



**Approved by the Tactical Operations  
Committee September 2014**

**VOR MON Outreach, Education and  
Required Modifications**

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*Report of the Tactical Operations Committee in Response to Tasking from  
The Federal Aviation Administration*

*September 2014*

# VOR MON Outreach, Education and Required Modifications

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## Background/Introduction

In order to transition from the use of a very high frequency (VHF) Omni-directional Range (VOR) based route structure to one based on Performance-Based Navigation (PBN), the VOR Minimum Operational Network (VOR MON) Implementation Program was established by the Federal Aviation Administration (FAA). It is one of many activities required to shift resources and operations from the legacy National Airspace System (NAS) to NextGen. The VOR MON Task Group (TG) was tasked by the RTCA Tactical Operations Committee (TOC) in July 2013 to provide recommendations to the FAA on the MON Implementation Program<sup>1</sup> so as to meet the target date of 2025.

Prior to the Task Group forming, the FAA developed initial draft VOR MON criteria and published them in the Federal Register for comment in December 2011. These criteria were further addressed in a notice in August 2012, and the VOR MON Task Group has offered additional criteria and prioritization in its recommendations. Currently, criteria for the VOR MON call for retaining VORs outside of the CONUS, those in Western mountainous regions, oceanic VORs and those in known GPS “jamming” locations. Criteria for the MON ensure that an operator can navigate to a safe landing airport within 100 NM of any point in the CONUS and full en-route coverage is provided at or above 5,000 ft AGL, enabling adequate navigation for non-RNAV capable aircraft. Where possible, retaining VORs for training purposes and the ability to hold for Core 30 airports is also considered.

The VOR MON Program went before the FAA Joint Resources Council (JRC) and was approved for Investment Analysis Readiness Decision (IARD) in March 2014. A Final Investment Decision (FID) is expected in 2015. Originally plans for the VOR MON expected completion of the MON program in 2020. However, recent assessment of the procedural modifications required to implement to the MON were conducted, and the FAA concluded the completion data of 2020 was untenable given the volume of modifications and available staff. The final implementation date of the MON was moved from 2020 to 2025. Decommissioning of individual VORs prior to FID has taken place and is planned to continue. In many cases, these VORs are not sustainable and cannot wait for FID.

The VOR MON Task Group has completed two previous tasks for the FAA to review VOR MON selection criteria and assumptions, offer additional criteria if appropriate and prioritization of criteria. At the request of the FAA, the Task Group deferred Task #3 and moved ahead to Task #4 since Task #3 was predicated on evaluating the draft PBN Route Strategy which is currently unavailable.

This report focuses on Task #4, which addresses outreach and education required to successfully implement the VOR MON. Additionally, this report advises the FAA of what existing policies, processes, procedures or training needs modification for successful implementation of the MON.

## Executive Summary

This document provides the Task Group’s response to Task #4 of the FAA Tasking letter and is focused on the outreach and education required to successfully implement the VOR MON.

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<sup>1</sup> Letter from Elizabeth L. Ray (Vice President, Mission Support Services) to Margaret Jenny (RTCA President) dated July 10, 2013.

This report provides recommendations in three broad areas: 1) the process for decommissioning VORs to achieve the MON, 2) community outreach and education before and during implementation of the MON and 3) required modifications and mitigations to successfully implement the MON.

The Task Group recognizes that the current process of decommissioning VORs is not scalable to the approximately 500 VORs targeted to reach MON objectives. The program therefore must be modified to balance the needs of stakeholders to be informed and create feedback while simultaneously allowing the FAA to review and adjudicate the comments in a reasonable amount of time with a reasonable level of resources. The TG provided recommendations aimed at balancing these needs.

The TG feels that a robust outreach and education process is foundational to the success of implementing the VOR MON. This process must notify all stakeholders, provide interaction between the stakeholders and the FAA, and allow for consideration of some exceptions. With regard to messaging, the VOR MON is not an end in and of itself, but rather a piece of the larger transition to NextGen and its inherent benefits. Therefore the message to the stakeholders must state the case for the benefits, be transparent and complete, and utilize a wide variety of channels including industry groups, the internet, social media and outreach to the Legislative Staff.

Finally, the TG believes that the third element of a successful implementation is the creation of a comprehensive list of all airspace and procedural modifications and mitigations associated with each decommissioned VOR. It is through this information that the public will fully understand the impact of the MON while also appreciating the extent of mitigation the FAA is providing in the transition to the VOR MON.

