



CEPT Report 79

Report from CEPT to the European Commission in response to the Mandate to amend Decision 2005/513/EC on the harmonised use of radio spectrum in the 5 GHz band for the implementation of WAS/RLAN following WRC-19

Report approved on 2 July 2021 by the ECC

0 EXECUTIVE SUMMARY

This CEPT Report proposes revised technical conditions for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) in the 5 GHz band in response to the EC Mandate to amend Decision 2005/513/EC [1] on the harmonised use of radio spectrum in the 5 GHz band for the implementation of WAS/RLAN following WRC-19 (see Annex 2).

These proposed revised technical conditions for WAS/RLAN in the 5 GHz band are presented in Annex 1 to this CEPT Report using the common format of a technical annex. Annex 1 distinguishes the following frequency bands: 5150-5250 MHz, 5250-5350 MHz and 5470-5725 MHz.

5150-5250 MHz

The proposed technical conditions for the use of the 5150-5250 MHz band distinguish the following indoor use cases: inside buildings, road vehicles, trains and aircraft. These conditions also acknowledge that only 3% of the overall 200 mW usage will be outdoors and this has resulted in the following limitations for 200 mW outdoor usage: no fixed use or attachment to a fixed installation or to the external body of road vehicles, a fixed infrastructure or a fixed outdoor antenna.

The conditions for use inside buildings and aircraft remain unchanged. The proposal enables in addition installation inside road vehicles (with 40 mW max e.i.r.p.) and inside trains (with 200 mW max e.i.r.p.).

The proposed amendments also enable the use of the 5170-5250 MHz band by Unmanned Aircraft Systems (UAS) as a specific outdoor use case.

5250-5350 MHz

The technical conditions for the use of the 5250-5350 MHz band are proposed to be amended by specifying the permissible operation as followed:

- Indoor use: inside buildings only. Installations in road vehicles, trains and aircraft are not permitted.
- Outdoor use is not permitted.

5470-5725 MHz

The technical conditions for the use of the 5470-5725 MHz band are proposed to be amended by specifying for the permissible operation that "Installations in road vehicles, trains and aircraft and use for Unmanned Aircraft Systems are not permitted".

Since the 2007 revision of the Commission Implementing Decision [2], read in isolation, it might be assumed that use inside aircraft might be permissible in all bands subject to the Decision. As use above 5250 MHz is required to use Dynamic Frequency Selection (DFS) and as DFS was not designed to accommodate use inside airborne platforms, this Report clarifies that WAS/RLAN use above 5250 MHz, inside aircraft, is not permitted (see ECC Report 140 [3]).

Notwithstanding the assumption of general authorisation, licensed operation in these bands still remains a possible national use, where the interference environment is not changed.

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
AMT	Aeronautical Mobile Telemetry
ARNS	Aeronautical Radionavigation Service
CEPT	European Conference of Postal and Telecommunications Administrations
CAC	Channel availability check
DFS	Dynamic Frequency Selection
EESS	Earth exploration-satellite service
EC	European Commission
ECC	Electronic Communications Committee
e.i.r.p.	Effective isotropic radiated power
ERC	Electronic Radiocommunication Committee
EU	European Union
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FSS	Fixed-satellite service
GMES	Global Monitoring for Environment and Security
JTG	Joint Task Group
I/N	Interference to noise ratio
ISM	In-service monitoring
MSS	Mobile-satellite service
RLAN	Radio Local Area Networks
RR	Radio
SRD	Short Range Devices
TPC	Transmit Power Control
UAS	Unmanned Aircraft Systems
WAS	Wireless Access Systems
WRC	World Radiocommunications Conference

1 INTRODUCTION

The frequency bands 5150-5350 MHz and 5470-5725 MHz were designated and harmonised for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) by ECC Decision (04)08 [4] and Commission Decision 2005/513/EC [1] (amended by Commission Decision 2007/90/EC [2]). These frequency bands have been allocated to the mobile service except aeronautical mobile service on a primary basis in all three regions by World Radiocommunication Conference 2003 (WRC-03), taking into account the need to protect primary services in these frequency bands. WRC-03 adopted RR Resolution 229 on "Use of the bands 5150-5250, 5250-5350 MHz and 5470-5725 MHz by the mobile service for the implementation of Wireless Access Systems including Radio Local Area Networks" [5]. This Resolution has been revised during WRC-12 and recently during WRC-19.

The European Commission issued a Mandate to CEPT to amend Commission Decision 2005/513/EC on the harmonised use of radio spectrum in the 5 GHz frequency band for the implementation of WAS/RLAN following the recent revision of ITU-R Resolution 229 at WRC-19. This document contains the response to tasks 1 and 2 of this Mandate:

1. To propose technical conditions in order to amend Commission Decision 2005/513/EC based on the outcome of WRC-19 (revision of Resolution 229) with regard to the frequency band 5150-5250 MHz.
2. In order to propose corresponding updates of the harmonised technical conditions for WAS/RLAN in the band 5150-5350 MHz and 5470-5725 MHz, as appropriate, to consider possibilities for the usage of these WAS/RLAN on board vehicles (aircraft, road vehicles (cars, buses), trains, etc.) and to assess feasibility of the usage of WAS/RLAN for UAS radio links.

