



INTERNATIONAL CIVIL AVIATION ORGANIZATION

**THE FREQUENCY MANAGEMENT WORKING GROUP
(FM WG)**

**REPORT OF THE FIFTH MEETING OF
FM WOKING-GROUP**

(FM WG/5)

(Doha, Qatar, 10-11 May 2026)

The views expressed in this Report should be taken as those of the MIDANPIRG FM Working Group and not of the Organization. This Report will, however, be submitted to the MIDANPIRG, and any formal action taken will be published in due course as a Supplement to the Report.

Approved by the Meeting
and published by authority of the Secretary General

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PART I – HISTORY OF THE MEETING

1. PLACE AND DURATION

1.1 The Fifth meeting of the Frequency Management Working Group (FM WG/5) was hosted by Qatar in Doha, Qatar, from 10-11 May 2026.

2. OPENING

2.1 The meeting was opened by Ms. Muna Alnadaf, the Technical Officer/ CNS, who welcomed the participants to Qatar and thanked them for their presence and participation.

3. ATTENDANCE

3.1 The meeting was attended by a total of eighty-nine (89) participants, from twelfth (12) States (Bahrain, Egypt, Iran, Iraq, Jordan, Libya, Oman, Qatar, Saudi Arabia, Syria, Sudan, and UAE) and three (3) International Organizations/Industry (IATA, IFALPA, and GCC). The list of participants is at the **Attachment A**.

4. OFFICERS AND SECRETARIAT

4.1 The meeting was chaired by Mr. Nawaf Abdulrab Al Yafei.

4.2 Mrs. Muna Alnadaf, Technical Officer/CNS, Air Navigation Bureau, ICAO HQ

5. LANGUAGE

5.1 The discussions were conducted in English. Documentation was issued in English.

6. AGENDA

6.1 The following Agenda was adopted:

Agenda Item 1: Adoption of the Provisional Agenda & Election of Chairpersons

Agenda Item 2: Frequency Congestion in the MID Region

Agenda Item 3: Interference Detection and Resolution

Agenda Item 4: Preparation for WRC27

Agenda Item 5: Any Other Business

7. CONCLUSIONS AND DECISIONS - DEFINITIONS

7.1 All MIDANPIRG Sub-Groups and Task Forces record their actions in the form of Conclusions and Decisions with the following significance:

- a) **Conclusions** deal with the matters which, in accordance with the Group's terms of reference, merit directly the attention of States on which further action will be initiated by ICAO in accordance with established procedures; and
- b) **Decisions** deal with matters of concern only to the MIDANPIRG and its contributory bodies.

8. LIST OF DRAFT CONCLUSIONS AND DRAFT DECISIONS

DRAFT CONCLUSION 5/1: FREQUENCY CONGESTION

DRAFT CONCLUSION 5/2: MITIGATING INTERFERENCE THROUGH EFFECTIVE SPECTRUM REGULATORY MEASURES AND ENFORCEMENT

DRAFT DECISION 5/3: COORDINATION AND ADVOCACY FOR THE PROTECTION OF THE RADIO ALTIMETER BAND IN WRC-27

PART II: REPORT ON AGENDA ITEMS**REPORT ON AGENDA ITEM 1: ADOPTION OF THE PROVISIONAL AGENDA & ELECTION OF CHAIRPERSONS**

1.1 The subject was addressed in WP/1, presented by the Secretariat. The meeting elected Mr. Nawaf Abdulrab Al Yafei, Electronics Engineer, Qatar Civil Aviation Authority, and Mr. Faris A. Alzahrani, Head of Spectrum Management Office, Saudi General Authority for Civil Aviation, unanimously as the Chairperson and Vice-Chairperson of the Frequency Management Working Group (FM WG), respectively.

1.2 Mr. Al Yafei thanked the meeting for the trust and confidence and assured the meeting that he will do his best to facilitate the group's work, encourage open exchange of expertise, and support the achievement of the Working Group's objectives.

1.3 The meeting reviewed and adopted the revised Agenda as at paragraph 6 of the History of the Meeting.

REPORT ON AGENDA ITEM 2: FREQUENCY CONGESTION IN THE MID REGION

2.1 The subject was addressed in WP02, WP03, WP/8, WP/9, and IP/3, presented by the Secretariat, Saudi Arabia, and Iraq, respectively.

