



CEPT Report 089

Report from CEPT to the European Commission in response to the Mandate to develop harmonised technical and operational conditions for the usage of non-active antenna systems aerial terminal stations (non-AAS ATS) in EU-harmonised frequency bands for terrestrial systems capable of providing electronic communications services

approved 7 March 2025

0 EXECUTIVE SUMMARY

The aim of this Report is to respond to the Mandate from the European Commission (EC) to develop harmonised technical and operational conditions for the usage of non-active antenna systems aerial terminal stations (non-AAS ATS) in EU-harmonised frequency bands for terrestrial systems capable of providing electronic communications services (see Annex 1).

For the purpose of this Report, the term non-active antenna systems aerial terminal station (non-AAS ATS) is used instead of “aerial UE”, a term which has been used in the CEPT studies, (e.g. ECC Report 309 [1] and ECC Report 348 [2]) and harmonisation measures related to this topic (e.g. ECC Decision (22)07 [3]). This clarification keeps terminology consistent with the EU legal framework.

The assessed EU-harmonised frequency bands in the framework of this Report are the following:

- 703-733 MHz/758-788 MHz ('700 MHz'), 791-821 MHz/832-862 MHz ('800 MHz'), 880-915 MHz/925-960 MHz ('900 MHz'), 1710-1785 MHz/1805-1880 MHz ('1800 MHz'), 1920-1980 MHz/2110-2170 MHz ('paired terrestrial 2 GHz'), 2500-2570 MHz/2620-2690 MHz ('paired 2.6 GHz') and 2570-2620 MHz (unpaired 2.6 GHz), with non-AAS terrestrial base stations;
- 1710-1785 MHz/1805-1880 MHz ('1800 MHz'), 1920-1980 MHz/2110-2170 MHz ('paired terrestrial 2 GHz'), 2500-2570 MHz/2620-2690 MHz ('paired 2.6 GHz'), 2570-2620 MHz (unpaired 2.6 GHz) with AAS terrestrial base stations.

For the purpose of this Report, a non-AAS ATS can be installed either on board of an unmanned aircraft (e.g. a drone) or on board of a manned aircraft (e.g. helicopters), and it refers to non-AAS ATS only. It is without prejudice to EU level and national regulations regarding civil aviation and flight operations.

The technical assessment concluded that the operation of non-AAS ATS in the bands 703-733 MHz, 832-862 MHz, 1710-1785 MHz, 2500-2570 MHz and 2570-2620 MHz is feasible within the operational and technical conditions defined in Annex 2

The usage of non-AAS ATS in the 880-915 MHz and 1920-1980 MHz frequency band is feasible without specific operational and technical conditions beyond those already applicable to conventional user equipment (UE) in EC Decisions in the given harmonised Wireless Broadband Electronic Communications Services (WBB ECS) bands.

In order to protect other services (radio astronomy, radars in some adjacent bands) there is a need to implement a “no-transmit” zone requirement with harmonised operational conditions described in Annex 2. These zones shall be defined (size and location) and implemented at national level and, where necessary, coordinated with neighbouring countries.

A mechanism to differentiate non-AAS ATS from other/conventional UE should allow mobile operators to identify non-AAS ATS and also to manage interference intra WBB ECS network. This mechanism cannot be changed by the end-user and it has to be ensured that non-AAS ATS respect the no-transmit zones.

Harmonised operational conditions applied to non-AAS ATS have been developed under the assumption of the mechanism which is described above. CEPT has invited ETSI to develop a harmonised standard for non-AAS ATS, which includes such a mechanism and relevant specific out-of-band emission (OOBE) requirements applying to non-AAS ATS.

CEPT invites the European Commission to include accordingly relevant requirements in the future European harmonised framework (see Annex 2).

In addition, CEPT will address issues regarding the use of non-AAS ATS in border areas operating in the bands mentioned above and will provide guidance to administrations on cross-border coordination.

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
3GPP	3rd Generation Partnership Project
4G/LTE	4th generation of wireless cellular technology/Long-Term Evolution
5G NR	5th generation of wireless cellular technology/New Radio
AAS	Active Antenna Systems
Aerial UE	Aerial User Equipment
ATS	Aerial Terminal Station
BVLOS	Beyond Visual Line of Sight
BS	Base station
CEPT	European Conference of Postal and Telecommunications Administrations
DL	Downlink
DTT	Digital terrestrial television
EC	European Commission
ECC	Electronic Communications Committee
ECS	Electronic Communications Services
ETSI	European Telecommunications Standards Institute
EU	European Union
FDD	Frequency division duplex
FRMCS	Future Railway Mobile Communication System
FS	Fixed Service
FSS	Fixed-Satellite Service
GSM-R	Global System for Mobile Communications – Rail(way)
HS	Harmonised standard
MetSat	Meteorological Satellites
MS	Mobile Service
MSS CGC	Mobile-Satellite Systems with Complementary Ground Components
Oobe	out-of-band emission
PMR/PAMR	Professional Mobile Radio/Public Access Mobile Radio
PPDR	Public Protection Disaster Relief
RAS	Radio astronomy Service
RLS	Radiolocation service
RMR	Railway Mobile Radio
RR	Radio Regulations

