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INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY

WACAF Regional Webinar on Aeronautical Frequency Management from 4 to 5 December 2025

Day 1 : Enhancing national aeronautical frequency management and regional data accuracy

Session 1 : ICAO framework and Aeronautical frequency database

WACAF Regional Webinar on Aeronautical Frequency Management from 4 to 5 December 2025

Session 1 : ICAO framework and Aeronautical frequency database

ICAO WACAF Regional Office

CNS Regional Officer

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Outline

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Session objectives

Importance of effective Aeronautical frequency management

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Why accurate data matters?

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Common challenges

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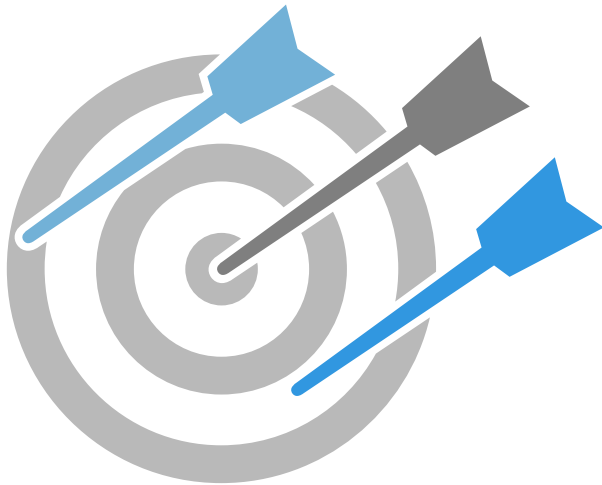Key Takeaways

Transition

01

# Introduction

1. Introduction

1.1 Session objectives

- Recall the ICAO SARPs governing aeronautical frequency management

- Understand the AFI regional spectrum management initiatives

- Review the current status of the AFI/WACAF frequency database

- Identify opportunities to improve national frequency planning and data accuracy

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1. Introduction

1.2 Importance of effective Aeronautical Frequency Management
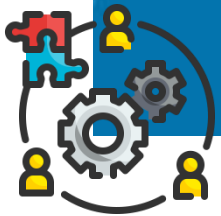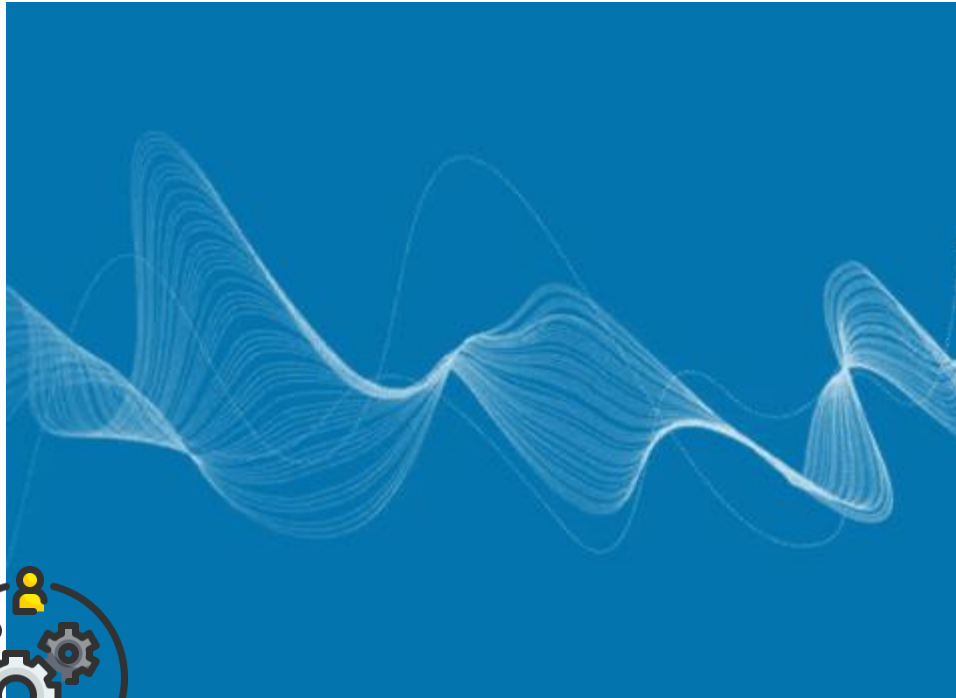
- ✓ Ensures safety, continuity, and efficiency of air navigation services

- ✓ Supports CNS/ATM modernization, including PBN, ADS-B, CPDLC, VHF coverage, GNSS

- ✓ Protects aviation systems from interference and congestion

- ✓ Facilitates coordination between civil aviation, ANSPs, telecommunication authorities, and ITU