2 CURRENT HARMONISED TECHNICAL CONDITIONS FOR WAS/RLAN IN THE 5 GHz BAND

The below table shows the current technical conditions for the use for WAS/RLAN of the bands 5150-5250 MHz, 5250-5350 MHz and 5470-5725 MHz harmonised by ECC Decision (04)08 [4] at CEPT level and Commission Decision 2005/513/EC [1] (amended by Commission Decision 2007/90/EC [2]) at European Union level.

Table 1: Current harmonised technical conditions for WAS/RLAN in the 5 GHz band

Frequency Band	5150-5250 MHz	5250-5350 MHz	5470-5725 MHz
Technical Conditions			
Permissible operation	Indoor only	Indoor only	Indoor / Outdoor
Maximum mean e.i.r.p. for in-band emissions	200 mW	200 mW	1 W
Maximum mean e.i.r.p. density for in-band emissions	10 mW/MHz in any 1 MHz band	10 mW/MHz in any 1 MHz band	50 mW/MHz in any 1 MHz band
Transmitter Power Control (TPC) (Note 1)	Not applicable	Applicable	Applicable
Dynamic Frequency Selection (DFS) (Note 2)	Not applicable	Applicable	Applicable
<p>Note 1: TPC shall provide on average, a mitigation factor of at least 3 dB on the maximum permitted output power of the systems; or, if transmitter power control is not in use, then the maximum permitted mean e.i.r.p. and the corresponding mean e.i.r.p. density limit shall be reduced by 3 dB.</p> <p>Note 2: Devices shall use dynamic frequency selection (DFS) as described in Recommendation ITU-R M. 1652 [6] to ensure compatible operation with radiodetermination systems. The DFS mechanism shall ensure that the probability of selecting a given channel will be the same for all available channels. The intention is to provide, on average, a near-uniform spread of the loading of the spectrum.</p>			

In addition to ECC Decision (04)08 which was last amended on 30/10/2009, CEPT decided to clarify the use of 5 GHz WAS/RLAN systems inside vehicles (aircraft, trains and automobiles) in a supplementary explanatory document published on the ECC website (see [7], hereafter referred to as the “explanatory paper”). The last update of this document was approved in February 2019. Its conclusion provides the following table which shows which frequency bands are possible for WAS/RLAN usage according to the spectrum regulations in force and by taking into account the considerations in the document (“Ok” means the band may be used):

Table 2: Frequency bands possible for WAS/RLAN usage [7]

Frequency band	On-board aircraft	In cars (passenger cars, lorries, buses)	In trains
2400-2483.5 MHz	Ok	Ok	Ok
5150-5250 MHz	Ok	Ok , Note 6	Ok , Note 4
5250-5350 MHz	Note 5	Note 1, Note 2	Note 1
5470-5725 MHz	Note 5	Note 1	Note 1
5725-5875 MHz	Ok	Ok , Note 3	Ok
Summary of spectrum:	333.50 MHz	333.50 MHz	333.50 MHz
<p><u>Remarks:</u></p> <p>Note 1: RLAN operation while in motion may not allow a proper application of the DFS mechanism. If the bands 5 250-5 350 MHz and 5 470-5 725 MHz were envisaged in the future for the "cars" and "trains" cases, DFS efficiency to ensure protection of radiodetermination systems would need to be clarified on European level.</p> <p>Note 2: Not possible with 200 mW e.i.r.p. because of indoor restriction.</p> <p>Note 3: See ECC Report 277 and its conclusions.</p> <p>Note 4: Possible for trains with metal coated windows. Possible also for other types of trains if railway operators provide additional information providing evidence that there is sufficient attenuation from the inside to the outside of trains.</p> <p>Note 5: See ECC Report 140 and its conclusions.</p> <p>Note 6: Possible if the maximum e.i.r.p. is limited to 25 mW. With this power restriction the attenuation from inside the car to the outside is equivalent to RLAN operating inside buildings and therefore the necessary attenuation to facilitate sharing is provided.</p>			

The frequency band 5725-5875 MHz is available for non-specific Short Range Devices (SRD) on a harmonised basis in CEPT (ERC Recommendation 70-03, Annex 1 [8]) and at EU level (latest amendment of EC Decision 2006/771/EC on SRD [9]). It provides a quite large frequency band (150 MHz), no duty cycle restriction and a reasonable transmit power of 25 mW e.i.r.p. vs propagation for the foreseen operations. These SRD Regulations are unaffected by the WRC-19 outcomes.

3 UPDATES OF THE HARMONISED TECHNICAL CONDITIONS FOR WAS/RLAN IN THE 5 GHZ BAND

3.1 WRC-19 OUTCOMES ON RESOLUTION 229 (REV. WRC-19)

The World Radiocommunication Conference in 2019 (WRC-19) revised Resolution 229 on the “Use of bands 5150-5250 MHz, 5250-5350 MHz and 5470-5725 MHz by the mobile service for the implementation of wireless access systems including radio local areas networks (WAS/RLAN)” of the Radio Regulations [5].