RSBN	Radio systems for short-range navigation
TDD	Time Division Duplex
UAS	Unmanned Aircraft Systems
UE	User Equipment
UL	Uplink
WBB	Wireless Broadband

1 INTRODUCTION

This Report addresses Task 1 and Task 2 of the EC Mandate to CEPT to develop harmonised technical and operational conditions for the usage of non-Active Antenna Systems (aerial terminal stations (non-AAS ATS) in EU-harmonised frequency bands for terrestrial systems capable of providing electronic communications services (see Annex 1):

1. “Assess the feasibility and the relevant conditions of radio communications between non-AAS ATS based on 4G/LTE and 5G NR technology and wireless terrestrial systems capable of providing electronic communications services using the EU-harmonised frequency bands:
 - 703-733 MHz/758-788 MHz (‘700 MHz’), 791–821 MHz/832-862 MHz (‘800 MHz’), 880-915 MHz/925-960 MHz (‘900 MHz’), 1710-1785 MHz/1805-1880 MHz (‘1800 MHz’), 1920-1980 MHz/2110-2170 MHz (‘paired terrestrial 2 GHz’), 2500-2570 MHz/2620-2690 MHz (‘paired 2.6 GHz’) and 2570-2620 MHz (unpaired 2.6 GHz), with non-AAS terrestrial base stations.
 - 1710-1785 MHz/1805-1880 MHz (‘1 800 MHz’), 1920-1980 MHz/2110-2170 MHz (‘paired terrestrial 2 GHz’), 2500-2570 MHz/2620-2690 MHz (‘paired 2.6 GHz’), 2570-2620 MHz (unpaired 2.6 GHz) with AAS terrestrial base stations.”
2. To “develop least restrictive harmonised technical and operational conditions for the radio communications between non-AAS ATS based on 4G/LTE and 5G NR technology and wireless terrestrial systems capable of providing electronic communications services using the related EU-harmonised bands.”

2 TECHNICAL FEASIBILITY ASSESSMENT / ANALYSIS OF SUITABILITY OF EXISTING FRAMEWORK

The technical assessment carried out in CEPT was made through ECC Report 309 [1] and ECC Report 348 [2]. The results of this assessment are shown in the following sections of this Report.

ECC Report 309 addresses the coexistences of aerial terminal stations (ATS) operated through Wireless Broadband Electronic Communications Services (WBB ECS) with other services in-band and in adjacent bands with the assumption of non-Active Antenna Systems (non-AAS) Base Stations (BS).

ECC Report 348 provides additional results in order to consider the usage of AAS BS in the coexistence scenario. The usage of AAS BS is only identified for frequency bands above 1 GHz.

These studies on the suitability of existing framework for ATS have been performed based on standardised LTE and 5G NR UE operating up to 10000 m altitude with the assumption of usage of already existing WBB ECS BS, which are typically deployed to provide effective coverage at ground level.

2.1 OUTCOMES OF TECHNICAL ASSESSMENT

2.1.1 700 MHz frequency band

In the case of ATS operating in 703-733 MHz, different coexistence scenarios have been analysed facing the following uses:

- WBB ECS above 736 MHz;
- PPDR between 698 and 703 MHz;
- Broadcasting (Digital Terrestrial Television (DTT)) below 694 MHz;
- Radio astronomy service (RAS) in the passive band 1400-1427 MHz, impacted by the second harmonics of the frequencies between 703-733 MHz.

ECC Report 309 provides relevant analysis and studies for the coexistence with these services.

In conclusion, ATS can only operate in the 700 MHz frequency band with the implementation of coexistence conditions to protect broadcasting receivers and RAS based on the outcome of ECC Report 309.

2.1.2 800 MHz frequency band

For ATS operating in 832-862 MHz, coexistence with the following services was studied:

- Radio systems for short-range navigation (RSBN) Aircraft transmitter in 770-810 MHz;
- Radiolocation service (RLS) 2 (Type 2) Ground radar transmitter in 833-839 MHz;
- RLS 1 (Type1) Ground radar transmitter in 830-839 MHz and 855-861 MHz;
- RLS1 (Type 2) Ground radar transmitter in 842-861 MHz;
- RAS in the frequency bands 1660-1670 MHz and 1718.8-1722.2 MHz, impacted by the second harmonics of the frequencies between 832-835 MHz and 859-861 MHz¹.