02

Overview of ICAO Regulatory Framework on Frequency Management

ANNEX 10 - AERONAUTICAL TELECOMMUNICATIONS

Volume 1 - Radio Navigation Aids

Volume 2 - Communication Procedures including those with PANS Status

Volume 3 - Communication Systems

Volume 4 - Surveillance and Collision Avoidance Systems

Volume 5 - Aeronautical Radio Frequency Spectrum Utilization

Volume 6 : Communication Systems and Procedures Relating to Remotely Piloted Aircraft Systems C2 Link

2. Overview of ICAO Regulatory Framework on Frequency Management

2.1 ICAO SARPs and 2025 amendments

| ICAO SARPs	Spectrum-Related Provisions	2025 Amendments Overview *(applicable on 27 November 2025)*
Volume I: Radio Navigation Aids	Frequency allocations and protection requirements	✔ Amendment 94 to Annex 10, Volume I (includind Frequency assignment planning and utilization for ILS, VHF VOR, DME and GBAS)
Volume II: Communication Procedures	VHF, HF spectrum usage and protocols	✔ Amendment 94 to Annex 10, Volume II
Volume III: Communication Systems	Technical specifications and performance standards	✔ Amendment 93 to Annex 10, Volume III
Volume IV: Surveillance and Collision Avoidance Systems	SSR, Mode S, ADS-B frequencies	✖
Volume V: Aeronautical Radio Frequency Spectrum Utilization	Global coordination framework, allocations and usage for distress, HF/VHF bands, navigation aids, and RPAS C2 links	✔ Amendment 91 to Annex 10, Volume V
Volume VI : Communication Systems and Procedures Relating to Remotely Piloted Aircraft Systems (RPAS)	Compliance with frequency allocations defined in Annex 10, Volume V for both terrestrial and satellite operations	✖

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2.2 Handbook on Radio Frequency Spectrum Requirements for Civil Aviation – DOC 9718

- ✓ outlines ICAO-approved radio frequency spectrum requirements for civil aviation to guide States in ITU conference preparations and promote the ICAO Position on aviation matters.
- ✓ Two volumes :

Doc 9718 – Volume I: ICAO Spectrum Strategy & Policy
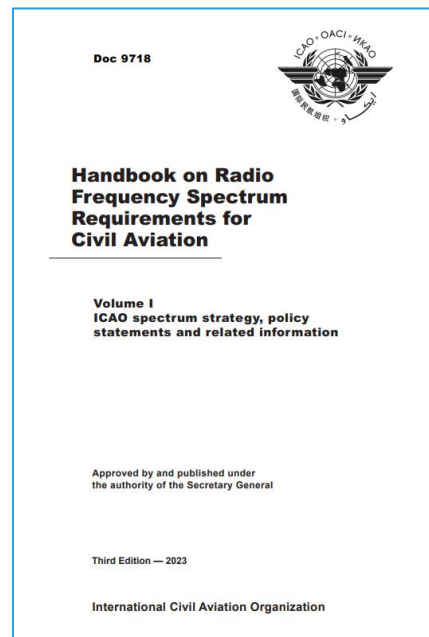
Doc 9718 – Volume II: Frequency Planning & Management
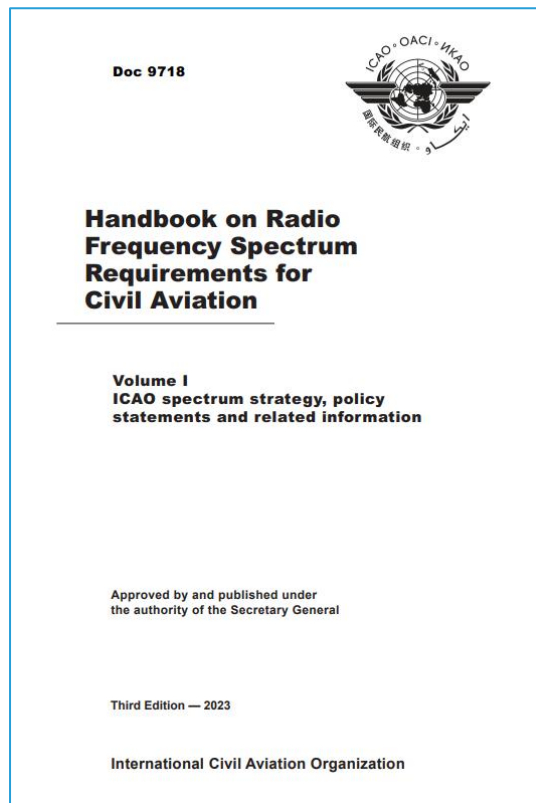
(3rd edition – 2023)

2nd Edition – 2022 Amendement n° 1 (June 2025)