## **Process for Decommissioning VORs to Achieve the MON**

Presently, the FAA already decommissions VORs. Some VORs have been made inoperable and non-repairable due to weather or natural deterioration of the facility. Others reside on land for which a lease cannot reasonably be renewed. In such cases, the FAA follows a standard process for decommissioning a Navigational Aid (NAVAID). The initial process is a non-rulemaking process in which the FAA provides an Advisory Circular (AC) from the appropriate Service Area. Each Service Area has a list of stakeholders to whom the AC is sent. There is no requirement to publish the intent to decommission in the Federal Register.

The current process handles one NAVAID at a time, and does not scale up effectively for a VOR MON program that plans to decommission on the order of 500 VORs.

### **Current Process Flow for Decommissioning**

The following chart depicts the FAA's current process for decommissioning a navigational aid. The first row communicates the steps to identify which navigational aids are planned for decommissioning. (The current VOR MON Program is effectively doing the work depicted in the first row by identifying the 500 or so VORs that will be identified for decommissioning in the MON.)

The second row in this flow chart communicates the process for distributing notification of the plan for decommissioning, acceptance and adjudication of public comment. The final row presents the process for communicating an updated intent for decommissioning based on public comment as well as identification of any mitigations required.

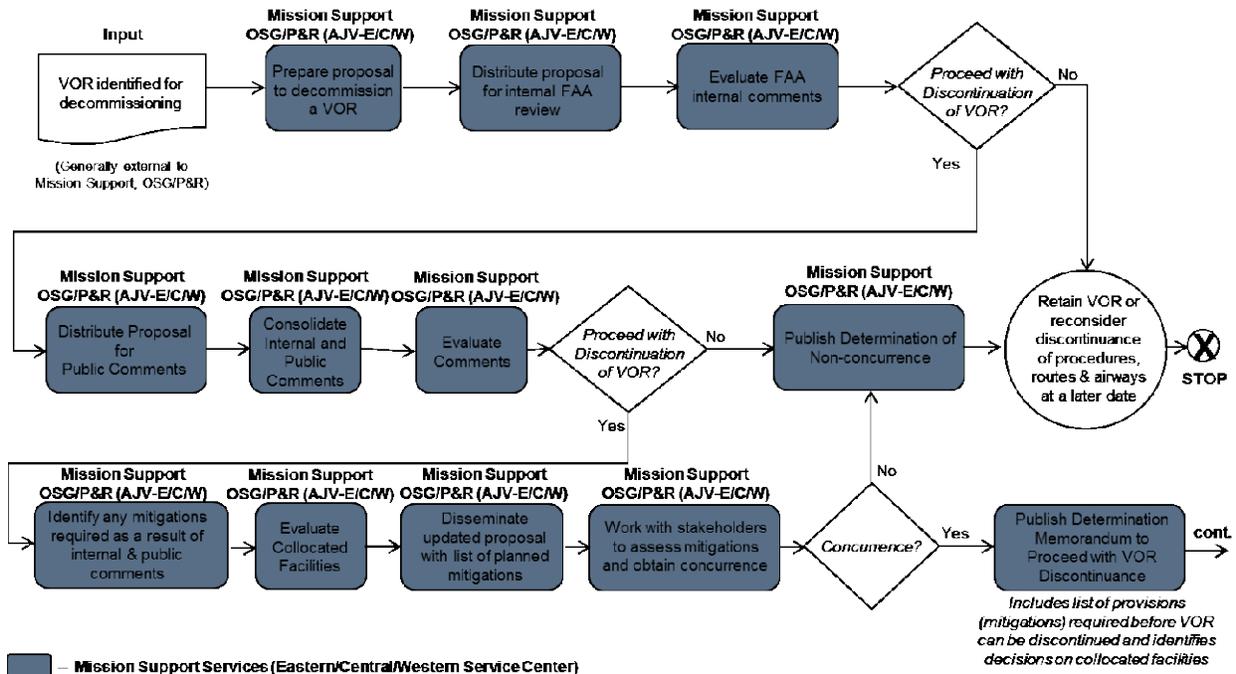


Figure 1: Current Process for Decommissioning VORs

## Guiding Principles

The VOR MON Task Group considered the following guidelines when developing recommendations for the decommissioning process:

1. Given the scale of decommissioning involved with the VOR MON, batch notification announcing all of the VORs planned for decommissioning to the public is preferable to individual notification (i.e., announce one VOR at a time).
2. The process for providing notification, gathering public comment and addressing public comment should not be so onerous to stall or delay the MON process.
3. The public comment and feedback process for one VOR should not delay the decommissioning process for other VORs.
4. Notification of the VORs planned for decommissioning should be transparent to the public and the process for making final determinations of individual VORs (the mitigations to be considered) should be included in the initial notification.
5. The work of determining the mitigations required by the VOR decommissioning must occur upfront to understand the network impacts of a large-scale VOR shutdown.