Based on the results of the studies in the ECC Report 309, CEPT recommends, that ATS can operate in the 800 MHz frequency band with the implementation of “no-transmit” zone in order to protect RAS in the frequency band 1660-1670 MHz as appropriate, since, among others, there is no ETSI standardisation on additional filtering available up to now.

¹ Second harmonics of WBB ECS UE in the frequency range 832-835 MHz and 859-861 MHz could potentially affect RAS in the frequency bands 1660-1670 MHz and 1718.8-1722.2 MHz respectively. The former band has a primary allocation for RAS in the RR and is also mentioned in RR No. 5.149, while the latter has only a secondary allocation for RAS according to RR No. 5.385 and is mentioned in RR No. 5.149.

2.1.3 900 MHz frequency band

ATS operating in 880-915 MHz face the following services in adjacent bands as identified in ECC Report 96 [7] and ECC Report 313 [8]:

- GSM-R Uplink (UL) in 876-880 MHz (in some European countries on a national basis 873-880 MHz);
- GSM-R Downlink (DL) in 921-925 MHz (in some European countries on a national basis in 918-925 MHz);
- Railway Mobile Radio (RMR) (UL) in 874.4-880 MHz;
- RMR (DL) in 919.4-925 MHz;
- Professional Mobile Radio/Public Access Mobile Radio (PMR/PAMR) (DL) in 915-921 MHz.

ECC Report 309 [1] provides relevant analysis and studies for the coexistence with these services. It can be concluded that ATS can operate in the 900 MHz without any additional measures on the basis of the assumption of robustness of Future Railway Mobile Communication System (FRMCS) cab-radios against blocking signals emitted by non-AAS ATS (i.e. ETSI standards on FRMCS cab-radio receivers to be consistent with relevant requirements from CEPT Report 76 [9] and Commission Implementing Decision on RMR (EU) 2021/1730 [10]).

2.1.4 1800 MHz frequency band

2.1.4.1 1800 MHz frequency band – aerial terminal stations served by non-AAS WBB ECS BS

ATS operating in 1710-1785 MHz, face the following applications in adjacent bands and identified in ECC Report 96 as:

- Weather satellites (MetSat) below 1710 MHz;
- Defence systems (fixed telemetry) below 1710 MHz and Wireless broadband (fixed service) above 1785 MHz;
- Radio-Microphones above 1785 MHz;
- In addition, RAS in the band 1718.8-1722.2 MHz (see Footnote RR Nos. **5.149** and **5.385** in the Radio Regulations (RR)) is in-band with respect to the 1800 MHz WBB ECS band.

ECC Report 309 [1] provides relevant analysis and studies for the coexistence with these services. The 1718.8-1722.2 MHz RAS frequency band has only a secondary allocation according to RR No. **5.385** and is mentioned in RR No. **5.149**. Therefore, ATS can operate in the 1800 MHz frequency band only with the implementation of coexistence conditions to protect MetSat. Out-of-band emission limit: -40 dBm/MHz in the frequency range 1675-1710 MHz for ATS operating in 1710-1785 MHz.

2.1.4.2 1800 MHz frequency band – aerial terminal stations served by AAS WBB ECS BS

ECC Report 348 [2] provides analyses for the use of WBB ECS AAS BS serving aerial UE (i.e. non-AAS ATS). It concludes that ATS does not lead to additional interference cases. The usage of WBB ECS by non-AAS ATS where AAS BS are deployed does not require additional mitigation measures in the 1.8 GHz band other than those (if any) already identified in the section above (see 2.1.4.1).

2.1.5 2 GHz Frequency band

2.1.5.1 2 GHz frequency band – aerial terminal stations served by non-AAS WBB ECS BS

ATS operating in the 1920-1980 MHz frequency band is adjacent to:

- FRMCS operating in the frequency band 1900-1910 MHz with the associated harmonised technical conditions for Railway Mobile Radio (RMR) defined in ECC Decision (20)02 [11] and corresponding Commission Implementing Decision (EU) 2021/1730 [10]. CEPT Report 52 [6] assesses and identifies alternative uses of the 1900-1920 MHz frequency band other than for the provision of mobile electronic communications services through terrestrial cellular networks that up to now have not been harmonised in CEPT and EU;
- A Mobile-Satellite Systems with Complementary Ground Components (MSS CGC) aeronautical system operating in the band 1980-2010 MHz and used in Europe.

