CEPT ECC
Electronic Communications Committee

ECC Decision (22)07

Harmonised technical conditions for the usage of aerial UE for communications based on LTE and 5G NR in the bands 703-733 MHz, 832-862 MHz, 880-915 MHz, 1710 - 1785 MHz, 1920-1980 MHz, 2500-2570 MHz and 2570-2620 MHz harmonised for MFCN

approved 18 November 2022

latest amended 6 March 2026

EXPLANATORY MEMORANDUM

1 INTRODUCTION

In CEPT countries, there is a fast-growing demand to operate aerial UE (User equipment) in particular under beyond-visual-line-of-sight (BVLOS) conditions, mainly for professional purposes. To enable these kinds of applications, there is the need for communication links between the aerial UE and mobile/fixed communication networks (MFCN) using bands harmonised for MFCN.

In this Decision, the term aerial UE refers to an UE supporting UAS features and services and requiring an aerial subscription. An aerial UE is installed either on-board an Unmanned Aircraft (e.g. drones) or on-board manned aircraft (e.g. helicopter). It identifies itself to the mobile network as being in this class.

Based on CEPT analysis (see ECC Report 309 [1] and ECC Report 348 [2]), this ECC Decision provides harmonised technical conditions for the usage of aerial UE for communications in the following MFCN harmonised bands: 703-733 MHz, 832-862 MHz, 880-915 MHz, 1710-1785 MHz, 1920-1980 MHz, 2500-2570 MHz and 2570-2620 MHz. This framework does not address civil aviation regulation.

2 BACKGROUND

Further to market demands expressed during a CEPT workshop on 29-30 May 2018, ECC analysed the conditions for the usage of aerial UE for communications in the following MFCN harmonised bands: 700 MHz, 800 MHz, 900 MHz, 1800 MHz, 2 GHz, 2.6 GHz, 3.4-3.8 GHz (with AAS BS scenario only for that band) (see ECC Report 309). Such studies only considered scenarios where one UE is located on the flying platform.

After the approval of ECC Report 309, ECC recognised a demand for further studies of aerial UE connected to 5G NR AAS base stations on the ground in the 1.8 GHz, 2 GHz and 2.6 GHz frequency bands and developed ECC Report 348 accordingly.

According to ECC Report 309 and ECC Report 348, the communication links of aerial UE are intended to be used primarily for data communication within MFCN bands.

This ECC Decision has been developed on the basis of assumptions, analysis and main conclusions of ECC Report 309 and ECC Report 348. These Reports assume that aerial UE use data payload. For aerial UE that do not use data payload (i.e. command and control aerial UE only) less stringent regulatory provisions might be applicable but further studies are required before these provisions can be relaxed.

In accordance with market demands and in order to use a technology widely available, the initial ECC studies (ECC Report 309) mainly focused on LTE which provides extensive MFCN coverage in CEPT countries. Additional analysis included in the ECC Report 348 extended conclusions of ECC Report 309 for the usage of aerial UE in the 1.8 GHz, 2.1 GHz and 2.6 GHz frequency bands with MFCN AAS base stations. ECC Report 348 also includes a technology comparison between LTE and 5G NR. Based on this analysis, technical and operational conditions such as OOBE limits or no-transmit zone based on the studies from the ECC Report 309 are valid for both LTE and 5G NR aerial UE.

This harmonised framework is limited to these two MFCN technologies which are already deployed and available in different MFCN frequency bands. Studies have been performed based on standardised LTE and 5G NR UE with usage of aerial UE operating up to 10000 m altitude with the assumption of usage of already existing MFCN base stations (BS), which are typically deployed to provide effective coverage at ground level. At this stage, ECC noted that mobile operators do not intend to develop specific network planning to respond to these new aerial use cases.

In addition to the already harmonised technical conditions for MFCN bands and for spectrum compatibility purposes, there is the need to define some spectrum operational restrictions. This can be done using “no-transmit zones”, which should be defined at national level as a geographical area where aerial UE are not allowed to operate in a certain frequency band. Another measure to achieve coexistence is to define additional OOB emission limits specific to aerial UE (to avoid interference to other services in some other bands (e.g. to protect MetSat at 1675-1710 MHz). The requirement may apply to aerial UE according to their operational

frequency band, e.g. aerial UE operating in a specific band or specific channel (see no-fly zone definition set out in ECC Report 309 [1], in this Decision referred to as “no-transmit zone”). In some cases, operation of aerial UE also requires respective cross-border coordination agreements.

