CEPT ECC
Electronic Communications Committee

ECC Recommendation (26)02

Guidelines for the coexistence between low and medium power terrestrial wireless broadband systems (WBB LMP) in the 3800-4200 MHz band and radio altimeters in the 4200-4400 MHz band, and the protection of radio altimeters when deploying medium power AAS base stations in the 4100-4200 MHz band

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INTRODUCTION

By ECC Decision 24(01) [1], CEPT has harmonised 3800-4200 MHz for the shared use by low/medium power terrestrial wireless broadband systems (WBB LMP) providing local-area network connectivity.

This Recommendation provides guidelines to support introduction of medium power WBB LMP using active antenna systems (AAS) operating in the 4100-4200 MHz band, in the close vicinity of airfields used by larger commercial air transport airplanes, while ensuring the protection of adjacent band radio altimeters as addressed in ECC Report 362 [2].

ECC Report 362 [2] concluded that, for WBB LMP deployment in the frequency band 3800-4200 MHz using non-AAS antennas, or equipment using AAS operating in part of the 3800-4100 MHz part of band, no additional measures are required to ensure the protection of the radio altimeters.

This Recommendation forms part of a set of Recommendations[1] that provide guidance for administrations to develop national rules for the coexistence between WBB LMP in 3800-4200 MHz whilst ensuring in-band and adjacent band coexistence with the incumbent services.

This Recommendation does not cover the case where an administration is planning to enable the use of WBB LMP base stations above the maximum power threshold as permitted in ECC Decision (24)01.

As noted in ECC Decision (24)01, further studies are required in order to identify relevant technical and operational conditions for the usage of aerial terminal stations in this frequency band. The use of aerial terminal stations has not been considered in this Recommendation.

[1] ECC Recommendation (25)03 [3], draft ECC Recommendation 26(03)

ECC RECOMMENDATION (26)02 OF 5 JUNE 2026 ON GUIDELINES FOR THE COEXISTENCE BETWEEN LOW AND MEDIUM POWER TERRESTRIAL WIRELESS BROADBAND SYSTEMS (WBB LMP) IN THE 3800-4200 MHZ BAND AND RADIO ALTIMETERS IN THE 4200-4400 MHZ BAND, AND THE PROTECTION OF RADIO ALTIMETERS WHEN DEPLOYING MEDIUM POWER AAS BASE STATIONS IN THE 4100-4200 MHZ BAND

"The European Conference of Postal and Telecommunications Administrations,

considering

a) that the harmonised frequency arrangement and least restrictive technical conditions (LRTC) for the shared use of the 3800-4200 MHz frequency band by low/medium power terrestrial wireless broadband systems (WBB LMP) providing local-area network connectivity has been determined in ECC Decision (24)01 [1];

b) that the frequency band 4200-4400 MHz is allocated in the International Telecommunication Union (ITU) Radio Regulations (RR) [4] on a primary basis to the aeronautical radionavigation service, and is reserved exclusively for radio altimeters installed onboard aircraft;

c) that radio altimeter is a downward-looking radar ranging system that measures the height of an aircraft above terrain during all phases of the flight, and that radio altimeters operate in the 4200-4400 MHz frequency range, and are required equipment integrated with automated systems that provide safety and regularity of flight;

d) that radio altimeters are deployed in a range of aircraft operating across CEPT, and are required by the international aeronautical regulation to allow operation of these aircraft;

e) that ECC Report 362 [2] determined the conditions for compatibility between mobile or fixed communications networks (MFCN) operating in 3400-3800 MHz and WBB LMP operating in the frequency band 3800-4200 MHz with radio altimeters operating in 4200-4400 MHz;

f) that ECC Report 362 took into consideration radio altimeter parameters based on measurements for several radio altimeter models, with Interference Tolerance Thresholds (ITT) derived from published Aerospace Vehicle Systems Institute (AVSI) Reports for heights of 200 feet and 1000 feet, and that the studies considered usage category 1 (UC1) radio altimeters for which data was published;

g) that ECC Report 362 describes the scenarios and other relevant parameters used in the studies;

h) that ECC Report 362 found that deployment of non-AAS WBB LMP base stations operating in the full 3800-4200 MHz band showed sufficient margins of at least 6 dB in accordance with the ICAO recommended Safety Margin [5] and therefore posed no risk of harmful interference to the studied radio altimeters;

i) that ECC Report 362 found that deployment of AAS WBB medium power base stations operating in 3800-4100 MHz showed sufficient margins of at least 6 dB in accordance with the International Civil Aviation Organization (ICAO) recommended Safety Margin and therefore posed no risk of harmful interference to the studied radio altimeters;

j) that one study in ECC Report 362 found that certain types of AAS WBB medium power base stations operating in the 4100-4200 MHz band could generate unwanted emissions into 4200-4240 MHz up to 13 dB higher than the maximum tolerated interference threshold (including the 6 dB Safety Margin recommended by ICAO) for some of the radio altimeter models, whereas all other studies in this ECC Report show sufficient margin;

recommends

1 that, in close vicinity to airfields used by larger commercial air transport airplanes, where WBB medium power base stations with AAS transmitting in 4100-4200 MHz, administrations should consider coordination and/or mitigation measures to ensure that WBB LMP deployments do not cause interference to radio altimeters (including a 6 dB ICAO safety margin);

2 that, in close vicinity of runways at these airfields, with Annex 1 providing an example of a zone considered as close vicinity, administrations may consider the following coordination or mitigation measures:

- no medium power AAS base station deployment in 4100-4200 MHz in close vicinity of the runway;
- AAS medium power base stations comply with emission levels meeting the spurious emission limit between 4200 MHz and 4240 MHz, or at least 13 dB lower compared to the out of band emissions requirements in ETSI TS 138 104 [6];
- detailed interference assessments of the individual AAS base station deployment, including, exact location, terrain height, actual transmit power, antenna/beam pointing angles, antenna pattern and any measurements of real base station out of band emissions in the 4200-4240 MHz and any other relevant parameters;

3 that this Recommendation should be reviewed within 5 years of its adoption in the light of practical experience of its application and of the operation of WBB LMP systems."