Based on the outcome of ECC Report 309 [1] which provides relevant analysis and studies for the coexistence with these services and additional considerations during the drafting of this Report, the following can be concluded:

- There is no need for the implementation of coexistence techniques between ATS and FRMCS services;
- In the case of MSS services and coexistence with CGC, the results of the conducted studies have shown that different modelling and parameter assumptions have led to different conclusions. Further to additional consideration when drafting this Report, CEPT concluded that no condition is required for the protection of CGC operating in 1980-2010 MHz. At this stage CEPT administrations are invited to report interference². If appropriate, CEPT will further review the issue and inform the European Commission accordingly.

2.1.5.2 2 GHz frequency band – aerial terminal stations served by AAS WBB ECS BS

Compatibility analyses have been performed in the ECC Report 348 [2] in order to identify if ATS operating in the 1920-1980 MHz band, served by AAS WBB ECS BS, differ from ATS served by non-AAS WBB ECS BS and led to the following results:

- No need for protection measure is identified with the mobile-satellite service (MSS) operating in 1980-2010 MHz;
- No need for protection measure is identified with satellite services operating in 2025-2110 MHz (Earth-to-space);
- No need for protection measure is identified with MSS CGC receivers in 2170-2200 MHz.

2.1.6 2.6 GHz frequency band

2.1.6.1 2.6 GHz frequency band – aerial terminal stations served by non-AAS WBB ECS BS

ATS in the 2.6 GHz has been studied in two cases, where ATS operates the 2.6 GHz FDD UL band (2500-2570 MHz) and in the TDD band 2570-2620 MHz.

ATS operating in 2500-2570 MHz are adjacent to:

- Fixed Service, MSS (space to earth) and Mobile Service (MS) below 2500 MHz;
- MS in the 2570-2620 MHz unpaired TDD band;
- MSS and MS services below 2500 MHz as well as WBB ECS above 2570 MHz, operating with receivers on the ground;
- FS stations below 2500 MHz typically pointing towards the horizon.

Based on the outcome of ECC Report 309 [1], no specific measure is required for coexistence of ATS with the uses mentioned above.

ATS operating in the 2570-2620 MHz band are adjacent to:

- the 2500-2570 MHz WBB ECS UL band;
- the 2620-2690 MHz WBB ECS DL band.

Non-AAS ATS operating in 2570-2620 MHz will not create more interference to WBB ECS networks deployed in 2500-2570 MHz than non-AAS ATS operating in adjacent channels within 2500-2570 MHz (see ECC Report 309 [1]).

Based on the above and outcome of ECC Report 309, it can be concluded that ATS can only operate in the 2600 MHz frequency band with the implementation of coexistence conditions in order to protect radar above 2700 MHz and RAS in 2690-2700 MHz. Out-of-band emission limit: -50 dBm/MHz in the frequency range 2690-2900 MHz for ATS operating in 2500-2570 MHz or 2570-2620 MHz.

² see considering v) in ECC Decision 22(07) [3]

2.1.6.2 2.6 GHz frequency band – aerial terminal stations served by AAS WBB ECS BS

Compatibility analyses have been performed in the ECC Report 348 [2] in order to identify if an ATS served by AAS WBB ECS BS differs from ATS served by non-AAS WBB ECS BS and led to the following results:

- No additional protection measure is identified for RAS and Radar operating the 2.6 GHz.

3 RECOMMENDED REGULATORY FRAMEWORK

The recommended regulatory framework including the harmonised operational and technical conditions is presented in Annex 2. The following definitions are relevant to understand their application.

3.1.1 Non-AAS ATS

In the context of this CEPT Report, aerial terminal station using non-active antenna system (non-AAS ATS) refers to a system installed on board of an unmanned aircraft (e.g. drone) or on board manned aircraft (e.g. helicopter).

The usage of "aerial" terminal stations can be up to 10000 m. The communications links of ATS may be used for any type of communication, possibly including command and control and payload within WBB ECS bands.

Aerial terminal station can be differentiated from WBB ECS ground terminal station by using specific mechanism such as aerial subscription.

3.1.2 "No-transmit" zone

In the context of aerial terminal station and in order to protect some adjacent services as described in this Report, there is a need to identify geographical areas where ATS shall not transmit for spectrum compatibility purposes in a given harmonised WBB ECS band or part of it. This area is called "no-transmit" zone.

These "no-transmit" zones are specific to transmitters in given bands or even in given channels. Such zones shall be identified and implemented at national level (transmission restriction in given geographical areas).

In this Report, these "no-transmit" zones are defined for spectrum compatibility purposes. Other frequency bands, not subject to a "no-transmit" zone requirement, could be used as appropriate in the given geographical area. Relevant national authorities and users should be informed of "no-transmit" zones related to spectrum compatibility. Any such "no-transmit" zones required to achieve coexistence would be defined by the Member States.