This revision did not consider amendments on 5250-5350 MHz and 5470-5725 MHz bands, but provided amendments on 5150-5250 MHz band as follows:

“2 that, in the frequency band 5 150-5 250 MHz, stations in the mobile service shall be restricted to indoor use, including inside trains, with a maximum mean e.i.r.p.¹ of 200 mW and a maximum mean e.i.r.p. density of 10 mW/MHz in any 1 MHz band or equivalently 0.25 mW/25 kHz in any 25 kHz band; mobile stations inside automobiles shall operate with a maximum e.i.r.p. of 40 mW;

3 that in the frequency band 5 150-5 250 MHz, administrations may exercise some flexibility by taking appropriate measures that would allow controlled and/or limited outdoor usage with a maximum mean e.i.r.p.¹ of 200 mW; administrations have a further option to permit stations in the mobile service, for indoor or controlled outdoor use, to operate up to a maximum mean e.i.r.p. of 30 dBm; in the case of indoor or controlled outdoor use, administrations are requested to either ensure that the maximum e.i.r.p. at any elevation angle above 5 degrees as measured from the horizon shall not exceed 200 mW (23 dBm), or to ensure that the maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon shall not exceed 125 mW (21 dBm) or to apply the emission mask described in *resolves 5* below to maintain protection to the incumbent services; in that case, administrations shall take all appropriate measures, such as those described in *recognizing k*), to control the number of these higher power outdoor WAS/RLAN stations up to 2 per cent of the estimated total amount of WAS/RLAN stations; if the maximum e.i.r.p. is raised above 200 mW, unwanted emissions shall not increase above the existing levels already authorized within administrations for the existing systems that operate with an in-band e.i.r.p. of not greater than 200 mW; in all cases, administrations are requested to maintain protection to the other primary services;”

These technical conditions are the result of the WRC process and need to be considered in the light of the CEPT position developed and agreed during WRC-19 preparation. The CEPT position took into account the particularities of ITU Region 1 incumbent services in the bands studied, assessing the compatibility and sharing conditions to provide them the necessary protection against interference.

3.2 TECHNICAL ASSESSMENT OF COMPATIBILITY AND SHARING WITH 5 GHZ WAS/RLAN AND RECOMMENDED REGULATORY AMENDMENTS

In the framework of CEPT preparation to WRC-19 on Agenda Item 1.16 (RLAN at 5 GHz), technical studies were performed by CEPT administrations to address the relevant sharing and compatibility issues identified under this Agenda Item. Relevant elements from the CEPT Brief on WRC-19 Agenda Item 1.16 [10] and from the “explanatory paper” [7] are presented in this section. Proposed corresponding regulatory amendments in relation with specific use cases are then presented.

¹ In the context of this Resolution, “mean e.i.r.p.” refers to the e.i.r.p. during the transmission burst which corresponds to the highest power, if power control is implemented.

3.2.1 5150-5250 MHZ FREQUENCY BAND

3.2.1.1 *Summary of studies conducted*

Mobile-satellite service (MSS) feeder links (Earth-space) operating in the FSS fixed-satellite service and aeronautical radionavigation are incumbent primary services in the band 5150-5250 MHz. In some countries, the band is also allocated to the aeronautical mobile service, limited to aeronautical telemetry.

Results of one compatibility study using an Minimum Coupling Loss (MCL) analysis showed that the usage of outdoor WAS/RLAN systems in the frequency band 5150-5250 MHz has a more adverse impact on the operation of air-borne search and avoid systems than the indoor only usage of WAS/RLAN systems. It should be noted that the characteristics for the air-borne search and avoid systems used in this analysis are taken from Recommendation ITU-R M.2007 [11] which was first published in 2012 after WAS/RLAN systems first operated under the primary mobile allocation in the band. These and other studies carried out internationally have shown that to allow any introduction of outdoor WAS/RLAN systems additional steps would have to be taken to implement usage restrictions in addition to mitigation techniques that will limit the impact to MSS feeder links and air-borne search and avoid systems.

One study of the use of WAS/RLAN inside of cars showed that under peak load road conditions the e.i.r.p. limitation of WAS/RLAN transmitters located inside cars by the value of 40 mW with propagation losses through the car hull, which are equal to 15 dB, cannot ensure their compatibility with aircraft radiodetermination systems located on board the aircraft making the approach and landing. At the same time, such systems may be compatible with aircraft radiodetermination systems during en route flight. Reduction of the e.i.r.p. of automobile WAS/RLAN systems by the value of the 10 mW will help to improve the compatibility of automobile WAS/RLAN systems with aircraft radiodetermination systems, as well as the use of other mitigation techniques.

Another study considered WAS/RLAN deployments over Europe, North Africa and part of Asia and the Middle East and concluded that WAS/RLAN outdoor operation (up to 5.3%) would cause harmful interference to the MSS feeder link. However, a parametric investigation allowed to show that up to 3% maximum outdoor WAS/RLAN can be deployed with a maximum e.i.r.p of 200 mW. In that case, limited RLAN outdoor applications can be envisaged within the appropriate regulatory framework. This study also assessed in-vehicle usage. Simulations have shown that the same level of protection offered by the indoor usage is achieved for MSS when combining a low e.i.r.p. up to 40 mW with an in-car use and 200 mW with an in-train (high speed carriage) use.

