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INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY

Item 3: Strengthening collaboration to address frequency challenges

Session 4 : National Interference management practices

Interference on GCAA Aeronautical Spectrum: Source, Impact and Mitigation Measures - Ghana

Virtual Workshop on Aeronautical Frequency Management for the WACAF Region, from 4 to 5 December 2025

Atelier virtuel sur la gestion des fréquences aéronautiques – Région WACAF
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SESSION 4 : NATIONAL INTERFERENCE MANAGEMENT PRACTICES

GHANA CIVIL AVIATION AUTHORITY

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Presentation Outline

01 Introduction: Overview of Aeronautical Spectrum Usage in Accra FIR

02 Regulatory Framework on Spectrum Management in Ghana

03 Sources and impact of Interference on Aeronautical Frequencies in Ghana

04 Mitigation Measures

05 Recommendations

06 Conclusion

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01

Introduction

Overview of Aeronautical Spectrum Usage in Accra FIR

1. Introduction

1.1 Overview of Aeronautical Spectrum Usage

- Used for Safety-Related communications in Air Traffic management.
- Supports Navigational Aids systems such as ILS, VOR/DME
- Supports Surveillance systems in Air traffic Management (ATM)
- Plays a critical role in emergency communication and crisis response.
- Used in Search and Rescue operations.
- GCAA satellites links that supports VHF extended Range communication, Ground /Ground voice and data communication systems between ACCs, Surveillance data transmission, AIDC.

02

Regulatory Framework on Spectrum Management in Ghana

2. Regulatory Framework on Spectrum Management in Ghana

2.1 Legal framework

Constitutional Basis

- **1992 Constitution of Ghana** – Empowers Parliament to enact laws regulating communications and national resources, including spectrum.

Primary Legislation

- National Communications Authority (NCA) Act, 2008 (Act 769) – Establishes NCA and grants powers for spectrum planning, assignment, monitoring, enforcement and interference resolution.
- Electronic Communications Act, 2008 (Act 775) – Governs electronic communications and radio frequency spectrum use.
- Electronic Communications (Amendment) Act, 2009 (Act 786) – Updates and strengthens Act 775.

2. Regulatory Framework on Spectrum Management in Ghana

2.2 Institutional Framework

- ✓ **Ghana Civil Aviation Authority (GCAA)** – Collaborates with National Communication Authority (NCA) for aeronautical spectrum management, and compliance with ICAO SARPs.
- ✓ **International Telecommunication Union (ITU)** – Provides global Radio Regulations adopted by Ghana.

2.3 Enforcement Mechanisms

- ✓ Inspections and monitoring.
- ✓ Penalties for unauthorized use.
- ✓ Seizure of non-compliant equipment.
- ✓ Revocation of frequency authorization

03

Sources and impact of Interference on Aeronautical Frequencies in Ghana

3.1 Sources of interference

- **Spurious Emissions:** Unwanted signals radiated outside the assigned FM band due to poor transmitter linearity or degraded components.
- **Harmonic Radiation**: Harmonics of the main carrier (e.g., 88 MHz × 2 = 176 MHz) may generate signals that fold into the other bands due to mixing or reflection.
- **Poor Filtering:** Absence or failure of proper low-pass filters or harmonic traps allows harmonics and other unwanted emissions to propagate.

3.1 Sources of interference

- **Intermodulation Products (IM):** Non-linear behavior in the transmitter's final amplifier stage, or interaction with nearby transmitters which commonly referred to as collocation, or passive reflectors, can generate intermodulation products.
  - **IM = 2f1 ± f2 or 2f2 ± f1.**
  - **F1 = 106.3 MHz F2 = 88.6MHz**
  - **IM = 123.9MHz**

- **Interference from a Telecom service provider** authorized to operate 5G network

3. Sources and impact of Interference on Aeronautical Frequencies in Ghana cont'd

3.2 Operational Impact of Interference

- Communication loss or degradation of signal quality between pilots and ATC. (Leading to poor audio quality)
- Delayed or incomprehensible clearance and instruction.
- Can lead to increase stress level on users.
- Leads to reduction in system availability, reliability and integrity.

Source of icon : Flaticon

3. Sources and impact of Interference on Aeronautical Frequencies in Ghana cont'd

3.3 Safety impact

- Compromised situational awareness.
- Increased risk of incident and accident (Airspace conflict).
- Emergency communication failures.
- Loss of stakeholder confidence in using airspace
- Safety Concerns.

Source of icon : Flaticon

3. Sources and impact of Interference on Aeronautical Frequencies in Ghana cont'd

3.5 Case Example from GCAA Operations.

- **VHF Case:**

✓ Interference on 118.6 MHz and 119.5 MHz traced to an FM station.

✓ Station used non-compliant high-power transmitters.

- **SATCOM Case:**

- Interference on GCAA AFISNET and VSAT by 5G Operator

Source of icon : Flaticon

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Mitigation Measures

4. Mitigation measures

4.1 Technical measure

- GCAA has an SLA with NCA to deal with interference and other issues related to spectrum management.

- A technical team of GCAA and NCA collaborates to resolve interference issues.
- Enforcement of the use of RF cavity filters on FM radio transmitters to prevent out of band emissions.

4. Mitigation measures

4.2 Regulatory and Monitoring Measures

- Regulating frequency allocations and licensing.
- Continuous spectrum monitoring by NCA.

4.3 Stakeholder Engagement on interference issues

05

GCAA Recommandations

5. GCAA Recommendations

1. Established MOU with Spectrum Regulator to address interference and spectrum related issues.
2. Educate operators and stakeholders on aviation frequency protection.
3. Enhance incident detection and reporting systems.
4. Form a technical team of experts to discuss and deal with interference issues

06

Conclusion

6. Conclusion

- Interference poses serious threats to air safety.
- A multi-stakeholder approach is needed.
- The **spectrum regulator plays critical regulatory role**.
- Protecting aviation bands from FM stations and 5G interference is Critical.

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Thank You

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