Additionally, there is also a need to establish a mechanism to ensure that ATS respect the "no-transmit" zone defined by Member States. Such mechanism may need activities in different standardisation bodies (e.g. 3GPP, ETSI in Europe, etc.). When drafting this Report, CEPT noted that availability of national "no-transmit" zone information at the national WBB ECS terrestrial networks could help to develop such relevant mechanism. It is up to each Member State to manage how the relevant information is made available for such purpose.

4 ETSI SUPPORT TO THE IMPLEMENTATION OF THIS REGULATORY FRAMEWORK

CEPT invited in November 2022 ETSI³ to include the following requirements in future ETSI harmonised standard (HS) on ATS in order to ensure a coherence with the regulatory framework proposed in this Report:

- additional out-of-band emission (OOBE) requirements applicable to non-AAS ATS in the following frequency bands 1710-1785 MHz, 2500-2570 MHz, 2570-2620 MHz, as defined in section 2. In other frequency bands, OOBE limits applicable to terrestrial UE remain unchanged for non-AAS ATS;
- a mechanism coherent with the ATS definition (see section 3.1.1) in order to differentiate it from terrestrial UE operating under WBB ECS networks that would allow mobile operators to identify non-AAS ATS⁴ and also to manage interference intra WBB ECS networks;
- differentiation of ATS from conventional UE shall not be changed by the end-user;
- the ATS shall not be capable to connect to WBB ECS networks without aerial subscription.

CEPT considers that this HS would support implementation of a national licensing framework and the development of this usage with confidence of all spectrum users.

CEPT assumes that investigation of a mechanism ensuring that ATS respect “no-transmit” zones and its implementation in future harmonised standards/ETSI standards is under consideration. CEPT noted during the preparation of this Report that the first version of the ETSI harmonised standard is not expected to contain such mechanism.

³ [ECC\(22\)057, annex 07](#)

⁴ For the purpose of this Report, the term non-active antenna systems aerial terminal station (non-AAS ATS) is used instead of “aerial UE”, a term which has been used in the CEPT studies, (e.g. ECC Report 309 [1] and ECC Report 348 [2]) and harmonisation measures related to this topic (e.g. ECC Decision (22)07 [3]). This clarification keeps terminology consistent with the EU legal framework.

5 CONCLUSIONS

The aim of this Report is to respond to the Mandate from the European Commission (EC) to develop harmonised technical and operational conditions for the usage of non-active antenna systems aerial terminal stations (non-AAS ATS) in EU-harmonised frequency bands for terrestrial systems capable of providing electronic communications services (see Annex 1).

For the purpose of this Report, the term non-active antenna systems aerial terminal station (non-AAS ATS) is used instead of “aerial UE”, a term which has been used in the CEPT studies, (e.g. ECC Report 309 [1] and ECC Report 348 [2]) and harmonisation measures related to this topic (e.g. ECC Decision (22)07 [3]). This clarification keeps terminology consistent with the EU legal framework.

The assessed EU-harmonised frequency bands in the framework of this Report are the following:

- 703-733 MHz/758-788 MHz ('700 MHz'), 791-821 MHz/832-862 MHz ('800 MHz'), 880-915 MHz/925-960 MHz ('900 MHz'), 1710-1785 MHz/1805-1880 MHz ('1800 MHz'), 1920-1980 MHz/2110-2170 MHz ('paired terrestrial 2 GHz'), 2500-2570 MHz/2620-2690 MHz ('paired 2.6 GHz') and 2570-2620 MHz (unpaired 2.6 GHz), with non-AAS terrestrial base stations;
- 1710-1785 MHz/1805-1880 MHz ('1800 MHz'), 1920-1980 MHz/2110-2170 MHz ('paired terrestrial 2 GHz'), 2500-2570 MHz/2620-2690 MHz ('paired 2.6 GHz'), 2570-2620 MHz (unpaired 2.6 GHz) with AAS terrestrial base stations.

For the purpose of this Report, a non-AAS ATS can be installed either on board of an unmanned aircraft (e.g. a drone) or on board of a manned aircraft (e.g. helicopters), and it refers to non-AAS ATS only. It is without prejudice to EU level and national regulations regarding civil aviation and flight operations.

The technical assessment concluded that the operation of non-AAS ATS in the bands 703-733 MHz, 832-862 MHz, 1710-1785 MHz, 2500-2570 MHz and 2570-2620 MHz is feasible within the operational and technical conditions defined in Annex 2.

The usage of non-AAS ATS in the 880-915 MHz and 1920-1980 MHz frequency band is feasible without specific operational and technical conditions beyond those already applicable to conventional user equipment (UE) in EC Decisions in the given harmonised Wireless Broadband Electronic Communications Services (WBB ECS) bands.

In order to protect other services (radio astronomy, radars in some adjacent bands) there is a need to implement a “no-transmit” zone requirement with harmonised operational conditions described in Annex 2. These zones shall be defined (size and location) and implemented at national level and, where necessary, coordinated with neighbouring countries.

A mechanism to differentiate non-AAS ATS from other/conventional UE should allow mobile operators to identify non-AAS ATS and also to manage interference intra WBB ECS network. This mechanism cannot be changed by the end-user and it has to be ensured that non-AAS ATS respect the no-transmit zones.

Harmonised operational conditions applied to non-AAS ATS have been developed under the assumption of the mechanism which is described above. CEPT has invited ETSI to develop a harmonised standard for non-AAS ATS, which includes such a mechanism and relevant specific out-of-band emission (OOBE) requirements applying to non-AAS ATS.

CEPT invites the European Commission to include accordingly relevant requirements in the future European harmonised framework (see Annex 2).

In addition, CEPT will address issues regarding the use of non-AAS ATS in border areas operating in the bands mentioned above and will provide guidance to administrations on cross-border coordination.

ANNEX 1: EC MANDATE TO CEPT



EUROPEAN COMMISSION
 Communications Networks Content & Technology Directorate-General
 Digital Decade and Connectivity
Radio Spectrum Policy

MANDATE TO THE CEPT TO DEVELOP HARMONISED TECHNICAL AND OPERATIONAL CONDITIONS FOR THE USAGE OF NON-ACTIVE ANTENNA SYSTEMS AERIAL TERMINAL STATIONS IN EU-HARMONISED FREQUENCY BANDS FOR TERRESTRIAL SYSTEMS CAPABLE OF PROVIDING ELECTRONIC COMMUNICATIONS SERVICES

1. PURPOSE

The purpose of this mandate to the CEPT is the feasibility study and development of harmonised technical and operational conditions, for the usage¹ of aerial terminal stations (ATS)² in EU-harmonised bands for terrestrial systems capable of providing electronic communications services. The mandate addresses the following frequency bands: 700 MHz, 800 MHz, 900 MHz, 1 800 MHz, the paired terrestrial 2 GHz band and 2.6 GHz (both, its paired and unpaired portions). It sets focus on the latest generations of mobile communications technology, namely 4G/LTE and 5G, given their tailored performance characteristics. The deliverables of the work on this mandate will be used in support of an EU-level technical harmonisation measure under the Radio Spectrum Decision (Decision 676/2002/EC³).

2. EU POLICY OBJECTIVES

The EU’s digital decade policy programme⁴ sets ambitious connectivity targets and infrastructure priorities in support of the digital and green transformation.

There has been a big increase in demand across the Member States for the operation of ATSs over large distances under beyond-visual-line-of-sight (BVLOS) conditions, mainly for professional purposes, such as industrial and governmental use cases (e.g. pipelines inspections, agriculture fields monitoring, assistance in search and rescue missions) based on the most advanced mobile communication technologies (4G/LTE and 5G). The ATS is intended for wireless communications with base stations of terrestrial systems providing

¹ Currently under study by ETSI, there is need for a mechanism to differentiate between an aerial terminal station and a conventional User Equipment. This mechanism cannot be changed by the end-user and is necessary to ensure that aerial terminal stations respect no-transmit zones.

² For the purpose of this mandate and its follow-up, the term aerial terminal station (ATS) is used instead of “aerial UE”, term which has been used in the CEPT studies and harmonisation initiative related to this topic and cited in this mandate. This clarification keeps terminology consistent with the EU legal framework.

³ Decision 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community, OJ L 108, 24.4.2002, p. 1.

⁴ Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030, OJ L 323, 19.12.2022, p. 4

electronic communications services⁵, using EU-harmonised frequency bands. Usage of 4G/LTE and 5G technology provides high data rate, low latency, large system capacity and robust reliability, which are necessary for the operation and data exchange of ATSS. In this regard, the Commission Communication ‘5G for Europe: an Action Plan’⁶, calls for appropriate steps for the future evolution of the overall network architecture to respond to new use cases arising in key industrial sectors.

Establishing harmonised technical and operational conditions for terrestrial wireless communications with ATSS will contribute to the development of the internal market, contribute to addressing safety issues (e.g. avoiding risks for workers linked to dangerous inspections or critical missions) and ensure radio coexistence with other users. At the CEPT level, following the results of the ECC Reports 309 and 348, on 18 November 2022 the ECC adopted its ECC Decision (22)07 which sets out harmonised technical conditions for the provision of connectivity to non-AAS ATS based on 4G/LTE and 5G New Radio (NR) technology by terrestrial systems providing electronic communications services using the following EU-harmonised bands:

- 700 MHz, 800 MHz, 900 MHz, 1 800 MHz, the paired terrestrial 2 GHz band and the paired/unpaired portion of the 2.6 GHz band with non-AAS base stations.
- 1 800 MHz, the paired terrestrial 2 GHz band and the paired/unpaired portion of the 2.6 GHz band with AAS base stations.

Therefore, it is appropriate to further develop the EU framework and ensure its alignment with the CEPT framework.

3. JUSTIFICATION

Pursuant to Article 4 of the Radio Spectrum Decision, the CEPT is mandated to undertake the work required to study and develop harmonised technical and operational conditions for the operation of ATSS under the control of wireless terrestrial systems capable of providing electronic communications services, such as mobile networks (as of the fourth generation onwards) using EU-harmonised bands on the basis of the principles of technology and service neutrality laid down in the European Electronic Communications Code⁷.

For the purpose of this mandate, an ATS can be installed either on board of an unmanned aircraft (e.g. a drone) or on board of a manned aircraft (e.g. helicopters). This mandate deals exclusively with the development of harmonised technical and operational conditions (under the Radio Spectrum Decision) for wireless communications within EU-harmonised bands, between ATSS and terrestrial systems providing electronic communications services, such as mobile networks. It is without prejudice to EU-level and national regulations regarding civil aviation and flight operations.

⁵ Possibly also other types of base stations in the future.

⁶ Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions ‘5G for Europe: An Action Plan’, COM(2016) 588 final.

⁷ Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code, OJ L 321, 17.12.2018, p. 36.

1. TASKS AND SCHEDULE

The CEPT is hereby mandated to undertake a study with regard to the following tasks.

Task 1

Assess the feasibility and the relevant conditions of radio communications between non-AAS ATSS based on **4G/LTE and 5G NR technology** and wireless terrestrial systems capable of providing electronic communications services using the EU-harmonised frequency bands:

- 703-733 MHz/758-788 MHz ('700 MHz'), 791–821 MHz/832-862 MHz ('800 MHz'), 880-915 MHz/925-960 MHz ('900 MHz'), 1710-1785 MHz/1805-1880 MHz ('1 800 MHz'), 1920-1980 MHz/2110-2170 MHz ('paired terrestrial 2 GHz'), 2500-2570 MHz/2620-2690 MHz ('paired 2.6 GHz') and 2570-2620 MHz (unpaired 2.6 GHz), with non-AAS terrestrial base stations.
- 1710-1785 MHz/1805-1880 MHz ('1 800 MHz'), 1920-1980 MHz/2110-2170 MHz ('paired terrestrial 2 GHz'), 2500-2570 MHz/2620-2690 MHz ('paired 2.6 GHz'), 2570-2620 MHz (unpaired 2.6 GHz) with AAS terrestrial base stations.

Task 2

Pursuant to the outcome of Task 1, develop least restrictive harmonised technical and operational conditions for the radio communications between non-AAS ATSS based on 4G/LTE and 5G NR technology and wireless terrestrial systems capable of providing electronic communications services using the related EU-harmonised bands. These conditions should be consistent with the existing EU regulatory framework applicable to the frequency bands under consideration. They should ensure interference mitigation and appropriate co-existence with incumbent radio services/applications in the same band and in adjacent bands, in line with the regulatory status of these services/applications.

The CEPT may develop appropriate receiver characteristics for radio equipment as part of the harmonised technical conditions. Based on such harmonised technical and operational conditions, the CEPT may further recommend to ETSI to consider the results of this study when developing relevant harmonised standards.

The CEPT should provide deliverables according to the following schedule:

Delivery date	Deliverable	Subject
November 2024	Draft Report from the CEPT to the Commission.	Description of work undertaken and final results subject to public consultation.
March 2025	Final Report from the CEPT to the Commission, taking into account the outcome of the public consultation.	Description of work undertaken and final results.

The CEPT is requested to report on the progress of its work pursuant to this mandate to all meetings of the Radio Spectrum Committee taking place during the course of the mandate.

The Commission, with the assistance of the Radio Spectrum Committee and pursuant to the Radio Spectrum Decision, may consider applying the results of this mandate in the EU, pursuant to Article 4 of the Radio Spectrum Decision.



ANNEX 2: HARMONISED OPERATIONAL AND TECHNICAL PARAMETERS

This Annex provides harmonised operational and technical conditions to be implemented in order to allow the usage of non-AAS ATS in relevant WBB ECS harmonised bands: 703-733 MHz, 832-862 MHz, 1710-1785 MHz, 2500-2570 MHz and 2570-2620 MHz. ATS refers to a non-AAS ATS supporting UAS features and services and requiring an aerial subscription. An ATS is installed either on board an Unmanned Aircraft (e.g. drones) or on board manned aircraft (e.g. helicopter).

