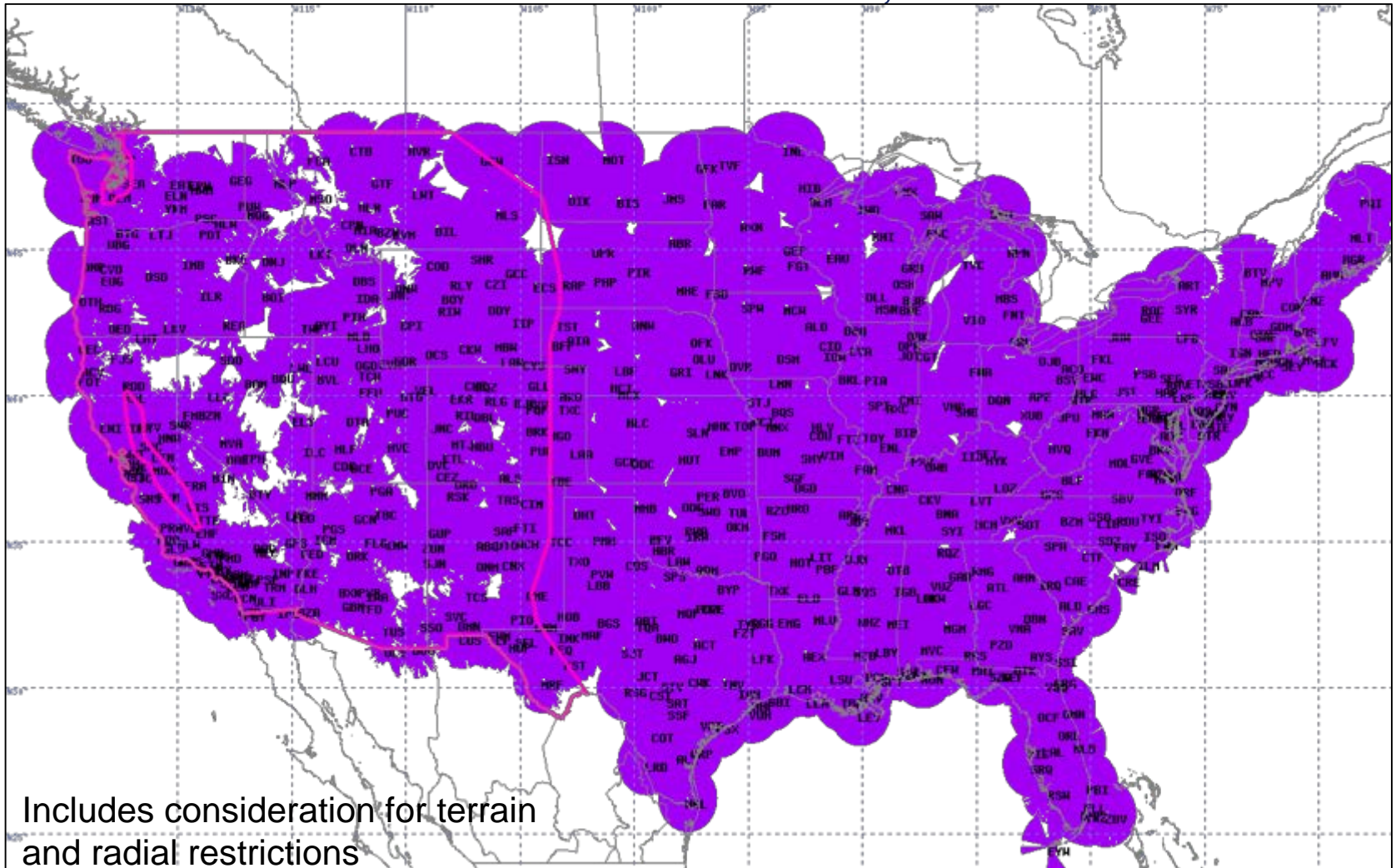
FY15 FAA VOR Network Coverage

40 NM Service Volume at 5,000' AGL



Planned VOR MON Coverage

70 NM Service Volume at 5,000' AGL



Planned Activities

- **Remaining FY19 VOR discontinuances:**

1. [ASP] Au Sable, in Oscoda, MI – June 20, 2019
2. [CSX] Cardinal, in St. Louis, MO – June 20, 2019
3. [LSE] La Crosse, in La Crosse, WI – June 20, 2019
4. [MTO] Mattoon, in Mattoon/Charleston, IL – June 20, 2019
5. [BQM] Bowman, in Louisville, KY – Aug. 15, 2019
6. [CZQ] Clovis, in Fresno, CA – Aug. 15, 2019
7. [FRM] Fairmont, in Fairmont, MN – Aug. 15, 2019
8. [GRV] Grantsville, in Grantsville, MD – Aug. 15, 2019
9. [GTH] Guthrie, in Guthrie, TX – Aug. 15, 2019
10. [HUB] Hobby, in Houston, TX – Aug. 15, 2019
11. [IKK] Kankakee, in Kankakee, IL – Aug. 15, 2019
12. [ISQ] Schoolcraft County, in Manistique, MI – Aug. 15, 2019
13. [TPL] Temple, in Temple, TX – Aug. 15, 2019

•Next Chart Cycle

Next Steps

- Receive final approval and distribution of Change 3 to FAA Order 6050.32B *Spectrum Management Regulations and Procedures Manual*
- Continue the following activities in support of VOR discontinuance and establishment of the MON:
 - Mitigation of Instrument Flight Procedures (IFPs) due to VOR discontinuances
 - Flight inspection of MON (retained) VORs

Contacting the VOR MON Program Team

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