2.2 The meeting addressed the issue of VHF COM and NAV frequency congestion in the MID Region and considered the following measures to mitigate it:

- Revision of the MID Region allotment plan by reducing the sub-band allocated to AOC in order to make it available for other services;
- Enhancement of the ICAO database quality to support more accurate frequency assignment and separation;
- Consideration of additional measures to increase available spectrum capacity, including the implementation of 8.33 kHz channel spacing; and
- Exploration of various approaches to optimize the use of DME.

2.3 The meeting recalled that, in order to increase the amount of spectrum available for aeronautical services (VHF COM), MIDANPIRG/20 tasked the FM WG, through Decision 20/35, to review and amend the regional frequency allotment plan as deemed necessary. It was highlighted that the regional frequency allotment tables are an integral part of the ICAO Regional Air Navigation Plan and are published as a supplement to ICAO Doc 9718, Volume II.

2.4 In line with the MID Air Navigation Plan (MID ANP), Volume II, the Meeting recalled the priority order to be followed when assigning frequencies to services, as follows:

- a) ATS channels serving international services (ACC, APP, TWR, FIS);
- b) ATS channels serving national purposes;
- c) channels serving international VOLMET services;
- d) channels serving ATIS and PAR; and
- e) channels used for other than ATS purposes.

2.5 The Meeting noted with appreciation the comprehensive analysis conducted by Iraq on the MID Region allotment plan, which included allocated channels for each service, a comparison of allotted channels in the MID Region with other ICAO Regions, sub-band utilization, and identified issues in the current assignments.

2.6 The meeting noted Iraq's proposal to reduce the AOC band to 130.9–132.025 MHz (46 channels) and agreed that the Frequency Finder Tool should be utilized to conduct a comprehensive assessment of channel availability for each service within the MID Region. In this regard, Egypt requested that the meeting defer finalization of this proposal to FM WG/6, as they require time to assess it and coordinate internally with relevant service providers.

2.7 The meeting also noted with concern that the ICAO database contains inaccurate assignments, including errors in airport names, service locations, and registered Designated Operational Coverage (DOC), which in some cases exceed the actual geographic area of the designated sector. In addition, several duplicate assignments were observed in the ICAO VHF COM database.

2.8 In this regard, the meeting recalled that MIDANPIRG/20 urged States, through Conclusion 20/36, to coordinate with ICAO MID Office before assigning frequencies for aeronautical services (VHF COM, VHF NAV) and perform an update/review of the data in the VHF-COM/NAV module, to optimize the frequency assignment planning and mitigate VHF frequency congestion.

2.9 The meeting also received an update on the initiative taken by ICAO to clean up the database and enhance the quality of registered assignments (ICAO database Data Quality Control). A comprehensive review, including a comparison with published AIP data, has been completed, and an Excel file has been prepared for each State to reflect this information. Due to time constraints, the meeting was unable to review and update the States' files during the meeting sessions. It was therefore agreed to arrange one-to-one meetings between ICAO and the involved States in the third quarter of 2026 (Q3 2026).

2.10 The meeting noted that, due to GNSS RFI concerns, several States have recently installed additional DMEs, which could contribute to increased DME spectrum congestion in the Region. The meeting was also apprised of a study conducted by Airbus and EUROCONTROL, which indicated that DME utilization beyond 130 NM is very limited, with only 2.25% of flights selecting DMEs at distances greater than 130 NM.

2.11 The meeting was also apprised of the following five potential approaches for increasing the availability of DME channels. The technical feasibility of each measure needs to be assessed in greater detail, and the meeting agreed to consider these approaches for the future reduction of DME congestion in the MID Region. In addition, the meeting agreed on the need to clean up NAV data in a manner similar to the COM3 database:

- a) Limit Designated Operational Coverage (DOC) range to 130NM (in line with FMS DME selection logic)
- b) Tailoring the transmitting power (EIRP) to the DOC range
- c) Avionics Un-pairing DMEs from ILS and VORs
- d) Utilization of Z-channel
- e) Implementation of Double-DOC

2.12 Based on all the above, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 5/1: FREQUENCY CONGESTION

In order to reduce COM and NAV frequency congestion and enhance frequency availability in the MID Region, States are required to complete the following actions by the end of the year:

- a) *Complete the review and update of their frequency assignment data in the current ICAO database;*
- b) *Provide their projected frequency requirements up to 2034 using the questionnaire provided in **Appendix 2A**, to enable ICAO to conduct the necessary simulations and assess with States the need for implementing reduced channel spacing (8.33 kHz);*
- c) *Complete the review of the MID Region allotment plan for processing by ICAO and inclusion in the relevant ICAO documents.*

2.13 The meeting was apprised of updates to the regional and inter-regional frequency assignment procedures, including those related to future space-based VHF assignments.