ATS identifies itself to the mobile network as being in this class. This regulatory framework needs the implementation of a mechanism to differentiate ATS and a conventional user equipment (UE) and this mechanism cannot be changed by the end-user. This mechanism to differentiate ATS from other UE, should allow mobile operators to identify ATS and to manage self-interference. A mechanism is necessary to ensure that ATS respect “no-transmit” zones.

Member States should make further studies at national level, to define and to implement “no-transmit” zones for spectrum compatibility purposes, for ATS operating in the respective frequency bands defined below. Furthermore, there is a need for OOB limits for ATS in some frequency bands. There is no need for additional measures in 880-915 MHz and 1920-1980 MHz.

A2.1 HARMONISED TECHNICAL CONDITIONS

ATS shall meet as appropriate the requirements that already apply to UE in each relevant EU Decision applicable to WBB ECS, if not mentioned otherwise. The following technical conditions are additional requirements specific to ATS:

- a mechanism coherent with the ATS definition in order to differentiate it from terrestrial UE operating under LTE/NR 5G networks
- an ATS shall not be capable to connect to WBB ECS terrestrial networks without identifying itself to the mobile network as being a non-AAS ATS⁵

There is a need for OOB limits for ATS operating in the following frequency bands:

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

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

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

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

A2.2 HARMONISED OPERATIONAL CONDITIONS AND RELEVANT REQUIREMENTS

Harmonised operational conditions, as additional measures to the harmonised technical conditions, are required in order to protect some adjacent services as described hereafter. Concerning the “no-transmit” zone requirement, location and size shall be defined and implemented at national level.

⁵ For the purpose of this Report, the term non-active antenna systems aerial terminal station (non-AAS ATS) is used instead of “aerial UE”, a term which has been used in the CEPT studies, (e.g. ECC Report 309 [1] and ECC Report 348 [2]) and harmonisation measures related to this topic (e.g. ECC Decision (22)07 [3]). This clarification keeps terminology consistent with the EU legal framework.

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

- Harmonised operational conditions: ATS operating in 703-733 MHz should not transmit when less than 30 m above ground level to avoid interference to DTT receivers⁶;
- Harmonised operational requirements: “no-transmit” zones are required around RAS sites operating in 1400-1427 MHz for ATS operating in the 703-718 MHz frequency band, as appropriate. Locations and sizes of these zones shall be determined by each Member State.

ATS operation in 832-835 MHz: Protection of RAS sites

- Harmonised operational requirements: “no-transmit” zones are required around RAS sites operating in 1660-1670 MHz for ATS operating in the 832-835 MHz frequency band, as appropriate. Locations and sizes of these zones shall be determined by each Member State.

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

- Harmonised operational requirements: “no-transmit” zones are required around RAS sites operating in 2690-2700 MHz for ATS operating in the 2500-2570 MHz or 2570-2620 MHz frequency band, as appropriate. Locations and sizes of these zones shall be determined by each Member State;
- Harmonised operational requirements: “no-transmit” zones might be required around radars operating in 2700-2900 MHz for ATS operating in the 2500-2570 MHz or 2570-2620 MHz frequency band. Locations and sizes of these zones shall be determined by each Member State.

A2.3 OTHER REQUIREMENT

CEPT recommends, as part of the harmonised technical conditions, to require that the differentiation of ATS from conventional UE shall not be changed by the end-user and that the differentiation mechanism shall not be accessible to the users.

⁶ Another frequency band than 703-733 MHz shall be used for landing and take-off.

ANNEX 3: 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 November 2022
- [3] [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 November 2022
- [4] [CEPT Report 72](#): “Report from CEPT to the European Commission in response to the Mandate “to review the harmonised technical conditions for certain EU-harmonised frequency bands and to develop least restrictive harmonised technical conditions suitable for next-generation (5G) terrestrial wireless systems”
Report A: Review of technical conditions in the paired terrestrial 2 GHz and the 2.6 GHz frequency bands, and the usage feasibility of the 900 MHz and 1800 MHz frequency bands”, approved July 2019
- [5] [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
- [6] [CEPT Report 52](#): Report from CEPT to the European Commission in response to the Mandate “To undertake studies on the harmonised technical conditions for the 1900-1920 MHz and 2010-2025 MHz frequency bands (“Unpaired terrestrial 2 GHz bands”) in the EU”
- [7] [ECC Report 96](#): “Compatibility between UMTS 900/1800 and systems operating in adjacent bands”, approved April 2007
- [8] [ECC Report 313](#): Technical study for co-existence between RMR in the 900 MHz range and other applications in adjacent bands approved May 2020, editorial update February 2024
- [9] [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)
- [10] 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
- [11] [ECC Decision \(20\)02](#): “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 (RMR)”, approved November 2020, latest amended June 2024