Similar results are obtained with regard to the coexistence between in-vehicle usage (e.i.r.p. up to 40 mW in-car and 200 mW in-train) and aeronautical applications (aeronautical mobile telemetry (AMT) and aeronautical radionavigation systems (ARNS)). With regards to AMT and ARNS, a MCL coexistence study showed that an outdoor WAS/RLAN relaxation without any mitigation technique would lead to higher protection distances than those found by the study for indoor deployment (e.g. 500 km vs 70 km).

A dynamic study assessing the impact of outdoor relaxation with regards to the ARNS operation have shown that the outdoor relaxation does not alter the I/N protection criterion exceedance more than what the provision of Resolution 229 did at the time of the study.

Given the above results some studies show that outdoor deployment in this band would be possible only if the number of outdoor WAS/RLAN is limited. In-car and in-train usage have been proven to satisfy the same level of protection provided by Resolution 229 provisions, under certain conditions and if they respect the e.i.r.p. levels cited above.

Some CEPT countries are considering the possibility of allowing controlled outdoor usage by implementing appropriate regulatory measures to limit WAS/RLAN outdoor usage to a suitable number of devices based on the results of studies.

3.2.1.2 *Regulatory framework for indoor use cases in the 5150-5250 MHz band*

The existing regulatory framework enables WAS/RLAN use of the 5150-5250 MHz band inside buildings and aircraft.

As technical assessment showed that the use of WAS/RLAN inside cars and trains is possible applying suitable limits on maximum mean e.i.r.p. for in-band emissions and taking into account the necessary attenuation to facilitate sharing with incumbent services, there is a necessity to extend the definition of indoor use to cover these new use cases.

Technical parameters recommended to be applied to the 5150-5250 MHz band in the revised Commission Decision 2005/513/EC are provided in Annex 1.

The regulatory parameters applicable inside buildings and aircraft remain unchanged. The proposed amendments allow authorising explicitly in addition use inside road vehicles and trains.

3.2.1.3 Regulatory framework for outdoor use cases in the 5150-5250 MHz band

In the 5150-5250 MHz band, based on its technical assessment during the WRC-19 preparation, CEPT noted that an uncontrolled outdoor relaxation to WAS/RLAN would affect the operation of the MSS feeder links, aeronautical radionavigation and aeronautical telemetry (see No. 5.446C [5]). However, CEPT already allows the use of WAS/RLAN systems inside vehicles (aircraft, trains and automobiles) in ECC Decision (04) 08 [4] and explanatory paper [7]. Moreover, CEPT supported in-car usage up to 40 mW and in-train usage up to 200 mW with reference to the appropriate penetration losses. CEPT also supported that administrations should have the right to “exercise some flexibility” to allow limited outdoor use (up to maximum 200 mW e.i.r.p) of the band 5150-5250 MHz by WAS/RLAN within Resolution 229 (Rev. WRC-19) if taking “appropriate regulatory measures” to protect the incumbent services.

The regulatory framework recognises that only 3% of the overall 200 mW usage will be outdoors and this has resulted in the following limitations for 200 mW outdoor usage: no fixed use or attachment to a fixed installation, a fixed infrastructure or a fixed outdoor antenna. The deployment of command, control and payload for Unmanned Aircraft Systems (UAS) is also possible, given that the number of UAS envisaged to be deployed at the same time and in the same place will be limited. This ensures the protection of incumbent services in the band.

Technical parameters recommended to be applied to the 5150-5250 MHz band in the revised Commission Decision 2005/513/EC are provided in Annex 1.

The proposed amendments allow authorising explicitly in the regulatory framework, UAS applications as “outdoor use”. The use of the frequency range 5150-5170 MHz shall however not be allowed due to the protection requirement of the aeronautical radionavigation service. Use of the 5 GHz spectrum by UAS is therefore limited to the frequency band 5170-5250 MHz.

Fixed outdoor use:

Resolves 3 of Resolution 229 (Rev. WRC-19) indicates that “administrations have a further option to permit stations in the mobile service, for indoor or controlled outdoor use, to operate up to a maximum mean e.i.r.p of 30 dBm; in the case of indoor or controlled outdoor use”.

This provision responds to requests from administrations outside CEPT. However, it should be noted that scenarios with up to 30 dBm WAS/RLAN stations go beyond what was agreed in CEPT in the European Common Proposal submitted to WRC-19 [12].

The deployment of fixed outdoor use would require the implementation of specific regulatory measures aiming to control the deployment of fixed outdoor stations, including the angle above the local horizontal plane to facilitate the protection of the MSS (feeder link) service in the band. This would require assessment on a national basis as to whether setting such measures would fit within the different national general authorisation regimes, thus in this case it was not considered applicable to this harmonisation measure for 5 GHz WAS/RLAN.