The defined spectrum operational restrictions and/or additional emission limits are mostly independent from the used MFCN technology. Even though ECC Report 309 studies focused on LTE technology, there is no fundamental difference between LTE and 5G NR (non-AAS). Therefore, the conclusions in ECC Report 309 are valid for both and are confirmed in ECC Report 348 [2].

FRMCS cab-radio receivers at 1900-1910 MHz are assumed to be designed in a way that ensures robustness against blocking signals emitted by aerial UE (ETSI standards on FRMCS cab-radio receivers to be consistent with relevant requirements from CEPT Report 76 [3] and Commission Implementing Decision on RMR (EU) 2021/1730 [4]).

Regarding the 2 GHz band (1920-1980 MHz), ECC Report 309 contains several studies, which used different methodologies and assumptions for the number of aerial UE and consequently has different options for the regulatory measures to provide compatibility. This Decision is based on the “Approach 2” option of ECC Report 309.

The coexistence conditions (see Annex 1) have been developed under the assumption that there is the mechanism to differentiate between an aerial UE and a conventional UE and this mechanism cannot be changed by the end-user. A mechanism is necessary to ensure that aerial UE respect no-transmit zones.

In addition, to manage the potential interference to MFCN, the control of aerial UE density may be necessary.

There is no interference between neighbouring FDD MFCN networks operating in adjacent channels.

As is the case for other UE operating under the control of an MFCN network, the aerial UE usage on MFCN networks may benefit from international roaming.

ECC noted that the following frequency bands: 703-733 MHz, 832-862 MHz, 880-915 MHz, 2500-2570 MHz, 2570-2620 MHz and 3400-3600 MHz are allocated to Mobile except aeronautical mobile service in Region 1 (Radio Regulations). Nevertheless, studies performed by CEPT in ECC Report 309 and ECC Report 348 provide the technical and operational background conditions which form the basis for this ECC Decision providing a harmonised framework to be implemented on national basis. In addition, CEPT will develop relevant guidance for usage of aerial UE at the border usages. These ECC deliverables are providing operational and technical conditions for use of aerial UE as an application in these frequency bands avoiding harmful interference into services in-band and in adjacent bands.

The next review of this ECC Decision could assess relevant impact of technology evolution, mechanisms to enable aerial UE to respect the frequency band dependent no-transmit-zones, specific aerial UE use case scenarios and will consider if the band 3.4-3.8 GHz can be included in this Decision.

3 REQUIREMENT FOR AN ECC DECISION

To ensure confidence of all spectrum users, including those in adjacent bands, there is a need for an ECC Decision providing harmonised technical conditions of the usage of aerial UE for communications based on LTE and 5G NR in the following MFCN harmonised bands: 703-733 MHz, 832-862 MHz, 880-915 MHz, 1710 - 1785 MHz, 1920-1980 MHz, 2500-2570 MHz and 2570-2620 MHz.

ECC DECISION OF 18 NOVEMBER 2022 ON HARMONISED TECHNICAL CONDITIONS FOR THE USAGE OF AERIAL UE FOR COMMUNICATIONS BASED ON LTE AND 5G NR IN THE 703-733 MHZ, 832-862 MHZ, 880-915 MHZ ,1710-1785 MHZ, 1920-1980 MHZ, 2500-2570 MHZ AND 2570-2620 MHZ MFCN HARMONISED BANDS (ECC DECISION (22)07), CORRECTED 7 MARCH 2025 AND LATEST AMENDED 6 MARCH 2026

"The European Conference of Postal and Telecommunications Administrations,

considering

a) that ECC Report 309 [1] provides an analysis of conditions of usage of aerial UE for communications based on LTE in various harmonised MFCN bands;

b) that there is no technical difference between LTE and 5G NR non-AAS, relevant operational and technical conditions are also valid for both LTE and 5G NR non-AAS (see ECC Report 281 [5], ECC Report 297 [6], ECC Report 298 [7], ECC Report 308 [8] and ECC Report 348 [2]);

c) that ECC Report 348 provides additional conclusions to those in ECC Report 309 relating to AAS base stations in the 1.8 GHz, 2 GHz and 2.6 GHz harmonised bands;

d) that compatibility assessment on the band 3.4-3.8 GHz was made in ECC Report 309, however, this band is excluded from this decision and subject to additional compatibility studies and a first compatibility analysis with radio altimeters operating in the band 4.2-4.4 GHz was addressed in ECC Report 362 [11];

e) that to ensure confidence for all spectrum users, including in adjacent bands, there is a need for harmonised technical conditions applicable to aerial UE which can be identified in the suitable MFCN bands;

f) that the 703-733 MHz, 832-862 MHz, 880-915 MHz, 2500-2570 MHz and 2570-2620 MHz frequency bands are allocated to Mobile except aeronautical mobile service in most of the CEPT countries;