Note:

Please check the ECO Documentation Database https://docdb.cept.org/ for the up to date position on the implementation of this and other ECC Recommendations.

ANNEX 1: EXAMPLE OF A ZONE WHICH IS CONSIDERED IN CLOSE VICINITY OF RUNWAYS

An example of a coordination zone was included in ECC Report 362, annex 3 study [2] based on a simulation of the use of certain types of AAS WBB medium power base stations together with radio altimeters parameter Set 2 (which applies the 200 feet interference tolerance threshold to below 200 feet), showing that unwanted emissions from these base stations may not meet the 6 dB ICAO safety margin for the modelled beamforming antenna configurations. This same study also showed the 6 dB ICAO safety margin is fully covered for base station positions greater than 1200 m from the runway threshold or 40 m laterally (to either side of the centre line of the runway).

It was noted that the coordination zone outlined in ECC Report 362 did not consider the lateral deviation when determining the area where an aircraft may be positioned during its final approach. Lateral deviation should thus be taken into account when establishing the coordination zone.

One method to define a coordination zone that takes into account the lateral deviation is suggested below, where a typical Instrument Landing System (ILS) approach is derived from the beam of the localiser signal.

For an ILS approach, the zone where the aircraft may be located is an isosceles trapezoid (orange area in Figure 1) where:

- the short base, b_{short}, (dashed blue line in Figure 1) is perpendicular to and centred on the runway centreline, overlaying the runway threshold and 2×105 m wide[2];
- the sides (dashed yellow lines in the figure below) are made of two lines originating from an anchor point (far left in Figure 1) located at the intersection of the runway centreline and the localiser antenna network (or by default at 300 m from the runway edge) and connecting each extremity of the short base;
- the trapezoid height between the two parallel bases is 1200 m;
- the long base, b_{long}, can be calculated using:

$$b_{long} = 2 \cdot \left(\frac{b_{short}}{2} + 1200\ \text{m} \cdot \tan(\varphi)\right)$$

where:

$$\varphi = \arctan\left(\frac{b_{short}}{2 \cdot \left(d_{localizer} + l_{runway}\right)}\right)$$

Finally, the 40 m on either side of the runway (grey shaded areas in Figure 1) which formed the rectangle in the original study should be added to the isosceles trapezoid defined above to form the complete coordination zone (orange + grey shaded areas in Figure 1).

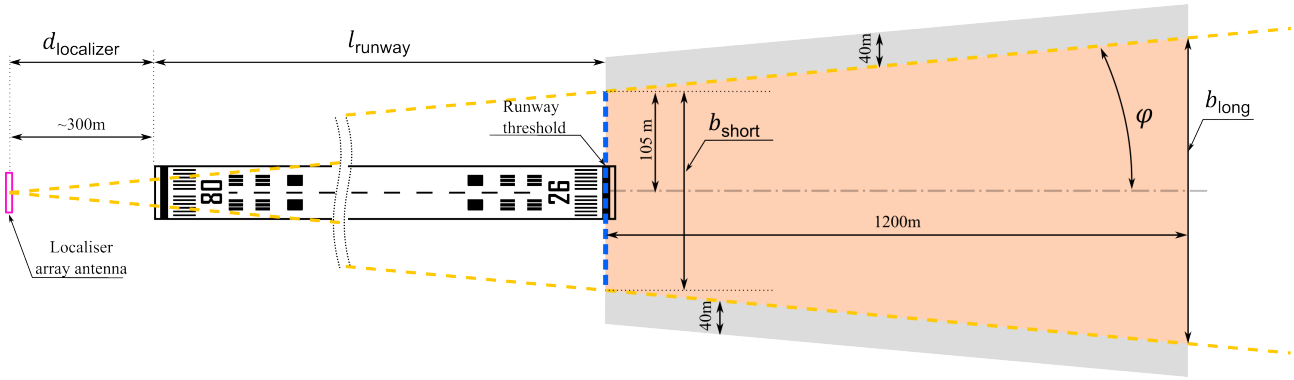


Figure 1: Example of a coordination zone

[2] The value of 105 m is taken from Annex 10 to the Convention on International Civil Aviation, Vol I 7.4.1.1 Approach azimuth

ANNEX 2: LIST OF REFERENCES

[1] ECC Decision (24)01: “Harmonised technical conditions for the shared use of the 3800-4200 MHz frequency band by low/medium power terrestrial wireless broadband systems (WBB LMP) providing local-area network connectivity”, approved 8 November 2024

[2] ECC Report 362: “Compatibility between MFCN operating in 3400-3800 MHz and wireless broadband systems in low/medium power operating in the frequency band 3800-4200 MHz with Radio Altimeters operating in 4200-4400 MHz”, approved 8 November 2024

[3] ECC Recommendation (25)03: “Guidelines for the protection of FS and FSS and their future deployment when introducing low and medium power terrestrial wireless broadband systems (WBB LMP) in the 3800-4200 MHz frequency band, also considering cross border situations”, approved 17 October 2025

[4] ITU Radio Regulations, edition of 2024

[5] Handbook on Radio Frequency Spectrum Requirements for Civil Aviation - Volume I - ICAO spectrum strategy, policy statements and related information (Doc 9718-1) (Third Edition, 2023), section 9.2.22

[6] ETSI TS 138 104: “5G; NR; Base Station (BS) radio transmission and reception”