3.2.2 5250-5350 MHZ FREQUENCY BAND

3.2.2.1 Summary of studies conducted

WRC-19 agenda item 1.16 looked at possible outdoor WAS/RLAN use under the existing primary mobile allocation in 5250-5350 MHz band in which currently in Europe and elsewhere in the world there are indoor only restrictions.

A number of altimeter and scatterometer sensors are currently operated, and planned to operate in the future, under the Earth exploration-satellite service (EESS) allocation in the band 5250-5350 MHz. This band represents a key spectrum resource for Europe's policy on Earth exploration through the GMES/Copernicus programme with Sentinel and EUMETSAT satellites. Recent compatibility studies between EESS (active) and WAS/RLAN systems in the 5250-5350 MHz frequency range using similar WAS/RLAN parameters as agreed pre-WRC-15 within JTG 4-5-6-7 (see Annex 27 to Document 5A/298-E, November 2016 [13]) and based on some of the predicted future WAS/RLAN deployment levels give negative results with the current CEPT indoor-only WAS/RLAN regulations. Further studies are needed with altimeters (operating across 5250-5570 MHz range).

Results of one compatibility study show that providing usage of outdoor WAS/RLAN systems in the frequency band 5250-5350 MHz would require development of effective measures for reducing interference to operation of air-borne and ground-based radars. The effect of Dynamic Frequency Selection (DFS) as a mitigation technique has not been taken into account in this study. Previous ITU studies carried out when the original mobile allocation was made showed that DFS would ensure acceptable protection to radar from WAS/RLAN operating indoor and outdoor in the 5250-5350 MHz band.

Additionally, the technical assessment made in the explanatory paper on the possibility of enabling the use of WAS/RLAN in this band inside cars and trains concluded that in the light of the mobile nature of WAS/RLAN applied to these use cases, detection of radar signals by DFS cannot be ensured. Therefore, WAS/RLAN for these use cases shall not be allowed because the protection of incumbent services cannot be ensured in the band.

3.2.2.2 Regulatory framework for the 5250-5350 MHz band

Given the results of technical assessment, the installations of WAS/RLAN inside cars, trains and aircraft, and the outdoor use in general shall not be allowed in the 5250-5350 MHz band.

Technical parameters to be applied to the 5250-5350 MHz band in the revision of Commission Decision 2005/513/EC are provided in Annex 1.

It is proposed to specify the permissible operation as followed:

- Indoor use: inside buildings only. Installation in road vehicles, trains and aircraft is not permitted;
- Outdoor use is not permitted.

However, when incumbent usage are geographically limited and known to administrations, use on trains where the usage can be controlled and geographically restricted may be authorised on a national level.

3.2.3 5470-5725 MHZ FREQUENCY BAND

3.2.3.1 Summary of studies conducted

ECC Report 140 [3] assessed the compatibility between WAS/RLAN on board aircraft and radars in the bands 5250-5350 MHz and 5470-5725 MHz and concluded that concerning military radars in the bands 5250-5350 MHz and 5470-5725 MHz the compatibility is theoretically feasible but should be carefully considered. In addition, in some specific scenarios, this may lead to a reduction of the ability of a military radar to identify the required target.

Although ETSI EN 301 893 [14] has not been specifically developed to address radars using Frequency Hopping modulation, detection of Frequency Hopping radar signals is ensured if these signals are covered by one of the existing radar test signals included in ETSI EN 301 893. In the case of WAS/RLAN on-board aircraft flying over areas where frequency hopping radars are in use, frequent DFS triggers may cause numerous channels to be temporarily unavailable for the WAS/RLAN on-board aircraft operation.

With regard to meteorological radars in the band 5600-5650 MHz, ECC Report 140 [3] concluded that when implementing WAS/RLAN on board aircraft the aviation industry must avoid the use of the band 5600-5650 MHz. Technical assessment showed that for WAS/RLAN compliant with ETSI EN 301 893 v1.5.1, the DFS operation would only rely on the “in-service monitoring” (ISM) for WAS/RLAN on board aircraft; some interference may occur into meteorological radars. Further analysis indicates that coexistence between meteorological radars, making use of some signals that may not be detectable by the DFS, and airborne WAS/RLAN cannot be ensured since it does not rely on 10 minutes “Channel Availability Check” (CAC).

It is expected that, when flying over Europe, WAS/RLAN on board aircraft would always be in view of a number of meteorological radars simultaneously. Therefore, frequent DFS triggers are expected, resulting that the channels within the band 5600-5650 MHz will not be available for the RLAN on-board aircraft operation.

Additionally, the technical assessment made in the explanatory paper on the possibility of enabling the use of WAS/RLAN in this band inside cars and trains concluded that in the light of the mobile nature of WAS/RLAN in these use cases, detection of radar signals by DFS cannot be ensured. Therefore, WAS/RLAN for these use cases shall not be allowed because of the protection of incumbent services cannot be ensured in the band. The same conclusion applies to the use of WAS/RLAN for command, control and payload of UAS in this band.

3.2.3.2 Regulatory framework for the 5470-5725 MHz band

Given the results of technical assessment, the installations of WAS/RLAN inside cars, trains and aircraft shall not be allowed in the 5470-5725 MHz band. The use of WAS/RLAN devices for command, control and payload for UAS shall also not be allowed in the 5470-5725 MHz band.