g) that ECC Decision (06)09 [9] designates the bands 1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile-Satellite Service including those supplemented by a Complementary Ground Component (CGC);

h) that the term aerial UE, used in this ECC Decision, refers to an UE supporting UAS features and services and requiring an aerial subscription. An aerial UE is installed either on-board an Unmanned Aircraft (e.g. drones) or on-board manned aircraft (e.g. helicopter). It identifies itself to the mobile network as being in this class;

i) that this ECC Decision refers to non-AAS aerial UE only;

j) that this ECC Decision has been developed under the assumption that there is the mechanism to differentiate between an aerial UE and a conventional UE and that this mechanism cannot be changed by the end-user;

k) that the mechanism to differentiate aerial UE from other UE, should allow mobile operators to identify aerial UE and to manage self-interference;

l) that the scenario for commercial aircraft connectivity differs from those addressed by this ECC Decision;

m) that various types of terrestrial radars operating above 2.7 GHz are already subject to nationally determined coordination zones, which are larger than the separation distance (lower than 1 km) required to avoid blocking effects on any kind of the radars operating above 2700 MHz caused by aerial UE band emissions below 2620 MHz;

n) that a no-transmit zone in this Decision is defined as a geographical area where aerial UE are not allowed to transmit for spectrum compatibility purposes in a given harmonised MFCN band or part of it;

o) that national studies are needed, as appropriate, to define no-transmit zones for spectrum compatibility purposes, for aerial UE operating in the relevant frequency bands;

p) that a mechanism is necessary to ensure that aerial UE respect no-transmit zones;

q) that FRMCS cab-radios in 1900-1910 MHz are assumed to be compliant with relevant FRMCS receiver requirements from CEPT Report 76 [3] and Commission Implementing Decision on RMR ((EU) 2021/1730) [4] applicable to EU member states only;

r) that there is a need for specific OOBE limits for aerial UE in some frequency bands to avoid interference to other services in some other bands (e.g. to protect MetSat or radar operations);

s) that the band 1427-1518 MHz is harmonised for MFCN SDL but excluded from the scope of this ECC Decision due to foreseen bi-directional or uplink communications from aerial UE to the network;

t) that this ECC Decision is without prejudice to other regulation on aerial UE, in particular at EU level on UAS categories (open, specific, certified) and relevant requirements to be fulfilled;

u) that for compatibility purposes the use of MFCN for the communication links of aerial UE within a country may be restricted in certain frequency bands and/or in some geographical areas due to national laws other than national telecommunication laws or the table of frequency allocations of that country;

v) that in this ECC Decision it is assumed that aerial UEs have a height reporting capability;

w) that in EU/EFTA countries the aerial UE equipment intended to be used under open and specific categories under the scope of this Decision shall comply with the RE Directive [10]. Conformity with the essential requirements of the RE Directive may be demonstrated by compliance with the applicable harmonised European standard(s) or by using the other conformity assessment procedures set out in the RE Directive.

DECIDES

1. that the purpose of this ECC Decision is to harmonise the operational and technical conditions in the following harmonised MFCN frequency bands: 703-733 MHz, 832-862 MHz, 880-915 MHz, 1710-1785 MHz, 1920-1980 MHz, 2500-2570 MHz and 2570-2620 MHz for the usage of “aerial UE” as defined in Annex 1;

2. that depending on the market demand, CEPT administrations shall allow the usage of aerial UE in the 880-915 MHz and 1920-1980 MHz frequency band without specific operational and technical conditions beyond those already applicable to UE in ECC Decisions in the given bands;

3. that for operation of aerial UEs in the bands 703-733 MHz, 832-862 MHz, 1710-1785 MHz, 2500-2570 MHz and 2570-2620 MHz, CEPT administrations shall implement the operational and technical conditions as defined in Annex 1;

4. that no-transmit zones as described in this Decision should be defined and implemented at national level and where necessary coordinated with neighbouring countries;

5. that administrations are invited to monitor and report annually to the European Communications Office on the effects of this ECC Decision in their countries;

6. that ECC shall review this decision within 3 years, in particular, to reassess, if needed, the protection of CGC base stations from aerial UE in the 2 GHz frequency band and to assess if the band 3.4-3.8 GHz shall be included in this Decision;

7. that this Decision **enters into force** on18 November 2022;

8. that the preferred **date for implementation** of this Decision shall be 18 May 2023;

9. that CEPT administrations shall communicate the **national measures** implementing this Decision to the ECC Chair and the European Communications Office when this ECC Decision is nationally implemented."

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 Decisions.