## Recommendations

The VOR MON Task Group offers the following recommendations with respect to the process for decommissioning:

1. **At the beginning of the process, the FAA should notify the public concerning the full list of VORs to be planned for decommissioning; this should be done via non-rulemaking action such as an Advisory Circular (AC). If the FAA chooses to use ACs, publication of ACs could include one for the entire MON Program or one for each Service Center. In either case, the list(s) should be broken down by State.**

The Task Group strongly recommends that the FAA publish a list of all VORs planned for decommissioning at the beginning of the notification process. It is paramount to publish the full list upfront so there are no surprises to the public later in the process about which VORs are being shut down.

Notification can be done in one or multiple Advisory Circulars. The intent of multiple ACs is to break the information down geographically to make the information more accessible. However, publication of an Advisory Circular for every individual VOR planned for decommissioning would be too onerous, both in terms of production and consumption of the information.

The Task Group also suggests publishing a notification of the VOR MON Program in the Federal Register at the same time. The specific list of VORs intended for decommissioning in the MON should not be published in the Federal Register notice; the Task Group recommends not initiating a public comment mechanism at the time of notification. Readers of the Federal Register should be referenced to the AC's for specific VOR listings.

2. **Process for decommissioning should separate the notification (non-rulemaking) component from the rulemaking components to not stall the process unnecessarily.**

Once a VOR is approved for decommissioning, any impact to procedures, routes, etc. may require rulemaking procedures which can take substantial time. Currently, the average time required for the rulemaking process around procedure or route changes is 241 days. The Task Group recommends that the notification process and, to the extent possible, feedback from and engagement with the public should be independent of any required rulemaking.

3. **The process for collecting, evaluating and adjudicating public comment should be communicated clearly in the notification of the VOR MON.**

The FAA should communicate to the public how it will adjudicate public comments.

## Recommended Process Flow for VOR MON Decommissioning

The recommendations relate to the process flow for VOR decommissioning. The following graphic depicts a simple picture of an alternate process flow for decommissioning that the Task Group is proposing for consideration:

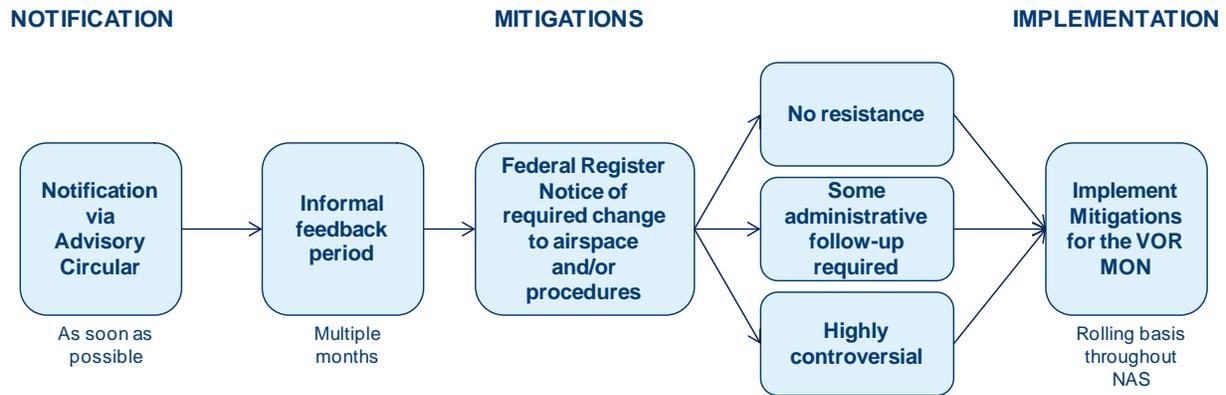


Figure 2: Simplified Alternative Process for Communicating VOR MON

The Task Group recommends that the initial notification be provided as quickly as possible and be a complete list of VORs. The initial notification is separate in process and time from the rulemaking steps of notification of procedure and route mitigations required as a result of decommissioning. This rulemaking step will require a Federal Register notice for each VOR planned for decommissioning. The time between AC notification(s) and FR notices will be a number of months during which the FAA will gain further understanding of which VORs are meeting no resistance, which require some administrative follow-up and which will be highly controversial and require additional attention, such as individual outreach or local town hall meetings. The TG expects that most VORs will be in the first category. The process as recommended is designed to informally gather feedback on which VORs will be most controversial and hence require the most allocation of resources to follow up.

## Outreach and Education on the VOR MON

The VOR MON Task Group envisions three levels of notification and communication from the FAA to the Public regarding the VOR MON:

1. The first level of communication is NOTIFICATION. This step involves a one-way flow of information from the FAA to the Public. Communication would include information about the VOR MON Program as a whole, the rationale, the value to the Public and the list of VORs and sequence for shut down. It will also include a standard template of information about each of the VORs scheduled for shutdown as part of the MON. Some tools for this phase of communication may include (but are not limited to) public notices, magazine articles, press releases, flyers, mailers, etc.
2. The second level of communication is INTERACTION. In this phase, stakeholders are expected to request information at a more local and detailed level. The Task Group does not expect that all VORs scheduled for shutdown will require extensive interaction, but some will. This may involve community town hall meetings and/or individual meetings with key local stakeholders.
3. The third level of communication is EXCEPTION. In this final phase, the FAA may take some action to evaluate exceptions and even modify the plan(s) based on new inputs unavailable until the VOR MON list is released to the public. Legitimate stakeholders with substantive concerns and feedback may sway the FAA to modify the plan(s).

## Guiding principles

The VOR MON Task Group worked from the following set of Guiding Principles in its development of recommendations on the process for Outreach:

1. The FAA should focus on providing complete information early in the process.
2. Communication about the VOR MON should include messages that the process is not ad hoc and not just a random selection of VORs. The communication should include the fact that there were criteria, criteria were weighted and the selection was based on a structured approach.
3. Messaging about the VOR MON should be focused on the flying public and why the VOR MON Program is beneficial for the flying public. While they can and should be mentioned, the messaging should not focus on benefits to the FAA.
4. Planning of and transition to the VOR MON requires the participation of three main groups: the FAA, the VOR MON Task group (and the industry they represent) and the public. Each has a role and responsibility in the process. The FAA has the responsibility to create a plan and be responsive to industry stakeholders in modifying that plan. The VOR MON Task Group has the responsibility to represent broad constituencies while providing recommendations and feedback to the FAA on the creation of criteria and implementation plans. The public has the responsibility to provide detailed feedback with legitimate concerns and questions on individual VORs.

## Recommendations

### **1. The overarching theme about the VOR MON should relate to the transition to Performance-Based Navigation (PBN) and NextGen.**

The critical message is that NextGen is anticipated to improve air travel for all parties involved, including the flying public. An important component of NextGen is industry transition to Performance-Based Navigation. This is partially enabled by moving from ground-based to satellite-based navigation. The Task Group expects that this detail can be drawn from existing information within the FAA's NextGen Office.

The message should also communicate the idea that the VOR MON is a natural consequence of the transition to NextGen. Part of the transition to PBN is a reduced need for legacy equipment and procedures as well as a necessary reallocation of human resources to fully support the new PBN operation. This financial and human resource reallocation drives the need for the VOR MON. Finally, the message should include the list, and aggregated information on the age of the VORs and expenses to maintain the current VOR inventory.

Additionally, the message should include background on the process for developing the VOR MON list. This includes the idea that there has been a rigorous process involving quantitatively weighted criteria and formal input from industry.

The Task Group also notes that within the transition to PBN, the VOR MON is not the only valuable step being taken as part of this transition. The FAA should be able to communicate the full set of changes

associated with the move to PBN that the Industry and Public may care about.

**2. To ensure transparency, the FAA should provide a published VOR MON plan, including plans for decommissioning VORs, as soon as possible.**

A published VOR MON plan helps the aviation industry to move forward and plan in earnest for the VOR MON. (Industry participants do not want to outpace the FAA in any decisions.) Also, published plans help the industry support protection of FAA funding for the VOR MON Program.

A component of this communication should recognize that the pilot community will be a critical recipient of this information. Communications that help pilots understand the changes taking place and their impact on training, charting, flight planning and other aspects of the operation are of particular importance.

Finally, the FAA should be clear in its publications that the VOR MON may continue to evolve even after publication. For example, if a VOR planned for decommissioning is ultimately retained in the MON, it may be swapped into the MON for another VOR that was not originally planned for shutdown. While the FAA should work to minimize the number of these changes, the Task Group recognizes some will be inevitable.

### **Recommendations on Tools for Communication about the VOR MON**

**3. FAA should accept the support of industry organizations to help communicate the message about the VOR MON.**

Industry organizations, such as the National Business Aviation Association (NBAA), Airlines for America (A4A) and the Aircraft Owners and Pilots Association (AOPA) are willing to help advocate this effort to their members. The organizations need as much information as possible in a well structured format to support the FAA in communicating the rationale, approach and mitigations to their members in a way that makes sense for each organization. The organizations are willing to have “skin in the game” for communication of the VOR MON. Events such as A4A Ops Council, NBAA events, ACF, Oshkosh, Sun n’ Fun are forums in which the VOR MON Program could be communicated.

Though these organizations are willing to support outreach, any public form of communication should be led by the FAA in partnership with other industry organizations. Ultimately, public stakeholders are interested to hear the message from the FAA directly. The organizations can help provide the forums and opportunities to deliver the communication, but the FAA needs to lead the actual communication process.

Finally, while organizations can provide the forums to communicate the overarching storyline about the VOR MON, any engagement or dialogue on specific VORs would be between the public and the FAA directly.

**4. Utilize the internet and social media to communicate about the VOR MON.**

The Task Group recommends the FAA create a VOR MON website that communicates a graphical version of the VOR MON storyline. Such a website could depict a graphical version of the VOR MON, i.e., which VORs are planned for shutdown, what the alternatives are, safe landing airports from any point in

the NAS, etc. The website could allow users to “mouse over” any VOR and learn about its specific plans as part of the MON. Such a website could be a very effective means of communicating the complex details of the VOR MON. Additionally, utilization of Social Media options such as Facebook and Twitter should be employed to broadly communicate the messages about the VOR MON. The FAA may consider providing geographically targeted information to General Aviation pilots to alert them of VORs scheduled for decommissioning in their region (as opposed to the 500 or so in the entire NAS).

**5. The FAA should actively reach out to Legislative Staff to ensure they understand the Program and the approach and rationale for decision-making.**

The FAA should outreach to Congressional Staff about the VOR MON Program. Additionally, the FAA should communicate about the VOR MON to the Legislative Staff of industry organizations to ensure that all parties have the same information about the VOR MON.

## **Recommendations on Required Modifications for the VOR MON**

The VOR MON Task Group considered the different modifications required for successful implementation of the MON. The TG offers the following recommendations on required modifications to policies, processes, procedures or training for successful implementation of the MON:

### **Required Modifications to Procedures**

The Task Group offered the following recommendations in its initial Recommendation for Task #1, submitted in November 2013. The Group believes that the following required considerations for modifications to procedures represent the most important requirements in the transition to the VOR MON:

- All Standard Arrival Routes (STARs), Standard Instrument Departures (SIDs), Instrument Approach Procedures (IAPs) (to include Missed Approaches and One Engine Inoperative (OEI) procedures) that have the targeted VOR as part of the procedure.
  - All Obstacle Departure Procedures (ODPs) and take off minima that are dependent on the targeted VOR.
  - All Holding Patterns, Pref Routes, Fixes, Airways (high/low) and VOR CHKPs dependent on the targeted VOR.
  - Non-navigation services provided by the targeted VORs – for example, communications (Flight Service Stations (FSS), Hazardous Inflight Weather Advisory Service (HIWAS), Automatic Terminal Information Service (ATIS)) references to intersections and waypoints that define Special Activity Airspace (SAA), Notices to Airmen (NOTAM), Letters of Agreement (LOA), Sigmets/Airmets, PIREPS, airspace classifications, Temporary Flight Restrictions (TFRs), military training routes, air refueling tracks, intra-/inter-facility letters of agreement and Memorandums of Understanding (MOUs).
    - All AeroNav Chart products that depict the VOR.
  - For each item identified above, the FAA needs to decide and document, in coordination with the user community (a) no mitigation or replacement is necessary, and the rationale why or (b) a mitigation or replacement is needed, a description of the mitigation/replacement and the effective date. Both (a) and (b) will include a cost/benefit analysis to include user costs/impacts. To the maximum extent possible, no VOR shall be decommissioned prior to implementing the mitigation or publishing the replacement procedure.

## Single Engine Inoperative

The recommendations discussed in the previous section relate to all Instrument Approach Procedures, including One Engine Inoperative procedures. The FAA, in its response letter to the Task #1 Recommendation, noted that OEI procedures were typically designed by operators or third party vendors, and the FAA did not have access to this information. The FAA requested feedback on how it should address the Task Group's recommendation as it relates to OEI procedures.

The Task Group recommends that operators retain responsibility for adjustment of these procedures. For the operators to effectively adjust their internal procedures, they require ample advanced notification of all VORs planned for decommissioning. This will allow operators to evaluate which VORs are most critical to internal company procedures. With this notification, the onus falls on the operators to evaluate and adjust their procedures. This provides further emphasis on the FAA providing the full list of VORs planned for decommissioning upfront in the notification process.

In addition to large commercial and business aviation operators, the Task Group recommends the FAA communicate the list of VORs planned for decommissioning to large membership organizations such as A4A, NBAA and NATA. Also, the performance engineering companies should be directly contacted to inform them of the VOR MON in light of their work with flight departments/airlines on OEIs. Finally, chart vendors often create company procedures on behalf of an operator, and these vendors should be actively notified about the MON as well.

## Required Modifications to Publications

There are multiple publications that require an explanation of the VOR MON, a listing of affected airports and a listing of safe-landing airports. These publications include:

- Aeronautical Information Manual (AIM)
- Airport/Facility Directory (AFD)
- Instrument Procedures Handbook (IPH)
- Instrument Flying Handbook (IFH)
- Controller Handbook (7110.65)

## Required Modifications to Notifications

- There may be required changes to IFR charting if there is either a requirement to depict the VORs that will remain as part of the VOR MON or to depict VOR MON safe landing airports on charts. As the transition to the VOR MON will take place over many years, it would be beneficial for charts (paper and electronic) to depict those VORs that will remain once the drawdown is complete as well as those airports designated as safe landing airports. The Task Group notes that such discussion should be referred immediately to the Aeronautical Charting Forum (ACF) for the October 2014 ACF meeting.
- The NOTAM service needs a process for notification of a GPS event. Currently there are NOTAMs provided for DoD GPS jamming tests. Such NOTAMs should continue and any additional loss of GPS signal, whether scheduled or unscheduled, should be included in the NOTAM service. One specific example of this is required maintenance down times for VORs within the MON. When such down time occurs, the MON will have gaps in its required 100 nm or less for a safe landing airport. Such gaps would require prioritization in NOTAM information.

## Required Modifications to Training and Operations

- Should GPS be unavailable in certain parts of the country, there may be a need to define VOR MON operating procedures. There are multiple considerations in the event of an outage: Do aircraft have to land immediately? Should aircraft continue to operate to the closest safe landing airport? Should they operate to the safe landing airport nearest their original destination? Etc. When a MON scenario develops, procedures that pilots use like calculating “Bingo fuel” in the hold may need a different approach than in non-MON scenarios. The Task Group believes that FAA Flight Standards will have to evaluate such scenarios and identify the appropriate operating rules, if any are required.
- With the implementation of the VOR MON, training on aeronautical decision making in conjunction with the MON should be developed for pilots. Operators will need a mechanism to identify the closest safe landing airport during operations. This may require charts that depict the closest MON airport at any point in the NAS.
- Navigational databases will need to be updated to reflect the VOR MON as it evolves. The industry as a whole may consider providing additional color coding on charts to alert pilots of VORs that are planned for decommissioning as part of the MON. This would be another agenda item for consideration by the Aeronautical Charting Forum.
- As part of Instrument Rating and an Airline Transport Pilot (ATP) License, training may be required on the existence of the VOR MON and safe landing airports as well as how a pilot would operationally use the VOR MON in the case of a GPS outage in Instrument Meteorological Conditions (IMC).
  - There may be a need for an Advisory Circular that explains VOR MON operating procedures.
  - When the MON is operational in a region, there may be a need for training and testing on the MON.
- Training will be required in ATC facilities on new procedures resulting from the MON.
- Training for inclement weather may require changes such as diversion decisions for military aircraft that may only land at one of the safe landing airports
- Testing standards may include use of the VOR MON. Such testing may involve the Flight Review or Instrument Proficiency Checks for General Aviation, air carrier recurrent training, controller recurrent training, etc.
- 
- While this may be beyond the scope of the VOR MON, the FAA must plan for managing operations in the case of a large scale GPS outage. Training must be in place, especially in high density operations. Some level of route structure may be warranted to assist controllers in sequencing aircraft.

## Appendix A: Members of the VOR MON Task Group

Kal Bala	RTCA, Inc.
Phillip Basso	DoD Policy Board on Federal Aviation
Rich Boll	National Business Aviation Association
Andy Cebula	RTCA, Inc.
Dale Courtney	Federal Aviation Administration (Subject Matter Expert)
<b>Donald Dillman</b>	<b>Airlines for America (Co-Chair)</b>
Bob Ferguson	NetJets Association of Shared Aircraft Pilots
Denise Fountain	DoD Policy Board on Federal Aviation
Jens Hennig	General Aviation Manufacturers Association
Mark Hopkins	Delta Air Lines, Inc.
Tom Kramer	Aircraft Owners and Pilots Association
<b>Bob Lamond</b>	<b>National Business Aviation Association (Co-Chair)</b>
Deborah Lawrence	Federal Aviation Administration (Subject Matter Expert)
David Manville	U.S. Army
Vince Massimini	The MITRE Corporation
Don McClure	Air Line Pilots Association
Trin Mitra	RTCA, Inc.
Rick Niles	The MITRE Corporation
Matthew Ross	Real NewEnergy
Edwin Solley	Southwest Airlines
Stephen Sorkness	SkyWest Airlines
Greg Tennille	The MITRE Corporation
Robert Utley	National Air Traffic Controllers Association
David Vogt	Delta Air Lines, Inc.

## Appendix B: Glossary of Acronyms

- A4A – Airlines for America
- AC – Advisory Circular
- ACF – Aeronautical Charting Forum
- AFD – Airport/Facility Directory
- AIM – Aeronautical Information Manual
- AOPA – Aircraft Owners and Pilots Association
- ATIS – Automatic Terminal Information Service (ATIS)
- ATP – Airline Transport Pilot
- DoD – Department of Defense
- FAA – Federal Aviation Administration
- FID – Final Investment Decision
- FSS – Flight Service Stations
- GPS – Global Positioning System
- HIWAS – Hazardous Inflight Weather Advisory Service
- IAP – Instrument Approach Procedure
- IARD – Investment Analysis Readiness Decision
- IFH – Instrument Flying Handbook
- IMC – Instrument Meteorological Conditions
- IPH – Instrument Procedures Handbook
- JRC – Joint Resources Council
- LOA – Letter of Agreement
- MOU – Memorandum of Understanding
- NAVAID – Navigational Aid
- NBAA – National Business Aviation Association
- NOTAM – Notice to Airmen
- ODP – Obstacle Departure Procedure
- OEI – One Engine Inoperative
- PBN – Performance Based Navigation
- SAA – Special Activity Airspace
- SID – Standard Instrument Departure Route
- STAR – Standard Arrival Route
- TFR – Temporary Flight Restriction
- VOR MON – Very High Frequency Omni-Directional Range Minimum Operating Network

## **Appendix C: FAA Tasking Letter**



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

Mission Support Services  
800 Independence Avenue, SW.  
Washington, DC 20591

JUL 10 2013

Ms. Margaret T. Jenny  
President  
RTCA, Inc.  
1150 15th Street, NW  
Suite 910  
Washington, DC 20036

Dear Ms. Jenny:

In order to provide navigation services in a more efficient and cost effective manner and meet the goals of the Next Generation Air Transportation System (NextGen), a transition from the use of a very high frequency Omni-directional Range (VOR) based route structure to that of a Performance-Based Navigation (PBN) based route structure is necessary and underway. To meet the goals of NextGen, current processes for defining airways, routes, and developing procedures using VORs must give way to routes and procedures with improved accuracy, availability, integrity, and continuity using PBN. The VOR Minimum Operational Network (VOR MON) Implementation Program has been established and is one of a myriad of activities required to shift resources and operations from the legacy National Airspace System (NAS) into NextGen. The VOR MON Program is designed to be a collaborative effort, which includes various lines of business (LOBs) within the Federal Aviation Administration (FAA) as well as numerous aviation stakeholder groups, to provide the tactical and strategic planning and implementation guidance to safely and systematically transition from a legacy network of 967 VORs to a MON of approximately 500 VORs by January 1, 2020.

The timing of the VOR MON Program is critical. Our current operating system of Federal Airways is based on 546 VOR/tactical air navigation (TACAN)s and 421 VOR/distance measuring equipment (DME)s. All of these VORs are beyond their economic service life. By 2020, the FAA projects the widespread availability of PBN procedures and the mandate of Automatic Dependent Surveillance-Broadcast (ADS-B) Out will result in most operators having a global positioning system (GPS) or wide area augmentation system (WAAS) and flying both PBN and conventional procedures using PBN avionics. This transition to PBN as the primary means of navigation will result in a significant decrease in the reliance on VORs. The remaining VORs will serve as a backup navigation service to non-DME/DME/Inertial Reference Unit equipped aircraft but PBN functionality will be limited. The VOR MON will provide backup navigation services to non-GPS and non-WAAS equipped aircraft but it will not be as efficient.

The VOR MON is envisioned to allow an aircraft to safely navigate VOR to VOR to land at an airport with a GPS independent approach within 100 nautical miles (nm) of any location within the Continental United States (CONUS). Efforts are ongoing to identify Alternative

Position, Navigation, and Timing solutions that will provide a full-scale backup system to GPS and are separate from the VOR MON effort. The FAA developed the initial draft VOR MON criteria and published them in the Federal Register for comment in December 2011. Based on comments, the criteria were clarified and a draft candidate list was established. Based on the draft candidate list, the VOR MON Program Office worked with the Service Areas and various FAA Headquarters organizations and identified some preliminary implementation issues. We also held some early discussions with the Department of Defense (DoD) to facilitate future coordination and to assess any impacts to DoD CONUS operations. TACAN and DME are not considered by the VOR MON program. Several other stakeholder groups have also been briefed about the program but we are requesting the assistance of the Tactical Operations Committee (TOC), to provide recommendations in three key areas:

Task One – Review and validate the VOR MON selection criteria and assumptions and make additional recommendations as needed.

Task Two – Review and validate the draft candidate VOR MON list, based on the above criteria.

Task Three – Review implementation planning to date and make recommendations to the preliminary waterfall schedule developed by the FAA.

Task Four – Provide recommendations to the FAA on outreach and education that should be accomplished to prepare the industry for the VOR MON reduction. More detail on each task follows.

### **Task 1: Review and validate the VOR MON selection criteria and assumptions**

We plan to transition from VOR defined route structures as the primary means of navigation to PBN using Area Navigation (RNAV) and Required Navigation Performance (RNP) by January 1, 2020. Since VORs do not enable advanced RNAV, RNP, or ADS-B operations, FAA will reduce operating costs by reducing the number of FAA-provided VORs and associated conventional procedures and routes. Reductions in VORs will be limited to the CONUS. Most VORs in the western mountains and all FAA- owned VORs outside CONUS will be retained. Remaining VORs will form the VOR MON and will accomplish the following:

- Provide navigation coverage above 5000 feet above ground level.
- Allow an aircraft in the CONUS to fly safely VOR to VOR or to a safe landing site with a GPS-independent approach within 100 nm of any location in CONUS.
- Support international arrival routes and operations at the Core 30 airports.
- Support Hazardous In-Flight Weather Advisory and Flight Service Station voice services.

We request the TOC:

- Review and validate the basic program assumptions made to date concerning the selection criteria. We will ensure the TOC has complete information on studies and analysis done to date as well as access to subject matter experts within the FAA.
- If amendments are recommended, please provide specific details with the recommendations to include the range of options and/or alternatives discussed.

We request this tasking be complete by January 2014 with an interim report in October 2013.

### **Task 2: Review and validate the draft candidate VOR MON list**

Based on the criteria noted above, we have developed a preliminary candidate list for the VOR MON. Those VORs not on the list would be slated for discontinuance. FAA Service Areas have reviewed the lists and commented based on the criteria above. We request the TOC:

- Review and validate the candidate VOR MON list based on the criteria and, if the TOC recommends amending the criteria, update the candidate list based on the amendments as appropriate. If specific options were considered but not adopted via consensus, please provide the range of options and/or alternatives considered.
- Advise the FAA from a stakeholder perspective on why, how, and whether exceptions should be made to valid criteria. Again, please provide specific details to include the range of options and/or alternatives discussed.

We request this tasking be complete by April 2014 with an interim report in January 2014.

### **Task 3: Review implementation planning to date and make recommendations to the preliminary waterfall schedule developed by the FAA**

We have identified the need to develop a waterfall schedule taking into account instrument procedures cancellation activities, Optimization of Airspace and Procedures in the Metropolises, and the development of high altitude (Q) and low altitude (T) area navigation routes. Clearly the effort has to be carefully coordinated with other activities which result in the development and charting of instrument flight procedures and routes in the NAS. Each VOR not on the candidate MON will likely have numerous conventional procedures or routes associated with the VOR. These procedures and routes will either need to be replaced or canceled. The order or timing of VOR cancellations must not reduce safety in the NAS. For example, Victor 3 extends from Maine to Florida and has 14 VORs identified for discontinuance/decommissioning. Should we implement based on an entire route like this?

Should we transition the entire route to a PBN based route structure first and retain end to end flight planning capability and minimize automation issues? We request the TOC:

- Examine and analyze the PBN Route Strategy in light of the VOR MON Program and recommend up to three possible implementation/waterfall scenarios. Advise the FAA of the pros and cons of each. If incremental actions are needed in any of the scenarios, please identify those with specificity. Please include the range of options and/or alternatives discussed in the documentation. We will provide the TOC with a draft copy of the PBN Route Strategy.
- Provide recommendations on which victor and jet routes should be retained in the 2013-2020 timeframe and why. Please include the range of options and/or alternatives discussed in the documentation.
- Provide high level industry perspective on the feasibility and actions needed to completely retire the legacy route structure after 2020.

We request this tasking be complete by July 2014 with an interim report in April 2014.

**Task 4: Provide recommendations to the FAA on outreach and education that should be accomplished to prepare stakeholders for the VOR MON reduction**

- Advise the FAA, from an external stakeholder perspective, of what existing policies, processes, procedures or training will need to be modified to successfully implement the VOR MON.
- Advise the FAA on an outreach strategy to include modes of outreach, timelines, etc. and provide recommendations on how the industry can assist the FAA in outreach efforts.

We request this tasking be complete by July 2014 with an interim report in April 2014.

Sincerely,



Elizabeth L. Ray  
Vice President, Mission Support Services  
Air Traffic Organization