2. Overview of ICAO Regulatory Framework on Frequency Management

2.2 Handbook on Radio Frequency Spectrum Requirements for Civil Aviation

Doc 9718 – Volume I: ICAO Spectrum Strategy & Policy

Doc 9718

Handbook on Radio Frequency Spectrum Requirements for Civil Aviation

Volume I
ICAO spectrum strategy, policy statements and related information

Approved by and published under the authority of the Secretary General

Third Edition — 2023

International Civil Aviation Organization

(3rd edition – 2023)

Purpose

✓ Presents ICAO's spectrum strategy and policy statements for civil aviation.
✓ Assists States and ICAO in preparing for ITU conferences and supporting ICAO's position at WRCs.
✓ Updated regularly to reflect technological developments, ITU decisions, and aviation operational needs.

Status

✓ Contains ICAO-approved policy statements and spectrum strategy.
✓ Supplements SARPs in Annex 10 but does not replace them.

Key features

✓ Provides ICAO Position for ITU WRCs (e.g., WRC-23 in Attachment F).
✓ Includes approach for establishing and promoting ICAO Position (Attachment E).
✓ Serves as a reference for States in national spectrum discussions and regional coordination.

Organization

✓ Chapters 1–9: Spectrum management principles, institutional roles, ICAO policy by frequency band, future requirements, and interference control.
✓ Attachments A–H: ITU definitions, acronyms, regulatory aspects, ICAO Position, technical info, and ITU Resolutions/Recommendations.
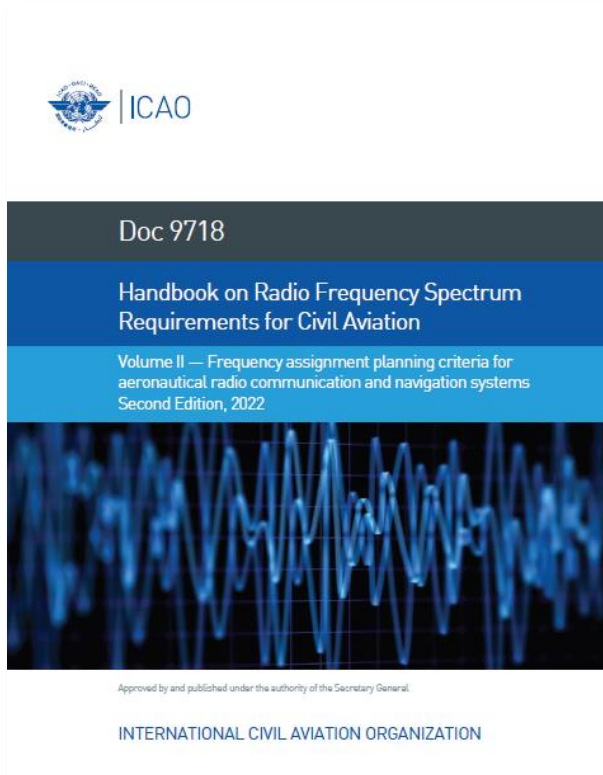
2. Overview of ICAO Regulatory Framework on Frequency Management

2.2 Handbook on Radio Frequency Spectrum Requirements for Civil Aviation

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Doc 9718

Handbook on Radio Frequency Spectrum
Requirements for Civil Aviation

Volume II — Frequency assignment planning criteria for
aeronautical radio communication and navigation systems
Second Edition, 2022

Approved by and published under the authority of the Secretary General.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Second Edition – 2022
Amendement n° 1 (June 2025)

Purpose
- ✓ Provides global frequency assignment planning criteria for aeronautical communication & navigation systems.
- ✓ Ensures harmonization and protection from harmful interference.

Scope
- ✓ Provides global frequency assignment planning criteria for aeronautical communication & navigation systems.
- ✓ Ensures harmonization and protection from harmful interference.

Implementation
- ✓ Applied globally; regional adoption via PIRGs & Regional Air Navigation Plans.
- ✓ Coordination by ICAO Regional Offices.

Organization
- ✓ Chapter 1: General principles & compatibility analysis.
- ✓ Chapter 2: VHF air-ground communication planning.
- ✓ Chapters 3–6: Planning for ILS, VOR, DME, GBAS/VDB.
- ✓ **Appendix: Includes Regional Allotment Plans for operational services in ICAO Regions.**

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2.3 Key ICAO principles for Frequency management

Vision

Long-term spectrum availability to support evolving CNS/ATM systems and global air transport safety and efficiency.

Key Principles

1

Aeronautical spectrum is a finite, protected resource

2

Assignments must be safe, efficient, coordinated, and accurately reported

3

States ensure compliance with ICAO and ITU rules

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2.4 Roles and Responsibilities in Aeronautical Frequency Management

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- Develop SARPs and guidance material
- Maintain global frequency databases
- Ensure protection of aviation spectrum from harmful interference and safeguard safety-of-life services
- Coordinate global and regional frequency planning and represent aviation interests at ITU WRCs and ITU-R study groups
- Prepare ICAO Position, spectrum estimates, and technical inputs for ITU conferences
- Support States in aligning national/regional plans with ICAO policies

ITU

- Regulate global radio spectrum via Radio Regulations
- Allocate spectrum for worldwide harmonization
- Set international telecom standards
- Organize WRCs and preparatory meetings
- Develop recommendations to prevent interference
- Resolve interference, prioritizing safety-of-life services
- Coordinate technical work through ITU-R Study Groups
- Maintain provisions for distress and safety communications

States

- Implement national frequency plans
- Transpose ICAO provisions, notably Annex 10 Volumes I–VI, into national regulations
- Coordinate with national telecom authorities
- Coordinate with ICAO Regional Offices
- Ensure alignment with AFI Regional Allotment Plan and regional CNS strategies
- Work closely with ICAO Regional Offices for planning and implementation consistency
- Submit accurate and timely frequency updates to ICAO for global database integrity
- Participate in ITU and regional preparatory activities to safeguard aviation spectrum requirements
- Support ICAO Position

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2.4 ICAO Position for the ITU World Radiocommunication Conference (2027) (WRC-27)

ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference 2027 (WRC-27)

Approved by ICAO Council on 25 June 2025

Distributed via State Letter Ref. E 3/5-25/65 (16 July 2025)

Safeguards spectrum critical for aviation safety and global interoperability

Supported by Assembly Resolution A42-7: Support of ICAO Policy on Radio Frequency Spectrum Matters

Calls action from States

ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference 2027 (WRC-27) - Cont.

Promoting ICAO Position for WRC-27

States and International Organizations are encouraged to:

1. Align their national preparation activities for WRC-27 with the ICAO Position, to the maximum extent possible, in accordance with Assembly Resolution A41-7.

2. Promote ICAO Position within regional telecommunication organizations.

3. Advocate ICAO Position during relevant ITU meetings

Awareness and capacity building

FSMP will hold workshops in 2025/2026 to raise awareness of WRC-27 aviation agenda items and promote ICAO Position.

Upcoming Events – AFI Region

✓ **WRC-27 Workshop :** *02–03 March 2026 |* ICAO WACAF Office

✓ **AFI Spectrum Regional Meeting :** *04–06 March 2026*

✓ **FSMP-WG/22 :** *04–13 March 2026*

Many WRC agenda items could affect aeronautical safety services! - *Further collaboration is needed!*

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2. Overview of ICAO Regulatory Framework on Frequency Management

2.4 ICAO Position for the ITU World Radiocommunication Conference (2027) (WRC-27)
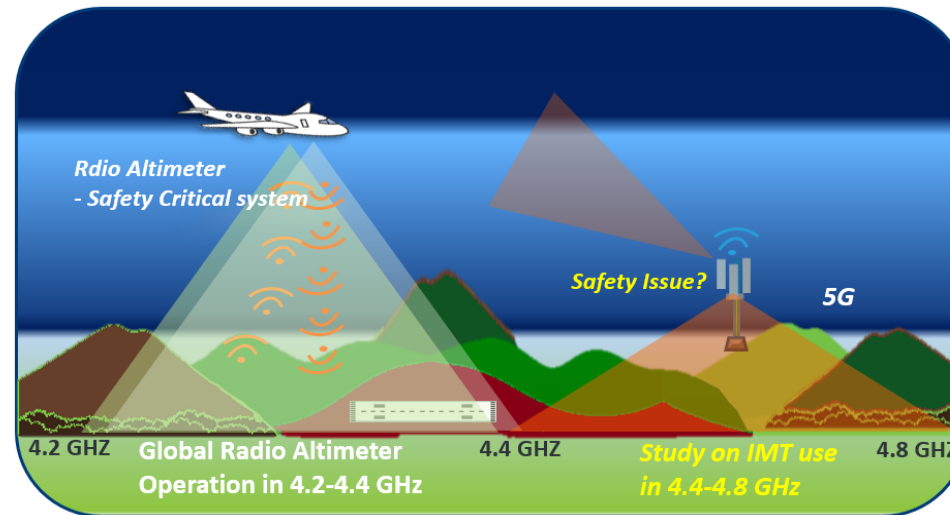
ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference 2027 (WRC-27) - Cont.

Active support from States is deemed to be the only means to ensure that the results of the WRC-27 reflect civil aviation's interest.

WRC-27

WRC-27 Agenda Item 1.7:
Study on IMT Use in the frequency bands 4400-4800 MHz

Rdio Altimeter - Safety Critical system

Safety Issue?

5G

4.2 GHZ **Global Radio Altimeter Operation in 4.2-4.4 GHz**   4.4 GHZ *Study on IMT use in 4.4-4.8 GHz* 4.8 GHZ

WRC-27 **WRC-27 Agenda Item 1.17: Space Weather Sensors**

HF/Sat Communication Disturbances
GNSS Positional Errors
Radiation At Flight Altitude

WRC-27 **WRC-27 Agenda Item 1.19:** Primary allocations to the EESS passive in the bands 4200-4400

Rdio Altimeter - Safety Critical system
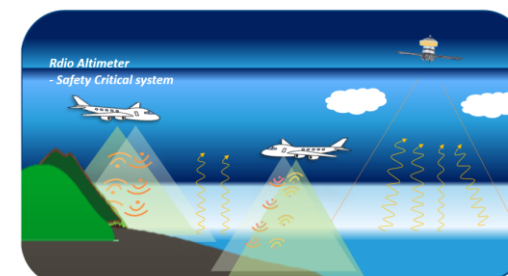
WRC-27 **WRC-27 Agenda Item 6:** Urgent action by Study groups in prep for the next WRC beyond-line-of-sight C2-link for RPAS

Satellite
Command and control Link (Forward link)
Command and control Link (Forward link)
Remotely Piloted Aircraft (RPA)
Return link
Command and control Link (Return link)
BRLOS
Command and control Link (Return link)
Remotely Piloted Aircraft (RPA)
Air Traffic Control
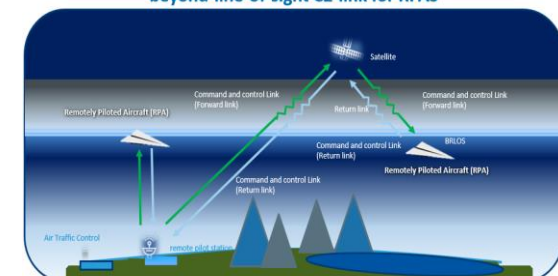
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2.5 Spectrum and Frequency Measures Arising from ICAO 42nd Assembly

ICAO Resolution	Key Spectrum/Frequency points
A42-8 : *Consolidated statement of continuing ICAO policies and practices related to a global air traffic management (ATM) system and communications, navigation, and surveillance/air traffic management (CNS/ATM) systems– Spectrum/Frequency Highlights (appendix C)*	✅ Interference Risks: Growing threats to CNS/GNSS (jamming, spoofing). 🔒 Spectrum Protection: States must safeguard CNS frequencies. 🤝 Collaboration: Aviation, military, and regulators to coordinate. 📢 Advance Notice: Inform ANSPs of operations causing interference. ⚠️ Proactive Management: Risks extend beyond conflict zones.
A42-7 : *Support of the ICAO Policy on Radio Frequency Spectrum Matters*	📡 Adequate Spectrum: Essential for aviation safety. 📘 ICAO Strategy: Align with ITU rules and ICAO policies. 🏛 State Coordination: Integrate aviation needs in national policies and WRC prep. 🛠 Support ICAO: Back ICAO positions at WRCs and ensure resources. 🌍 Global Participation: ICAO active in international/regional spectrum activities.

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AFI regional initiatives on Spectrum

3. AFI regional initiatives on Spectrum

3.1 Aeronautical Frequency Management in the AFI Region

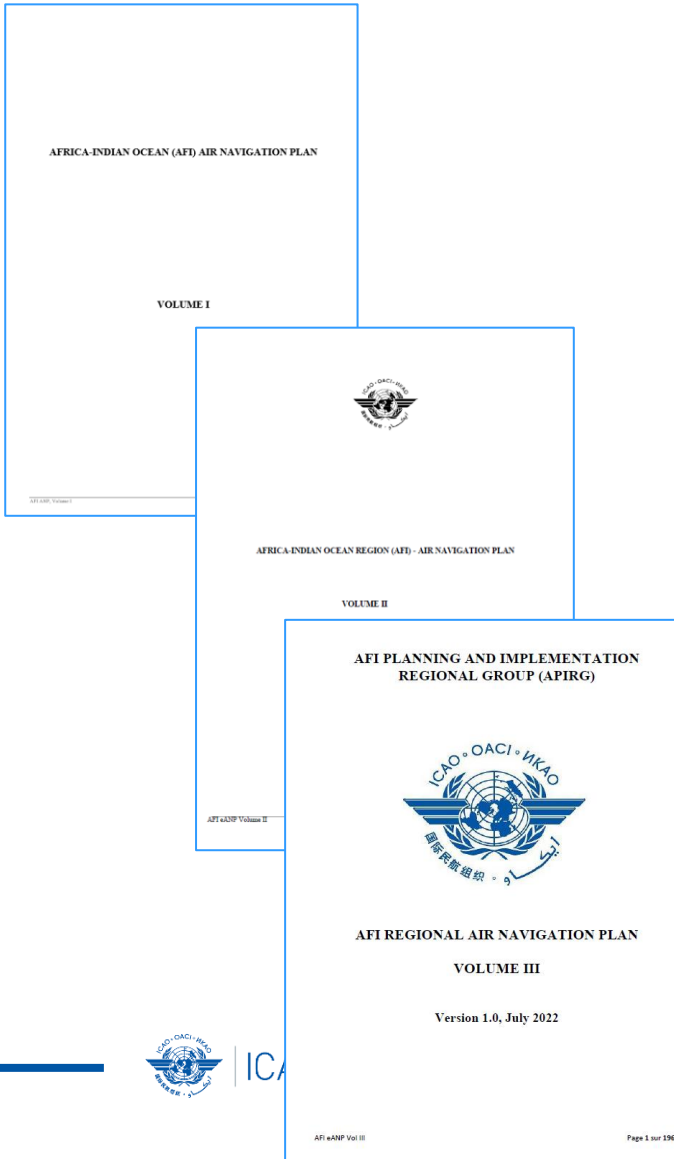**Frequency management requirements in AFI ANP**

GENERAL REGIONAL REQUIREMENTS

AFI eANP Volume 1 : §2.9 "Frequency assignment planning in the Region(s) should be carried out in accordance with the provisions of Annex 10 and ICAO **Handbook** on Radio Frequency Spectrum for Civil Aviation (Doc 9718), supplemented, as necessary, by regional recommendations and technical criteria developed for this purpose."

SPECIFIC REGIONAL REQUIREMENTS

AFI ANP, VOLUME II PART III – COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS), §2.45 to 2.52, and §2.54 States shall support of ICAO position for WRC

States in the AFI Region should coordinate, as necessary, with the ICAO Regional Office all radio frequency assignments for both national and inter-national facilities and Align assignments with the Frequency Allotment Plan for AFI [AFI/6, Recommendation 13/13]

AFRICA-INDIAN OCEAN (AFI) AIR NAVIGATION PLAN

VOLUME I

AFI ANP, Volume I

AFRICA-INDIAN OCEAN REGION (AFI) - AIR NAVIGATION PLAN

VOLUME II

AFI eANP Volume II

AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP (APIRG)

AFI REGIONAL AIR NAVIGATION PLAN

VOLUME III

Version 1.0, July 2022

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AFI eANP Vol III   Page 1 sur 196

3. AFI regional initiatives on Spectrum

3.2 Role and function of Regional Office
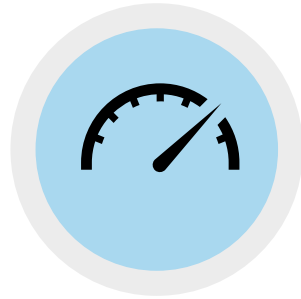
Advocate ICAO Spectrum Policy

🛡 **Defend ICAO Position**

📅 Participate in African Preparatory Meetings (APM) for WRC-27.

📝 Ensure aviation priorities are reflected in States' position papers for WRC-27 agenda items.

📣 **Promote ICAO Position at Regional Forums**

🌍 Engage in ITU Regional Radiocommunication Seminars for AFI and other relevant platforms.

Coordinate Aeronautical Frequency Management

🔄 Frequency Assignment coordination and selection

⚠️ Interference Resolution

📋 Maintain Frequency Lists

🔐 Interrogator Codes (IC) Code Management

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3. AFI regional initiatives on Spectrum

3.3 Aeronautical Frequency Coordination – Key highlights

1
ICAO ESAF and WACAF offices Role

🌍 Centralized portal: Single point for aeronautical frequency and IC coordination.

✅ Minimal bureaucracy, proven effective for AFI Region.

2
Use of Frequency Finder

🔍 FF tool : For selection, compatibility testing, and global database registration.

3
State responsibilities

📤 Timely Submissions: Provide all frequency and SSR/IC assignments for international coordination.

🤝 National Spectrum Coordination: Notify ITU and liaise with national authorities as needed.

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3. AFI regional initiatives on Spectrum

3.4 AFI Regional Spectrum Priorities (Focus on WACAF)

🔒 Protect aviation-critical frequency bands : Ensure safety-of-life services remain free from harmful interference.

📡 Support planning for VHF, NAV, GNSS, ADS-B, SATCOM : Facilitate efficient spectrum allocation for CNS/ATM systems.

⚠️ Monitor harmful interference : Detect, report, and mitigate interference risks proactively.

🌍 Harmonize frequency planning across AFI : Promote regional coordination and alignment with ICAO policies.

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3. AFI regional initiatives on Spectrum

3.5 Regional coordination mechanisms

- ➢ **AASPG (formerly APIRG) – Infrastructure & Information Management Subgroup (IIM/SG)**
  - ✓ Scope: Covers CNS, AIM, and MET domains
  - ✓ Key CNS Spectrum-Related AASPG Activities
  - ✓ AFI SPECTRA Project : Successor to IIM SPEC project, focused on aeronautical spectrum protection through a results-based approach and enhanced regional coordination.

- ➢ **AFI ANP Volume I, II, III** : Defines regional spectrum requirements for CNS/ATM systems.

- ➢ **Regional Surveys :**
  - ✓ Monitor frequency usage and identify interference trends across AFI States
  - ✓ conducted in the frawework of IIM COM 3 project (replaced by new reframed projet AFI-COMMOD – Modernization of Air-Ground Communication Infrastructure)

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3. AFI regional initiatives on Spectrum

3.5 Regional coordination mechanisms (cont'd)

AFI SPECTRA Project – Successor to SPEC

Background:
- ✓ The SPEC Project (Aeronautical Frequency Management) was dissolved by AASPG/1.

- ✓ New project AFI SPECTRA launched with similar objectives but a results-based approach and builts on the outputs of SPEC Project

AFI SPECTRA – Objectives

- ☑ Protect aeronautical spectrum from harmful interference.

- ☑ Strengthen regional coordination with States, regulators, and frequency bodies.

- ☑ Promote ICAO tools (Frequency Finder) and guidance (Doc 9718).

- ☑ Support ICAO positions at WRC-27 and beyond.

- ☑ Conduct technical studies on emerging risks (e.g., 5G impact on altimeters).Key Features vs SPEC

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Status and update process of frequency database in WACAF

4. Status and update process of frequency database in WACAF

4.1 Aeronautical Frequency Data

Aeronautical Frequency Data :Frequency List 1 (NDB), 2 (NAV), 3(VHF COM), 4(HF), and SSR II code

Why Accurate Data Matters :

📊 Feeds ICAO global and regional databases and planning tools (Frequency Finder)

🔄 Supports operational continuity

⚠️ Prevents harmful interference

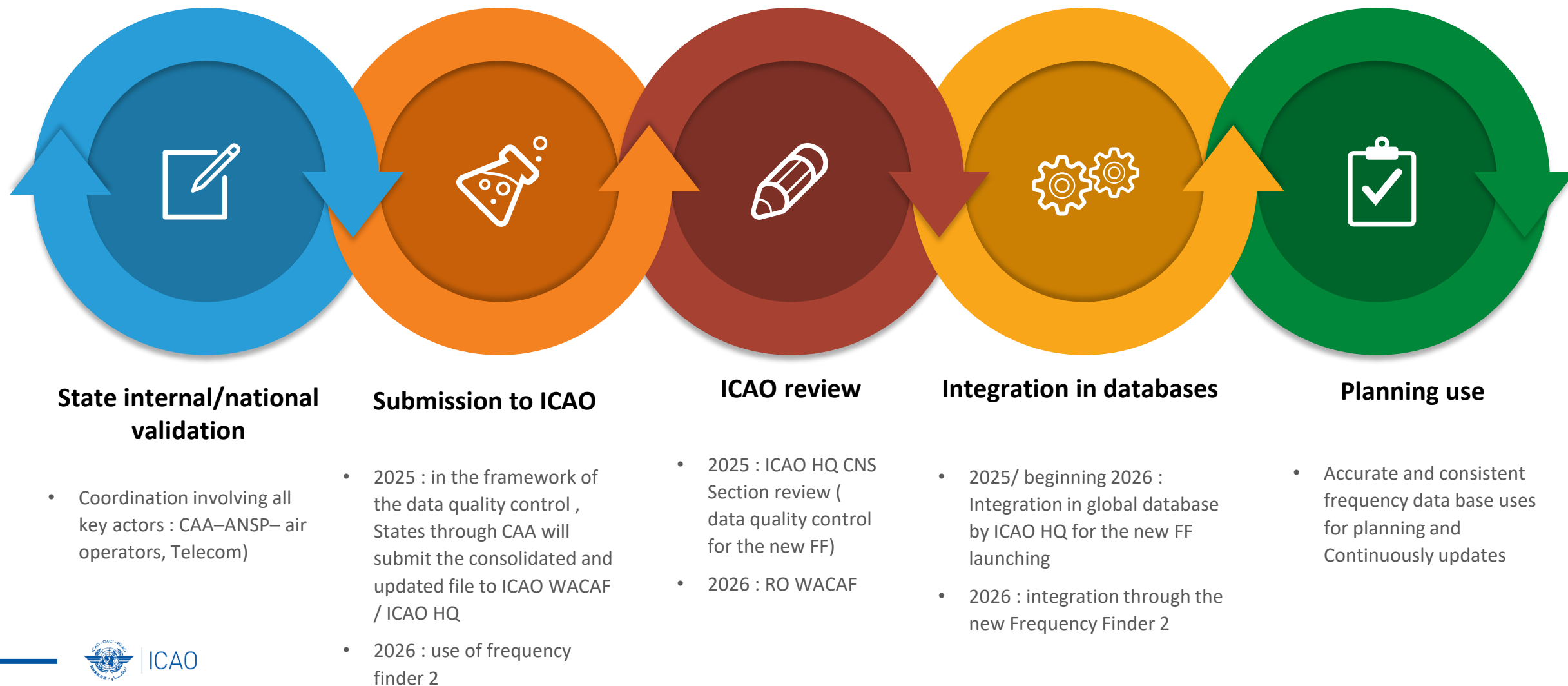🌍 Enables coordinated regional planningWACAF Database Status

WACAF Database Status

✅ Quality Control by ICAO HQ: Comparison with AIP frequency data

⚠️ Common Issues: Missing parameters, outdated assignments, unused frequencies

📅 Recent Review: Results presented during regional Frequency Database Quality Control meeting (12 Nov)

🔄 States currently updating files

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4.3 Frequency data update process

State internal/national validation

- Coordination involving all key actors : CAA–ANSP– air operators, Telecom)

Submission to ICAO

- 2025 : in the framework of the data quality control , States through CAA will submit the consolidated and updated file to ICAO WACAF / ICAO HQ

- 2026 : use of frequency finder 2

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- 2025 : ICAO HQ CNS Section review (data quality control for the new FF)

- 2026 : RO WACAF

Integration in databases

- 2025/ beginning 2026 : Integration in global database by ICAO HQ for the new FF launching

- 2026 : integration through the new Frequency Finder 2

Planning use

- Accurate and consistent frequency data base uses for planning and Continuously updates

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4.3 Frequency Finder

An ICAO-developed tool designed to support aeronautical frequency management and coordination at global and regional levels.

Purpose

- Acts as a centralized platform for frequency assignment, compatibility checks, and registration in ICAO's global database.
- Helps States and ICAO Regional Offices ensure efficient spectrum use and avoid harmful interference.

Key Functions

☑ Frequency selection and compatibility testing: Verifies proposed assignments against existing ones to prevent conflicts.

☑ Global registration: Stores coordinated frequencies and IC codes in ICAO's global database for international reference.

☑ Security features: Password-protected access for State focal points, data confidentiality, and integrity.

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4.3 Frequency Finder
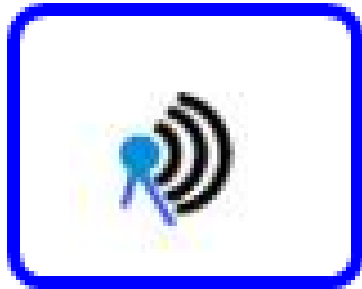
FREQUENCY FINDER 2

Phase 1: VHF COMMUNICATION SYSTEMS MODULE ✈ <u>**launched**</u>
- Web-based application
- Online database. No need to synchronize
- Management and coordination of frequency assignments between ICAO Contracting States and ICAO Regional Offices

Phase 2 : NAV MODULE

Phase 3 : SURVEILLANCE MODULE

Phase 4 : IMPROVEMENTS OF FREQUENCY FINDER : SPACE-BASED VHF

Recent/future enhancements by phases

🔐 *Improved data protection (password access, hiding radar coordinates).*

📑 *Bulk data import for States.*

🌐 *Migration to a modern web platform for VHF-COM with real-time visualization and optimized spectrum assignment tools.*

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05

Common challenges

5. Common challenges and opportunities

Challenges	Opportunities
📁 Outdated national databases	📒 Maintain structured internal databases 🔄 Update regurlaly in coordination Airport operators, ANSP, Airport operators for continuous update 🌐 Use ICAO Frequency Finder Tool proactively
🔗 Limited collaboration with telecom regulators	🤝 Use ICAO templates for coordination 👥 Establish MoU with telecom regulators
⚠️ Interference not systematically reported	📧 Report interference

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06

Conclusion

6. Conclusion

Key takeaways

📜 ICAO SARPs provide the regulatory foundation for aeronautical spectrum

🤝 AFI Initiatives Support harmonization

📊 Accurate Data is essential

🛡️ Coordination among all stakeholders(aviation service providers, national telecom authorities, and regulators) enhances efficiency and strengthens safety

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