Technical parameters to be applied to the 5470-5725 MHz band in the revision of Commission Decision 2005/513/EC are provided in Annex 1.

It is proposed to specify for the permissible operation that “Installations in road vehicles, trains and aircraft and use for Unmanned Aircraft Systems are not permitted”.

However, when incumbent usage is geographically limited and known to administrations, use on trains where the usage can be controlled and geographically restricted may be authorised allowed on a national level.

4 CEPT ONGOING WORK ABOUT WAS/RLAN INTERFERENCE CASES ON METEOROLOGICAL RADARS AT 5.6 GHZ

The issue of interference to meteorological radars from 5 GHz WAS/RLAN is on the agenda of CEPT. This topic has been part of ongoing discussions in ECC. These discussions have confirmed the common understanding within ECC about the importance of resolving the issue of interference to meteorological radars in 5600-5650 MHz.

This work will consider how to address the issue of interference to meteorological radars, in particular by reviewing the ECC 5 GHz WAS/RLAN Action Plan.

5 CONCLUSIONS

This CEPT Report proposes revised technical conditions for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) in the 5 GHz band in response to the EC Mandate to amend Decision 2005/513/EC [1] on the harmonised use of radio spectrum in the 5 GHz band for the implementation of WAS/RLAN following WRC-19 (see Annex 2).

These proposed revised technical conditions for WAS/RLAN in the 5 GHz band are presented in Annex 1 to this CEPT Report using the common format of a technical annex. Annex 1 distinguishes the following frequency bands: 5150-5250 MHz, 5250-5350 MHz and 5470-5725 MHz.

5150-5250 MHz

The proposed technical conditions for the use of the 5150-5250 MHz band distinguish the following indoor use cases: inside buildings, road vehicles, trains and aircraft. These conditions also acknowledge that only 3% of the overall 200 mW usage will be outdoors and this has resulted in the following limitations for 200 mW outdoor usage: no fixed use or attachment to a fixed installation or to the external body of road vehicles, a fixed infrastructure or a fixed outdoor antenna.

The conditions for use inside buildings and aircraft remain unchanged. The proposal enables in addition installations inside road vehicles (with 40 mW max e.i.r.p.) and inside trains (with 200 mW max e.i.r.p.).

The proposed amendments also enable the use of the 5170-5250 MHz band by Unmanned Aircraft Systems (UAS) as a specific outdoor use case.

5250-5350 MHz

The technical conditions for the use of the 5250-5350 MHz band are proposed to be amended by specifying the permissible operation as followed:

- Indoor use: inside buildings only. Installations in road vehicles, trains and aircraft are not permitted.
- Outdoor use is not permitted.

5470-5725 MHz

The technical conditions for the use of the 5470-5725 MHz band are proposed to be amended by specifying for the permissible operation that "Installations in road vehicles, trains and aircraft and use for Unmanned Aircraft Systems are not permitted".

Since the 2007 revision of the Commission Implementing Decision [2], read in isolation, it might be assumed that use inside aircraft might be permissible in all bands subject to the Decision. As use above 5250 MHz is required to use Dynamic Frequency Selection (DFS) and as DFS was not designed to accommodate use inside airborne platforms, this Report clarifies that WAS/RLAN use above 5250 MHz, inside aircraft, is not permitted (see ECC Report 140 [3]).

Notwithstanding the assumption of general authorisation, licensed operation in these bands still remains a possible national use, where the interference environment is not changed.

ANNEX 1: PROPOSED HARMONISED TECHNICAL CONDITIONS**Table 3: Technical conditions for the use of frequency band 5150-5250 MHz by WAS/RLAN**

Parameter	Technical conditions
Frequency band	5150-5250 MHz
Permissible operation	Indoor, including installations inside road vehicles, trains and aircraft, and limited outdoor use (Note 1) Use by Unmanned Aircraft Systems limited to within the 5170-5250 MHz band
Maximum mean e.i.r.p. for in-band Emissions	200 mW except for installations inside train carriages with an attenuation loss on average of less than 12 dB and inside road vehicles where 40 mW maximum mean e.i.r.p. applies.
Channel access and occupation rules	An adequate spectrum sharing mechanism shall be implemented.
Maximum mean e.i.r.p. density for in-band emissions	10 mW/MHz in any 1 MHz band
Note 1: If used outdoors, equipment shall not be attached to a fixed installation or to the external body of road vehicles, a fixed infrastructure or a fixed outdoor antenna.	