ANNEX 1: HARMONISED OPERATIONAL AND TECHNICAL PARAMETERS

This annex provides harmonised operational and technical conditions to be implemented by CEPT administrations in order to allow the usage of aerial UE according to considerings h) and j) in relevant MFCN harmonised bands: 703-733 MHz, 832-862 MHz, 1710-1785 MHz, 2500-2570 MHz and 2570-2620 MHz.

National studies are needed, as appropriate, to define and to implement no-transmit zones for spectrum compatibility purposes, for aerial UE operating in the respective frequency bands defined below. Furthermore, there is a need for OOBE limits for aerial UE in some frequency bands. There is no need for additional measures in 880-915 MHz and 1920-1980 MHz at this time.

A1.1 TECHNICAL CONDITIONS

These technical conditions are additional requirements specific to aerial UE. If not mentioned, aerial UE shall meet as appropriate the requirements that already apply to UE in each relevant ECC Decision applicable to MFCN.

There is a need for OOBE limits for aerial UE operating in the following frequency bands:

1710-1785 MHz: Protection of MetSat operating in the 1675-1710 MHz frequency band

- Out-of-band limit: -40 dBm/MHz in the frequency range 1675-1710 MHz for aerial UE operating in 1710 – 1785 MHz.

2500-2570 MHz/2570-2620 MHz: Protection of RAS operating in 2690–2700 MHz and radars operating in 2700-2900 MHz

- Out-of-band limit: -50 dBm/MHz in the frequency range 2690-2900 MHz for aerial UE operating in 2500 - 2570 MHz or 2570-2620 MHz.

A1.2 OPERATIONAL CONDITIONS

The operational conditions to be defined and implemented at national level provide additional measures to the technical conditions in order to protect other services.

703-733 MHz: Protection of DTT receivers and RAS sites

- Aerial UE operating in 703-733 MHz should not transmit when less than 30 m above ground level to avoid interference to DTT receivers[1];

- Nationally determined no-transmit zones are required around RAS sites operating in 1400-1427 MHz for aerial UE operating in the 703-713.5 MHz frequency band, as appropriate.

832-835 MHz: Protection of RAS sites

- Nationally determined no-transmit zones are required around RAS sites operating in 1660-1670 MHz for aerial UE operating in the 832-835 MHz frequency band, as appropriate.

2500-2570 MHz/2570-2620 MHz: Protection of RAS sites and radars

- Nationally determined no-transmit zones are required around RAS sites operating in 2690-2700 MHz for aerial UE operating in the 2500-2570 MHz or 2570-2620 MHz frequency band, as appropriate;

- Nationally determined no-transmit zones might be required around radars operating in 2700-2900 MHz for aerial UE operating in the 2500-2570 MHz or 2570-2620 MHz frequency band.

[1] Another frequency band than 703-733 MHz shall be used for landing and take-off.

ANNEX 2: LIST OF REFERENCES

[1] ECC Report 309: “Analysis of the usage of aerial UE for communication in current MFCN harmonised bands”, approved July 2020

[2] ECC Report 348: “Usage of aerial UE in 1.8 GHz, 2 GHz and 2.6 GHz frequency bands with MFCN AAS base stations”, approved 18 November 2022

[3] CEPT Report 76: “Report from CEPT to the European Commission in response to the Mandate on spectrum for the future railway mobile communications system; Report B: EU-harmonised technical conditions for the future railway mobile radio communications system (Task 5)”, approved November 2020

[4] Commission Implementing Decision (EU) 2021/1730 of 28 September 2021 on the harmonised use of the paired frequency bands 874,4-880,0 MHz and 919,4-925,0 MHz and of the unpaired frequency band 1900-1910 MHz for Railway Mobile Radio

[5] ECC Report 281: “Analysis of the suitability of the regulatory technical conditions for 5G MFCN operation in the 3400-3800 MHz band”, approved July 2018

[6] ECC Report 297: “Analysis of the suitability and update of the regulatory technical conditions for 5G MFCN and AAS operation in the 900 MHz and 1800 MHz bands”, approved March 2019

[7] ECC Report 298: “Analysis of the suitability and update of the regulatory technical conditions for 5G MFCN and AAS operation in the 1920-1980 MHz and 2110-2170 MHz band”, approved March 2019

[8] ECC Report 308: “Analysis of the suitability and update of the regulatory technical conditions for 5G MFCN and AAS operation in the 2500-2690 MHz band”, approved March 2020

[9] ECC Decision (06)09: “ECC Decision of 1 December 2006 on the designation of the bands 1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile-Satellite Service including those supplemented by a Complementary Ground Component (CGC)”, amended 5 September 2007

[10] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC

[11] 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 November 2024