International Civil Aviation Organization

Sixth Meeting of the Frequency Management Working Group (FM WG/6)

(Cairo, Egypt, 27 – 28 September 2026)

Agenda Item 2: Preparation for the WRC27

PROTECTION OF AERONAUTICAL RADIO ALTIMETER SPECTRUM IN WRC-27

(Presented by Iraq)

SUMMARY

This paper presents the operational perspective from Erbil International Airport Iraq

REFERENCES

- International Civil Aviation Organization (ICAO), **WRC-27 Agenda Item 1.7** – material concerning IMT use and compatibility studies involving aeronautical radio altimeters.
- International Civil Aviation Organization (ICAO), **Handbook on Radio Frequency Spectrum Requirements for Civil Aviation – Volume I (Doc 9718-1)**.
- International Civil Aviation Organization (ICAO), **FM WG/6 and MID regional preparation material for WRC-27**.

1. INTRODUCTION

1.1 Radio frequency spectrum is an important resource for civil aviation. Reliable and protected use of the spectrum is required for many aviation communication, navigation and surveillance systems.

1.2 WRC-27 will consider several spectrum-related issues that may affect existing services. One of these is **Agenda Item 1.7**, which concerns sharing and compatibility studies for possible use of certain frequency bands by International Mobile Telecommunications (IMT), while taking into account existing services operating in these and adjacent frequency bands.

1.3 One aviation-related consideration is the **4400–4800 MHz** frequency range, which is adjacent to the **4200–4400 MHz** band used by aeronautical radio altimeters.

1.4 This paper provides an operational perspective from **Erbil International Airport, Iraq**, and highlights the importance of considering realistic aviation operating conditions in compatibility studies.

1.5This paper represents an operational technical contribution from Erbil International Airport engineering to support national and regional preparation for WRC-27.

2. DISCUSSION

2.1 WRC-27 Agenda Item 1.7

WRC-27 Agenda Item 1.7 considers sharing and compatibility studies related to possible IMT use in the following frequency ranges:

- 4400–4800 MHz
- 7125–8400 MHz
- 14.8–15.35 GHz

The aviation-related consideration discussed in this paper is mainly associated with the **4400–4800 MHz** range because it is adjacent to the **4200–4400 MHz** band used by aeronautical radio altimeters.

The purpose of the studies is not to assume that interference will occur. Rather, the studies should assess whether the proposed use can coexist with existing services while providing the required protection.

2.2 Aeronautical Radio Altimeter

An aeronautical radio altimeter is an aircraft system used to provide a direct measurement of the aircraft's height above the surface below.

The **4200–4400 MHz** band is used by aeronautical radio altimeters. Radio altimeter information is important during low-altitude operations, particularly during approach and landing.

Radio altimeter data can also provide input to important aircraft functions and safety systems, including **Autoland and Traffic Alert and Collision Avoidance System (TCAS) functions**.

Therefore, any potential degradation of radio altimeter performance may have effects beyond the altitude indication itself, particularly during critical phases of flight.

For this reason, maintaining reliable radio altimeter operation is an important consideration when studying compatibility with systems operating in adjacent frequency bands.

2.3 Adjacent-Band Compatibility

The main technical issue considered in this paper is **adjacent-band compatibility**.

IMT systems and radio altimeters are not intended to operate on the same frequency band. However, unwanted emissions from a transmitter can extend outside its intended operating band. Therefore, compatibility studies should assess the possible effect of such emissions on systems operating in adjacent bands.

A simplified technical path can be considered as:

IMT transmitter → unwanted emissions → propagation environment → aircraft → radio altimeter receiver

The assessment should consider whether the unwanted signal reaching the aircraft could affect the performance of the radio altimeter receiver.

Relevant technical factors may include:

- transmitter characteristics and unwanted emissions.
- radio altimeter receiver characteristics.
- propagation conditions.
- distance between IMT stations and aircraft.
- antenna characteristics.
- IMT deployment scenarios.
- appropriate protection criteria for radio altimeter operation.

This approach helps the assessment focus on the actual signal level that may reach the radio altimeter receiver and its possible effect on receiver performance.