Table 4: Technical conditions for the use of frequency band 5250-5350 MHz by WAS/RLAN

Parameter	Technical conditions
Frequency band	5250-5350 MHz
Permissible operation	Indoor use: inside buildings only. Installations in road vehicles, trains and aircraft are not permitted. Outdoor use is not permitted.
Maximum mean e.i.r.p. for in-band emissions	200 mW
Channel access and occupation rules	An adequate spectrum sharing mechanism shall be implemented. Devices must use Transmitter Power Control (TPC) and Dynamic Frequency Selection (DFS) mitigation techniques.
Maximum mean e.i.r.p. density for in-band emissions	10 mW/MHz in any 1 MHz band
Transmitter Power Control (TPC)	TPC shall provide on average, a mitigation factor of at least 3 dB on the maximum permitted output power of the systems; or, if transmitter power control is not in use, then the maximum permitted mean e.i.r.p. and the corresponding mean e.i.r.p. density limit shall be reduced by 3 dB.
Dynamic Frequency Selection (DFS)	DFS is described in Recommendation ITU-R M. 1652-1 [6] to ensure compatible operation with radiodetermination systems. The DFS mechanism shall also ensure that the probability of selecting a given channel will be the same for all available channels within the bands 5250-5350 MHz and 5470-5725 MHz. The intention is to provide, on average, a near-uniform spread of the loading of the spectrum. WAS/RLAN shall implement a Dynamic Frequency Selection providing a mitigation against interference to radar at least as efficient as DFS described in ETSI EN 301 893. Settings (hardware and/or software) of WAS/RLAN related to DFS shall not be accessible to the user if changing those settings result in WAS/RLAN no longer being compliant with the DFS requirements. This includes not allowing the user to change the country of operation and/or the operating frequency band if that results in the equipment no longer being compliant with the DFS requirements and not accepting software and/or firmware which results in the equipment no longer being compliant with the DFS requirements.

Table 5: Technical conditions for the use of frequency band 5470-5725 MHz by WAS/RLAN

Parameter	Technical conditions
Frequency band	5470-5725 MHz
Permissible operation	Indoor and outdoor use Installations in road vehicles, trains and aircraft and use for Unmanned Aircraft Systems are not permitted.
Maximum mean e.i.r.p. for in-band emissions	1 W
Channel access and occupation rules	An adequate spectrum sharing mechanism shall be implemented. Devices must use Transmitter Power Control (TPC) and Dynamic Frequency Selection (DFS) mitigation techniques.
Maximum mean e.i.r.p. density for in-band emissions	50 mW/MHz in any 1 MHz band
Transmitter Power Control (TPC)	TPC shall provide on average, a mitigation factor of at least 3 dB on the maximum permitted output power of the systems; or, if transmitter power control is not in use, then the maximum permitted mean e.i.r.p. and the corresponding mean e.i.r.p. density limit shall be reduced by 3 dB.
Dynamic Frequency Selection (DFS)	DFS is described in Recommendation ITU-R M. 1652-1 [6] to ensure compatible operation with radiodetermination systems. The DFS mechanism shall also ensure that the probability of selecting a given channel will be the same for all available channels within the bands 5250-5350 MHz and 5470-5725 MHz. The intention is to provide, on average, a near-uniform spread of the loading of the spectrum. WAS/RLAN shall implement a Dynamic Frequency Selection providing a mitigation against interference to radar at least as efficient as DFS described in ETSI EN 301 893. Settings (hardware and/or software) of WAS/RLAN related to DFS shall not be accessible to the user if changing those settings result in WAS/RLAN no longer being compliant with the DFS requirements. This includes a) not allowing the user to change the country of operation and/or the operating frequency band if that results in the equipment no longer being compliant with the DFS requirements and b) not accepting software and/or firmware which results in the equipment no longer being compliant with the DFS requirements.

ANNEX 2: EU MANDATE FROM EUROPEAN COMMISSION TO CEPT

Ref. Ares(2020)2032572 - 14/04/2020



EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR COMMUNICATIONS NETWORKS, CONTENT AND TECHNOLOGY

The Director-General

Brussels
CNECT.B.4

MANDATE TO CEPT
TO AMEND COMMISSION DECISION 2005/513/EC ON THE HARMONISED USE OF
RADIO SPECTRUM IN THE 5 GHz FREQUENCY BAND FOR THE
IMPLEMENTATION OF WIRELESS ACCESS SYSTEMS INCLUDING RADIO LOCAL
AREA NETWORKS (WAS/RLANS) FOLLOWING WRC-19

1. PURPOSE

The objective of this Mandate is to amend the technical conditions for WAS/RLANs currently harmonised by Decision¹ 2005/513/EC as amended by Decision 2007/90/EC on WAS/RLANs in the 5 GHz band, in accordance with the outcome of WRC-19 and, as appropriate, with the results of assessment of possibilities for the usage of WAS/RLANs on board vehicles (aircraft, road vehicles (cars, busses), trains, etc.) and feasibility of the usage of WAS/RLANs for UAS ('Unmanned Aerial Systems') radio links.

2. BACKGROUND

WRC-03 adopted Resolution 229 on the 'Use of the bands 5150 - 5250 MHz, 5250 – 5350 MHz and 5470 - 5725 MHz by the mobile service for the implementation of wireless access systems including radio local area networks' recently revised at WRC-19.

Resolution 229 (WRC-03) was an incentive for further European harmonisation to enable a rapid take-up of WAS/RLAN systems in the European Union. Pursuant to Radio Spectrum Decision² 676/2002/EC and following a Mandate to CEPT, the Commission adopted Decision 2005/513/EC on the harmonised use of radio spectrum in the 5 GHz frequency band for WAS/RLANs.