2.14 The meeting noted the project phases and timeline of the new online ICAO Frequency Finder tool, as well as the update of the existing tool to incorporate the new SSR module.

REPORT ON AGENDA ITEM 3: INTERFERENCE DETECTION AND RESOLUTION

3.1 The subject was addressed in WP/4 and WP/10, presented by the Secretariat and UAE, respectively.

3.2 The meeting was apprised of the coordination mechanism between the Civil Aviation Authorities and the national radio regulator in the UAE, and noted the process for handling interference complaints, including geolocation of the interference source, actions to eliminate it, coordination with national and external stakeholders, and reporting and escalation procedures.

3.3 The meeting emphasized the need for States to establish a similar coordination mechanism between their Civil Aviation Authority and national radio regulator.

3.4 The meeting was apprised of the provisions and recommendations related to optimizing interference detection and resolution, through effective spectrum regulatory measures and enforcement, as contained in the relevant ICAO Resolutions emanating from the 42nd session of the ICAO Assembly, Recommendations from the 14th Air Navigation Conference, and the recommended actions from the 1st and 2nd ICAO Radio Navigation Symposiums. It also noted the ICAO/ITU/IMO joint Declaration on the protection of GNSS from harmful interference and WRC-23 Resolution 676.

3.5 The meeting discussed means to enforce these provisions and recommendations, given the importance and criticality of the issue. It was agreed that ICAO would provide a survey listing the required actions along with their references and monitor implementation using the matrix in *Appendix 3A*.

3.6 Regarding the following Recommendation: “*Radio regulatory authorities of States need to step up enforcement against GNSS jamming transmitters (GPS jammers) while educating the public about their illegality, without unintentionally exposing system vulnerabilities. Law enforcement should monitor and act against online marketplaces selling such devices. Additionally, making the ownership of GPS jammers illegal will help authorities confiscate them more effectively and strengthen regulatory control*”, the meeting was apprised of a best practice from the Gulf Cooperation Council (GCC), led by Bahrain. Bahrain reported that it had communicated with online marketplaces, requesting them to prohibit the sale of illegal transmitters to Bahrain and had enhanced collaboration with Customs Authorities to prevent their importation. GCC agreed to adopt similar measures. Consequently, the meeting agreed to the following Conclusion:

***DRAFT CONCLUSION 5/2: MITIGATING INTERFERENCE THROUGH EFFECTIVE
SPECTRUM REGULATORY MEASURES AND
ENFORCEMENT***

*That, in order to implement ICAO Resolutions and Recommendations related to the mitigation of interference through effective spectrum regulatory measures and enforcement, States are urged to implement the actions listed in **Appendix 3A** and provide feedback to the CNS SG/16 meeting, for monitoring and appropriate action.*

REPORT ON AGENDA ITEM 4: PREPARATION FOR WRC27

- 4.1 The subject was addressed in WP/05, WP/06, and WP/7, presented by the Secretariat.
- 4.2 The meeting was briefed on ICAO provisions concerning the aeronautical spectrum strategy and policies, the relevant Assembly Resolution, and the process for preparing ICAO's WRC position (WRC27 Position).
- 4.3 The meeting noted that Radio or Radar Altimeters are essentially primary radars pointing towards the ground. They provide a direct measurement of the clearance height of the aircraft over terrain or obstacles. These Radars operate in the 4.2-4.4 GHz frequency band.
- 4.4 Radio Altimeter (RA) provides real-time, highly accurate readings, and output from the Radio Altimeters is used for the Ground Proximity Warning System (GPWS) or Terrain Alerting or Warning System (TAWS).
- 4.5 The meeting noted with concerns that WRC agenda item 1.7 seeks, based on sharing and compatibility studies, to identify additional spectrum for international mobile telecommunications (IMT) in one or more frequency bands, including the 4 400 – 4 800 MHz, which is immediately adjacent to the Radio Altimeter (RA) band, 4 200 – 4 400 MHz. The RA are very vulnerable to out-of-band emissions from high powered IMT base stations. While the RA SARPs currently under development will provide considerable improvement to adjacent band interference rejection, the next generation RA will still be vulnerable to adjacent band transmissions when close to the 4 400 MHz band-edge.
- 4.6 The meeting noted that current WRC-27 preparatory studies raise several aviation safety and operational concerns. Ongoing studies do not fully address critical radio altimeter operational scenarios, particularly off-nominal landing conditions where RAs function as essential safety-net systems. This may result in an incomplete assessment of real-world interference risks. In addition, new RA SARPs are not expected before 2027, limiting their relevance to WRC-27 deliberations.
- 4.7 IATA emphasized that the availability of RA SARPs in 2027 does not imply immediate implementation, as there are cost considerations and challenges related to aircraft retrofitting. Therefore, it is crucial for States to collaborate to protect RA from potential interference.
- 4.8 The meeting stressed the need to actively advocate for the ICAO WRC27's position and to engage with States and relevant International Organizations in order to ensure the protection of aviation safety. Consequently, the meeting agreed to the following Draft Decision:

DRAFT DECISION 5/3: COORDINATION AND ADVOCACY FOR THE PROTECTION OF THE RADIO ALTIMETER BAND IN WRC-27

That, in order to strengthen regional and international coordination in support of the ICAO position on radio altimeter spectrum protection, and to ensure effective engagement with relevant stakeholders during WRC-27:

a) ICAO MID Office to:

- i. conduct Workshops and/or meetings in 2026/2027 with the Arab Spectrum Management Group (ASMG) in support of WRC-27 preparations, with particular*

- emphasis on radio altimeter issue; and*
- ii. coordinate with States as well as other International and Regional Organizations, to strengthen collaboration and advocate for the protection of the radio altimeter band.*

b) States' Civil Aviation Authorities to:

- i. participate actively in the Regional WRC27 preparatory events;*
- ii. coordinate with their national radio regulator to support ICAO WRC27 position; and*
- iii. send their representatives within the State's delegates to the WRC27*

REPORT ON AGENDA ITEM 5: ANY OTHER BUSINESS

5.1 Nothing has been discussed under this Agenda Item.

APPENDICES

SUBMISSION OF FREQUENCY REQUIREMENTS FOR THE PERIOD 2026 – 2034

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 by **Q4 2026**. On the basis of these requirements, ICAO 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 Regional Office.

1.4 States are able to download the Frequency Finder tool from the Frequency Spectrum Management Panel (FSMP) webpage at: <https://www.icao.int/safety/FSMP/Pages/Documents.aspx>, and ICAO 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

Effective Spectrum Regulatory Measures and Enforcement to Mitigate the Interference

No.	Action	Reference	Status (Completed/Ongoing/ not yet started)	Completion date	Remarks
1.	<p>Enhance collaboration with national radio regulator</p> <p>Existence of a coordination mechanism for detecting, geo-locating, and mitigating interference sources.</p>	<p>ICAO/ITU/IMU Joint déclaration, action (d)</p>			
2.	<p>Collaborate with the Radio Regulator to strengthen enforcement measures addressing the commercialization, purchase, possession, and use of illegal transmitters, including jammers and signal spoofers.</p> <p>Actions may include, inter alia, <i>Establish and enforce the necessary legal and regulatory frameworks to prevent, detect and regulate the sale and ownership of such devices, both online and offline, and effectively confiscate them.</i></p>	<p>A42-8/C Resolution</p> <p>ICAO Electronic Bulletin 25/20</p>			
3.	<p>Ensure proper resolution for incidents of GNSS RFI with cross-border impact that cannot be solved nationally or internationally through routine procedures</p>	<p>ICAO/ITU/IMU Joint déclaration, action (e)</p> <p>ITU Resolution 676</p>			

	<p>Existence of procedure to utilize the ITU Radio Regulations (RR) escalation procedure (RR Article 15) to report of interference incidents that could be resolved through routine procedure;</p> <p>Established procedure exists for reporting harmful interference and for the subsequent escalation to relevant authorities through ICAO Regional Office and ITU SIRRS</p>	ICAO Electronic Bulletin 25/20			
4.	<i>enhance the capacity of technical staff to effectively detect, identify, investigate, and report harmful interference</i>	FM WG/ Report			
5.	improve coordination with the military by facilitating the sharing of information on GNSS RFI testing and any relevant activities such as Counter-UAS operations	ICAO Electronic Bulletin 25/20			

LIST OF PARTICIPANTS

**Fifth Meeting of the Frequency Management Working Group (FM WG/5) and
Fifteenth Meeting of the MIDANPIRG Communication, Navigation and Surveillance Sub-Group (CNS SG/15)
(Doha, Qatar, 10 – 14 May 2026)**

State/ Org	Name	Title	Remarks
Bahrain	Hamad Najeeb Alshomali	Spectrum Monitoring Engineer	
	Hamad Fadhel Aldoseri		
Egypt	Mona Sabry Aly	Quality General Manager	
	Amir Aly Mohamed Eid	Surveillance Engineer	
	Ahmed Mostafa Mohamed Arman	Senior ANS/CNS Inspector	
	Khaled Ibrahim Mostafa Mohamed	General Manager of CNS Facilities	
	Mohamed Ahmed Mohamed Sultan	General Manager of Informative Computer Systems	Virtually
	Waheed Suliman	VOR Manager	Virtually
	Ami Ali		
Iran	Kaveh Parto	Senior Expert of Radio Navigation aids	Virtually
	Esmaeil Mahgoli	Deputy CNS Department	Virtually
Iraq	Ali Nasrullah	Mobile Communication Engineer	Virtually
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	Neveen Askar	Director of planning & training JANS	Virtually



State/ Org	Name	Title	Remarks
Libya	Ahmed Elamari		Virtually
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	Wadha Al Malki	Electronics Engineer	
	Mustafa Kalyon	Electronics Engineer	
	Mansoor Alam	Electronics Engineer	
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Ifrah AbdiYaqoub A Hersi	Electronics Engineer		



State/ Org	Name	Title	Remakrs
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	Khalid Al Muftah	Head of IT	
	Mohammed Al-Nuaimi	Senior Electronics Engineer	
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	Nawaf Abdulrab Al Yafei	Electronics Engineer	
	Hussain Mohd Zainal	Senior Electronics Engineer	
	Mohamed Ali Al-Naimi	Senior Electronics Engineer	
	Danah Ghaite Attari	Senior Electronics Engineer	
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	Mohammed Shahnawaz Khan	Electronics Engineer	
	Noora Ahmed Al Dosari	Electronics Engineer	
	Samina Razaq	Electronics Engineer	
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	Dibeh Abboud		
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	Michael Samuller		
	Veronica Bonji Iroy		
	Mohammed Jabor M Dorgham		
	Ervin Tamayo Iroy		
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Saudi Arabia	Sammer Qattlan	CNS Manager	
	Zaki Alamri	CNS Advisor	
	Anas Alhazmi	Head of CNS	
Syria	Hussam Alsaid Ali	CNS Manager	
	Hesham Hrould Hasan Jamal Eldin	CNS	
Sudan	Sami Enger	Telecommunication and Networking Engineer	Virtually
	Marsail Samaan	Communication Engineer	Virtually
	Sayed Ali		Virtually



State/ Org	Name	Title	Remarks
UAE	Abdulrahman Al Maeni	Engineer, Terrestrial Services, Spectrum Management Affairs	
	Ahmed Saif Al Ali	Senior Officer, Spectrum Services, Spectrum Management Affairs	
	Abdulla Alsayed Ahmed Almarzooqi	Senior Specialist – Air Navigation and Communication, Navigation & Surveillance	
	Mohamed AlAhmed	Specialist ANS Engineering	
	Rashed Alshehhi	Senior Manager ANS Engineering	
GCC	Ali Saleh	Head of Radio Frequency Department	
IATA	Lindi-Lee Kirkman	Regional Head ATM + CNS AME	
IFALPA	Arnaud Du Bedat	Regional officer EUR/MID	
ICAO-MID	Mohamed Smaoui	ICAO Deputy Regional Director	
	Muna Alnadaf	Technical Officer/CNS – ICAO HQ	
	Ahmed Shaker	Technical assistant	

- END -