2.4 Importance of Operational Scenario

The results of a compatibility study depend not only on the technical characteristics of the systems, but also on the operating conditions considered.

For aviation, realistic scenarios may include:

- Aircraft altitude.
- distance between aircraft and IMT transmitters.
- radio altimeter characteristics.
- IMT deployment scenarios.
- antenna characteristics.
- the surrounding environment.

Approach and landing operations may be particularly relevant because aircraft operate at lower altitudes and within the airport environment.

At the time of preparing this paper, **5G services are not currently active in Erbil**. This provides an opportunity for preventive planning before future deployment of 5G infrastructure around the airport.

Considering potential deployment scenarios in advance can help identify compatibility issues before new infrastructure is installed.

2.5 Operational Perspective from Erbil International Airport

Erbil International Airport operates a range of communication and technical systems supporting airport and air traffic control operations.

From an operational perspective, airport technical personnel can provide practical information about systems in use and the operating environment when such information is required for technical studies.

At present, this paper does not report a specific radio altimeter interference case at Erbil International Airport. The purpose is instead to provide an operational perspective and highlight the importance of preventive planning.

We recommend coordination between Airport CNS, the Civil Aviation Authority (CAA) and the Communications and Media Commission (CMC) to review telecommunications tower licenses within a 10 km radius around the airport.

Such coordination could help identify potential compatibility issues before the deployment of new IMT/5G infrastructure and allow relevant technical assessments to be considered at an early stage.

This approach would also provide an opportunity to consider the operational environment of the airport when reviewing future telecommunications infrastructure.

2.6 Coordination Between Aviation and Spectrum Authorities

Preparation for WRC-27 involves both technical and regulatory considerations.

Effective coordination between **civil aviation authorities, national spectrum authorities and operational aviation stakeholders** can help ensure that aviation requirements are properly considered during the preparation process.

Operational stakeholders, including airport technical personnel, can contribute information about:

- systems currently in operation.
- operational environments.
- relevant technical characteristics where available.
- practical considerations related to airport operations.

This operational information can complement technical studies carried out at national, regional and international levels.

For Erbil International Airport, coordination between the airport CNS team, the CAA and the CMC can provide a practical mechanism for considering aviation requirements during future spectrum and telecommunications planning.

2.7 Key Technical Considerations

Based on the operational perspective presented in this paper, the following points may be considered during the preparation for WRC-27 Agenda Item 1.7:

1. **Realistic aviation scenarios** should be included in compatibility studies.
2. **Radio altimeter receiver performance** should be considered when assessing the potential effect of unwanted emissions from adjacent-band systems.
3. Studies should consider the **level of unwanted signal reaching the radio altimeter receiver**, rather than considering frequency separation alone.
4. Appropriate **protection criteria** should be considered to maintain reliable radio altimeter operation.
5. IMT deployment scenarios, antenna characteristics, aircraft position and altitude, and propagation conditions should be considered where relevant.
6. Coordination between aviation stakeholders and national spectrum authorities should continue throughout the preparation process.

7. **Preventive coordination around airports** can be considered before the deployment of new IMT/5G infrastructure, including review of relevant telecommunications tower locations and licenses.

3. CONCLUSION

WRC-27 Agenda Item 1.7 is relevant to civil aviation because one of the frequency ranges under consideration, **4400–4800 MHz**, is adjacent to the **4200–4400 MHz** band used by aeronautical radio altimeters.

The assessment of compatibility should consider both technical parameters and realistic aviation operating conditions.

The operational perspective from Erbil International Airport highlights the value of involving airport technical personnel in providing practical information for compatibility studies and future spectrum planning.

As 5G services are not currently active in Erbil, there is an opportunity to consider preventive planning before future deployment around the airport.

Coordination between **Airport CNS, the Civil Aviation Authority and the Communications and Media Commission**, including review of telecommunications tower licenses within a **10 km radius around the airport**, could help identify potential compatibility issues at an early stage.

Although no specific radio altimeter interference case is reported in this paper, preventive coordination and realistic operational assessment can support the protection of aviation systems while allowing future spectrum development.

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