Resolution 229 was revised by WRC-19, now providing new options within the frequency band 5150 - 5250 MHz.

Moreover CEPT initiated activities on the update of the harmonised framework for WAS/RLANs at 5 GHz to consider the impact of the WRC-19 results and to include specific harmonised conditions for WAS/RLAN installations in vehicles (aircraft, road, trains) and to exclude use of WAS/RLANs for UAS radio links. In addition, in some Member States, meteorological radars are still suffering from 5 GHz WAS/RLAN

¹ Consolidated text of Decision 2005/513/EC (as amended by Decision 2007/90/EC) is available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1580398540083&uri=CELEX:02005D0513-20070213>

² 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, OJL 108 of 24.4.2002

interferences highlighting the limit of corrective actions focusing on market surveillance. CEPT intends to review this issue soon.

3. JUSTIFICATION

Pursuant to Article 4 (2) of the Radio Spectrum Decision, the Commission may issue mandates to the CEPT for the development and amendment of technical implementing measures with a view to ensuring harmonised conditions for the availability and efficient use of radio spectrum necessary for the functioning of the internal market. Such mandates shall set the tasks to be performed and their timetable.

4. TASKS AND SCHEDULE

The objective of this Mandate is to amend the technical conditions for WAS/RLANs, currently harmonised by Decision 2005/513/EC as amended by Decision 2007/90/EC on WAS/RLANs in the 5 GHz band, in accordance with the outcome of WRC-19.

CEPT is asked to address the following tasks:

- 1) To propose technical conditions in order to amend Commission Decision 2005/513/EC based on the outcome of WRC-19 (revision of Resolution 229) with regard to the frequency band 5150 - 5250 MHz.
- 2) In order to propose corresponding updates of the harmonised technical conditions for WAS/RLANs in the bands 5150 - 5350 MHz and 5470 - 5725 MHz, as appropriate, to consider possibilities for the usage of these WAS/RLANs on board vehicles (aircraft, road vehicles (cars, busses), trains, etc.) and to assess feasibility of the usage of WAS/RLANs for UAS radio links.

CEPT is also requested to collaborate actively with all concerned stakeholders and the European Telecommunications Standardisation Institute (ETSI) which develops relevant voluntary harmonised standards for the presumption of conformity under Directive 2014/53/EU.

CEPT should provide deliverables according to the following schedule:

Delivery date	Deliverable	Subject
March 2021	Draft Report from CEPT to the Commission	Draft final results under tasks 1 and 2 specified in section 4.
July 2021	Final Report from CEPT to the Commission taking into account the outcome of the public consultation	Final results of tasks 1 and 2 specified in section 4 taking into account the results of the public consultation.

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 3: LIST OF REFERENCES

- [1] 2005/513/EC: Commission Decision of 11 July 2005 on the harmonised use of radio spectrum in the 5 GHz frequency band for the implementation of wireless access systems including radio local area networks (WAS/RLANs)
- [2] 2007/90/EC: Commission Decision of 12 February 2007 amending Decision 2005/513/EC on the harmonised use of radio spectrum in the 5 GHz frequency band for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLANs)
- [3] ECC Report 140: “Compatibility between RLAN on-board aircraft and radars in the frequency bands 5250-5350 MHz and 5470-5725 MHz”, approved May 2010
- [4] ECC Decision (04)08 of 9 July 2004 on the harmonised use of the 5 GHz frequency bands for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLANs), latest amended on 30 October 2009
- [5] ITU Radio Regulations Edition of 2020 - <https://www.itu.int/pub/R-REG-RR-2020>
- [6] Recommendation ITU-R M.1652-1: “Dynamic frequency selection in wireless access systems including radio local area networks for the purpose of protecting the radiodetermination service in the 5 GHz band”
- [7] Explanatory paper related to RLAN equipment using the 5 GHz bands in vehicles, including the usage under the non-specific SRD regulation - <https://efis.cept.org/documents/44659>
- [8] ERC Recommendation 70-03 on relating to the use of Short Range Devices (SRD), latest amended on 23 October 2020
- [9] 2006/771/EC: Commission Decision of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices
- [10] CEPT Brief on WRC-19 Agenda Item 1.16 - https://cept.org/Documents/cpg/53502/cpg-19-143-annex-iv-16r1_cept-brief-on-ai-116
- [11] Recommendation ITU-R M. 2007: “Characteristics of and protection criteria for radars operating in the aeronautical radionavigation service in the frequency band 5 150-5 250 MHz”
- [12] European Common Proposal on WRC-19 Agenda Item 1.16 – Part 1
https://cept.org/Documents/cpg/53239/cpg-19-143-annex-viii-16a_ecp-on-wrc-19-agenda-item-116-part-1-5-150-5-250-mhz
- [13] ITU-R Joint Task Group 4-5-6-7, Annex 27 to Document 5A/298-E, November 2016 - https://www.itu.int/dms_pub/itu-r/md/15/wp5a/c/R15-WP5A-C-0298!N27!MSW-E.docx
- [14] ETSI EN 301 893: “Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive”