



International Civil Aviation Organization

MIDANPIRG Communication, Navigation and Surveillance Sub-Group

Twelfth Meeting (CNS SG/12)
(Amman, Jordan, 2-4 May 2023)

Agenda Item 4: CNS Planning and Implementation in the MID Region

LATEST UPDATES ON FREQUENCY FINDER TOOL

(Presented by the Secretariat)

SUMMARY

This paper presents the latest work, enhancements and functionalities brought to the Frequency Finder tool to assist ICAO Regional Offices and States to manage and coordinate aeronautical frequency assignments and SSR Mode S II/SI codes.

Action by the meeting is in paragraph 3.

1. INTRODUCTION

1.1 Frequency Finder (FF) is a program for managing, assessing compatibility and presenting frequency assignments for aeronautical communication and navigation systems as well as for the coordination of SSR Mode S Interrogator Identifier (II) / Surveillance Identifier (SI) codes. ICAO developed the program to offer a tool to assist ICAO Regional Offices and States to manage and coordinate aeronautical frequency assignments and SSR Mode S Interrogator Codes (IC).

2. CURRENT WORK ON FREQUENCY FINDER AND FUTURE ENHANCEMENTS

2.1 The Frequency Finder program currently combines the database management functions for updating the ICAO COM Lists 2 and 3 as well as the SSR list for SSR Mode S II/SI codes.

2.2 *The VHF-Communication (COM) and the VHF-Navigation (NAV) Modules.*

2.2.1 Channel Space Reduction

2.2.1.1 The issue of frequency saturation for the VHF Navigational aids in the MID Region is of high importance. It was reiterated (C. 19/21 - CNS SG11-Report refers) that MID States should continue to update the ICAO frequency Global database as a first step to minimize any erroneous data, which might contribute the frequency saturation for the VHF Navigational aids. The frequency band 108.000-117.975 MHz with 100kHz channel spacing falls short to satisfy the actual demand from the rapid development of the civil aviation industry and the substantial increase in the number of Radio Navigation Stations (RNS).

2.2.1.2 ICAO frequency finder tool fully supports 50 kHz channel spacing; States who have not already implemented or planned to implement the 50 kHz channel spacing for ILS/VOR facilities are strongly encouraged to do so (MIDANPIRG CONCLUSION 19/21 refers). While most of these States indicated no issues in implementation/planning, States should ensure the aircraft operating in their airspaces are able to support the use of 50 kHz channel spacing. It is encouraged that IATA would advise their member airline operators about the capability of their aircrafts avionics in operating with 50 kHz channel spacing for ILS/VOR facilities. States should also confirm with other relevant stakeholders that use ILS/VOR facilities on their ability to operate with such 50 kHz channel spacing.

2.3 *Frequency Planning Requirements/Criteria for the MID Region*

2.3.1 The latest revisions of the Handbook on Radio Frequency Spectrum Requirement for Civil Aviation (Doc 9718), Volume I and Volume II, which have been approved by the Secretary-General for publication, were formally published in early 2022. The Frequency Management Working Group should further review and amend, as deem necessary, the current MID allotment plan as at Appendix B to this WP (Appendix B-4. Regional frequency allotment plans – ICAO Doc. 9718, Vol. II refers), to increase the amount of spectrum that can be used for ATC Services.

<u>Conclusion xxx (CNS SG/12):</u>	
Review of the MID Region allotment plan by the FSWG to adopt the revised planning Principle for Aeronautical Frequency Bands of 117.975-137 MHz	
What: FM WG to revise the MID Region Allotment plan. That, Doc 9718, Handbook on Radio Frequency Spectrum Requirements for Civil Aviation, Volume II, Second Edition – 2022, is adopted as the planning principle for aeronautical facilities and services operating in the aeronautical frequency bands of 117.975-137 MHz in MID.	Expected impact: <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To increase the amount of spectrum that can be used for ATC Services	Follow-up: <input type="checkbox"/> Required from States
When: 2024	
Who: <input type="checkbox"/> Sub groups <input type="checkbox"/> MID States <input checked="" type="checkbox"/> ICAO MID RO <input type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> Other: FM WG	

2.4 *Simulation of VHF COM Frequency requirements for the next 10 years*

2.4.1 The increase of the expected VHF spectrum availability and with the expected changes in air traffic, a recommendation was formulated at the ACAO/ICAO Frequency Management workshop, Casablanca, Morocco 6-10 June 2022, to conduct a simulation on VHF COM frequency assignment in the MID Region based on the new operational requirements of States to 2030 as necessary. The primary purpose of this simulation is to determine, if a congestion in the use of frequencies can be foreseen that would require the implementation of 8.33 kHz channel spacing in any parts of the MID Region.

2.4.2 States are therefore requested, to check if all frequency assignments that are in use are also registered in FF. Only frequency assignments in the Frequency COM List 3 can be considered to be protected from harmful interference during future frequency assignment planning activities. The secretariat proposed that Appendix A of this WP be used to guide States for any frequency assignment that has not yet been submitted to the MID Regional Office.

2.4.3 The meeting invites therefore States/Administrations to submit these requirements to the MID Regional Office by **1 August 2023**. The analysis will be aimed at determining whether these requirements can be assigned a frequency within the available 25 kHz channels. In case not all frequency requirements until 2030 can be satisfied using 25 kHz channels, material for the introduction

of 8.33 kHz channel will need to be developed or other viable solution in the MID Region or parts thereof. Based on European experience, the introduction of 8.33 kHz channel separation would require a retrofit of airborne/ground equipment. If the MID States decide to reduce the number of frequencies allocated for the AOC, then there might not be a need for an immediate implementation of 8.33 kHz channel spacing.

<u>Conclusion xxx (CNS SG/12):</u> <i>Submission of Frequency Requirements for the Period 2023 – 2030 by MID States</i>	
What: That, MID States submit their frequency requirements for the period of 2023 - 2030	Expected impact: <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To conduct a simulation for VHF COM frequency assignment based on new operational requirements of States to 2030 as necessary	Follow-up: <input type="checkbox"/> Required from States
When:	
Who: <input type="checkbox"/> Sub groups <input checked="" type="checkbox"/> MID States <input checked="" type="checkbox"/> ICAO MID RO <input checked="" type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

2.5 *Frequency Coordination*

2.5.1 On frequency coordination, States should, to the extent possible use FF to coordinate for all frequency assignments that may affect the use of frequencies in other States. Not doing so will ultimately result in less efficient and less flexible assignment coordination and planning in a congested environment, ultimately resulting in unforeseen interference. Furthermore, there will little possibility of optimizing assignments to solve congestion, or conducting a meaningful simulation at the regional level.

<u>Conclusion xxx (CNS SG/12):</u> Frequency coordination for aeronautical frequency bands of 190-526.5 kHz, 108-117.975 MHz, 960 – 1215 MHz and 117.975 to 137 MHz.	
What: That, States coordinate with ICAO MID Office before assigning frequencies for aeronautical services in the frequency bands of 190-526.5 kHz, 108-117.975 MHz, 960 – 1215 MHz and 117.975 to 137 MHz.	Expected impact: <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To optimize the frequency assignment planning and solve congestion at regional level.	Follow-up: <input type="checkbox"/> Required from States
When:	
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> MID States <input checked="" type="checkbox"/> ICAO MID RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other: XXXX	

2.6 *Identification of errors in frequency assignments and the importance of accuracy of the information entered into the Frequency Finder database by States in FF (all Regions)*

2.6.1 States need to make certain of the accuracy of the information entered in the FF database. For example, missing or wrong coordinates can provide false results or mislead during the performance of the compatibility calculations and may result in showing inexact compatibilities/incompatibilities with adjacent States and wrong co- and adjacent channel calculations.

2.6.2 Further, States are strongly encouraged and requested to use the FF tool to review all parameters (coverage, location, latitude, longitude etc) and test all frequencies.

Conclusion xxx (CNS SG/12):	
MID States to review/update the data entered in the VHF/NAV module of FF	
What: That, States to perform an update/review of the data in the VHF-COM/NAV module	Expected impact: <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To optimize the frequency assignment planning and solve congestion at regional level.	Follow-up: <input checked="" type="checkbox"/> Required from States
When:	
Who: <input type="checkbox"/> Sub groups <input checked="" type="checkbox"/> MID States <input checked="" type="checkbox"/> ICAO MID RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other: XXXX	

2.6.3 After all details for a new or modified frequency assignment have been entered in FF and tested, the user can decide to keep the modified (or new) frequency assignment in the local database as a draft entry and start coordination with ICAO. In principle, the draft entry should be converted as early as possible into a registered frequency and should be submitted to the RO for international coordination and uploaded to the server.

2.7 *Continuous Enhancement and Future Work*

2.7.1 There are several other enhancements planned to be developed and implemented (such as adding simulation capability, better cyber resilience of the tool) to facilitate efficient use of spectrum, assisting States and ICAO regional offices to visualize the current and future frequency congestions as well as to identify the optimal spectrum assignment globally and regionally.

2.7.2 Further work on the calculation of buffer zones for areas services (and for ILS keyhole coverage areas) as well as introducing the use of terrain data to better visualize on the map the coverage of the VHF stations is necessary but cannot be completed with additional resources being available.

2.7.3 Other updates to FF were undertaken, which are more of a nature of ongoing improvements and improvement of user-friendliness usage of the tool.

2.8 *A Standalone Version of Frequency Finder Tool for the SSR Module*

2.8.1 The distribution of the runtime version to States has been provided in separate files, one for VHF-COM together with the NAV frequencies and one for SSR module since in States it may not always be the same person that is looking after SSR codes and looking after frequencies. For the remainder, the functions on the Start screen are the same as in earlier versions.

2.9 *Facilitation of the Interrogator Code (IC) Assignments in all ICAO Regions.*

2.9.1 More and more Mode S radars are deployed worldwide. The number of available II codes is not sufficient to accommodate this increasing number of Mode S radars. Therefore, the use of SI code becomes necessary in some regions (already used in ICAO EUR and ICAO MID Regions, coming in ICAO APAC Region).

2.9.2 Additional guidance on the assignment of II codes and SI codes to Mode S radars depending on the capability of the Mode S radar and Mode S transponders were therefore proposed for amendment to the Aeronautical Surveillance Manual (Doc 9924) - ASWG TSG WP 16-15R3 refers. As a result of the discussions, a WP related to SSR II-SI code planning was presented at the ASWG/17 meeting. These proposed amendments are very relevant to the further implementation of the compatibility criteria in Frequency Finder.

2.9.3 The last version of FFSurvm supports the coordination of two types of interrogators:

- II-only (this interrogator can only operate with II codes) and
- II/SI ((this interrogator can operate with both II codes and SI codes).

2.9.4 These interrogators can operate with both II only transponders and II/SI capable transponders.

2.9.5 A special case has been introduced to accommodate Mode S II only transponders for use with Mode S interrogators that are operating with SI codes. These interrogators support II/SI code operations and the code assignment planning criteria are as were proposed to the TSG meeting in February 2022. The current version does not include interrogators that do not support II/SI code operations since it is foreseen that for a long time II only transponders are in use. Therefore, the current version of FFSURV includes two types of Mode S interrogators:

- II only
- II/SI+; this interrogator DOES support II/SI code operations (this is for the interim period where both II only transponders and II/SI transponders are in operation).

Note the current version is compatible with the Mode S II and SI codes that have been implemented in the MID Region. It supports interregional coordination with the adjacent AFI and APAC Regions.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) make extensive usage of the Frequency finder tool for frequency coordination;
- c) provide feedback on Frequency Finder tool usage, suggestions, bugs and recommendations; and
- d) discuss any relevant matter as appropriate.

SUBMISSION OF FREQUENCY REQUIREMENTS FOR THE PERIOD 2023 – 2030

1.1 The primary purpose of this simulation is to determine if a congestion in the use of frequencies can be foreseen that would require the implementation of 8.33 kHz channel spacing in any parts of the MID Region.

1.2 With the view to determine the medium-term spectrum requirements for VHF communication services, States are invited to submit these requirements to the MID Regional Office (RO) by 1 August 2023. On the basis of these requirement, the RO will undertake an analysis that is aimed at determining whether these requirements can be assigned a frequency within the available 25 kHz channels.

1.3 In this case, States can introduce the requirements in the local version of Frequency Finder and generate with the button “Export Submissions” an Excel file that can be submitted to the RO.

1.4 States are able to download the Frequency Finder tool from Frequency Spectrum Management Panel (FSMP) webpage at: <https://www.icao.int/safety/FSMP/Pages/Documents.aspx> , and the RO will provide assistance for any difficulties in installation and use of this ICAO tool.

1.5 Precise details not available

1.5.1 When precise details are not available for future frequency requirements, States can submit such requirements in any format.

1.5.2 Example 1: For a new airport, States can submit the (approximate) coordinates and specify the need for:

- x TWR frequencies
- x Aerodrome surface frequencies
- x APP-U frequencies
- x APP-L frequencies
- x ACC-U frequencies
- ATTM.- 2
- x ACC-L frequencies
- x VOLMET frequencies
- x ATIS frequencies
- x VDL frequencies

