



ECC Decision (04)08

On the harmonised use of the 5 GHz frequency bands for
Wireless Access Systems including Radio Local Area
Networks (WAS/RLAN)

approved 09 July 2004

latest amended 1 July 2022

EXPLANATORY MEMORANDUM

1 INTRODUCTION

This CEPT/ECC Decision addresses the designation of the frequency bands 5150-5350 MHz and 5470-5725 MHz for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLAN). 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. Acting accordingly, WRC-03 adopted RR Resolution 229 on "*Use of the bands 5 150-5 250, 5 250-5 350 MHz and 5 470-5 725 MHz by the mobile service for the implementation of Wireless Access Systems including Radio Local Area Networks*" [1]. This Resolution was further revised by WRC-12 and WRC-19.

Wireless Access Systems (WAS) are broadband radio systems which can be deployed either inside or outside buildings, usually in geographically limited areas. Broadband RLAN (Radio Local Area Networks), a subset of WAS, are the major type of equipment deployed today and are predominantly used inside buildings. Typical WAS/RLAN include public and private applications offered in homes, schools, hospitals, hotels, conference centres, railway stations, airports, shopping centres etc. These types of applications are typically intended for connections between traditional business products such as PCs, laptops, workstations, servers, printers and other networking equipment as well as digital consumer electronic equipment in the wireless home network environment. More detailed information regarding broadband RLAN applications which are used worldwide can be found in the most recent version of Recommendation ITU-R M.1450 [2].

2 BACKGROUND

ECC Decision (04)08 in its initial version approved 12 November 2004 identified the following WRC-03 the following bands for use by 5 GHz WAS/RLAN under prescribed conditions:

- 5150-5350 MHz:
Only indoor use, mean e.i.r.p. limited to 200 mW, and use of Dynamic Frequency Selection (DFS) as well as transmitter power control (TPC) are required above 5250 MHz;
- 5470-5725 MHz:
Indoor as well as outdoor use allowed, mean e.i.r.p. limited to 1 W, use of Dynamic Frequency Selection (DFS) and transmitter power control (TPC) required.

Every WAS/RLAN, when operating in the frequency ranges 5250-5350 MHz and 5470-5725 MHz, shall employ a Dynamic Frequency Selection (DFS) mechanism with a Radar Interference Detection function to detect radar signals which have a level above the interference detection threshold as defined in Recommendation ITU-R M.1652-1 [3].

With regard to DFS, a WAS/RLAN device shall operate in either Master Mode or Slave Mode. WAS/RLAN devices operating in Slave Mode (Slave Device) can only operate in a network controlled by a WAS/RLAN device operating in Master Mode (Master Device).

Every Master Device will use the Radar Interference Detection function in order to check for any co-channel radar signal prior to use a channel but also during normal operation. In addition to this Radar Interference Detection function, every Master Device shall also implement a channel selection mechanism to ensure a near uniform spread of the loading of available spectrum. The Slave Devices shall not transmit before having received an appropriate enabling signal from a Master Device. Slave Devices with a power level of 200 mW e.i.r.p. or above shall have their own Radar Interference Detection function.

Ad-hoc operation is not seen as an additional mode with regard to DFS. Devices operating in ad-hoc mode and in the frequency ranges 5250-5350 MHz and 5470-5725 MHz, need to use DFS. Devices operating in ad-hoc mode but only in the band 5150-5250 MHz, do not need DFS.

As this initial spectrum regulations adopted in 2004 did not directly address the usage of 5 GHz WAS/RLAN in vehicles (cars, etc.), CEPT adopted in 2017 an explanatory paper [4] aiming to explain which frequency bands are possible for 5 GHz RLAN usage in vehicles.

WRC-19 revised RR 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)”.

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 5150-5250 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 5150-5250 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 at the light of 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.

In April 2020, the EC issued a mandate to CEPT with the objective to amend the technical conditions for WAS/RLAN currently harmonised by Decision 2005/513/EC [5] on 5 GHz WAS/RLAN as amended by Decision 2007/90/EC, in accordance with the outcome of WRC-19 and, as appropriate, with the results of assessment of possibilities for the usage of WAS/RLAN on board vehicles, aircraft, road vehicles (cars, buses), trains, etc., and feasibility of the usage of WAS/RLAN for Unmanned Aerial Systems (UAS) radio links. CEPT approved its response to the EC Mandate in CEPT Report 79 [10].

This amended ECC Decision distinguishes four specific use cases in order to regulate the different scenarios recognised as “indoor use”: inside buildings, road vehicles, trains and aircraft. It also provides the option for administrations to allow for some limited outdoor usage in the band 5150-5250 MHz for non-fixed operations and for radio links to UAS. An additional amendment introduced a transition period for the operation of WAS/RLAN installations in large² aircraft in the bands 5250-5350 MHz and 5470-5725 MHz (except in the frequency band 5600-5650 MHz), until 6 GHz WAS/RLAN equipment, as per ECC Decision (20)01 [11], is widely available on board aircraft.

3 REQUIREMENT FOR AN ECC DECISION

The allocation or designation of frequency bands for use by a service or system under specified conditions in CEPT countries is laid down by law, regulation or administrative action. ECC Decisions are required to deal

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.

² In line with the Commission Regulation (EU) No 1321/2014 [12], a large aircraft means an aircraft, classified as an aeroplane with a maximum take-off mass of more than 5700 kg, or a multi-engined helicopter. Multi-engined helicopters are excluded, however, from the scope of Notes 2 and 3.

with the licence related matters and for the carriage and use of equipment throughout Europe. The harmonisation on an European basis would support the Directive 2014/53/EU [6] 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. A commitment by CEPT member countries to implement an ECC Decision will provide a clear indication that the required frequency bands will be made available on time and on an European-wide basis.

The Radio Regulations make certain provisions related to the status of the mobile service in relation to services with existing allocations prior to WRC-03, i.e. footnotes 5.446B, 5.447F and 5.450A. This ECC Decision shall not be interpreted as any form of agreement to modify these arrangements between those Administrations which implement its provisions.

ECC DECISION OF 09 JULY 2004 ON THE HARMONISED USE OF THE 5 GHZ FREQUENCY BANDS FOR WIRELESS ACCESS SYSTEMS INCLUDING RADIO LOCAL AREA NETWORKS (WAS/RLAN) (ECC DECISION (04)08), AMENDED ON 12 NOVEMBER 2004, 5 SEPTEMBER 2007, 30 OCTOBER 2009, 2 JULY 2021 AND 1 JULY 2022

“The European Conference of Postal and Telecommunications Administrations,

considering

- a) that there is a need to harmonise spectrum for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLAN);
- b) that the frequency bands 5150-5350 MHz and 5470-5725 MHz have been allocated to the mobile service except aeronautical mobile service on a primary basis for the implementation of WAS/RLAN by WRC-03, taking into account the need to protect primary services in these frequency bands;
- c) that in Region 1 the frequency band 5150-5250 MHz is allocated to the Aeronautical Mobile Service on a primary basis limited to aeronautical telemetry transmissions from aircraft stations under RR 5.446C. These stations shall not claim protection from other stations operating in accordance with Article 5 of the ITU Radio Regulations. Use within CEPT is limited;
- d) that compatibility studies and spectrum investigations have shown that sharing between WAS/RLAN and mobile-satellite service (MSS) feeder links in the band 5150-5250 MHz is feasible under certain conditions and that Administrations may monitor whether the relevant aggregate power flux density (pfd) levels have been or will be exceeded in the future;
- e) that indoor use is intended to mean inside a closed space which will typically provide the necessary attenuation to facilitate sharing with other services. Indoor use can be classified in four use cases that represent specific scenarios: inside domestic, industrial or commercial buildings, inside road vehicles, inside trains and inside aircraft³;
- f) that, compared to RLAN usage inside buildings or inside road vehicles, there will be fewer installations inside trains which limit the overall aggregated emissions to satellite systems, and that usage inside trains from an interference point of view could be seen as comparable to indoor usage if the attenuation inside the train carriage is at least 12 dB;
- g) that usage on trains, in the bands 5250-5350 MHz and 5470-5725 MHz, where controlled and geographically restricted, may be allowed on a national level;
- h) that, for the operation of WAS/RLAN installations in large aircraft in the bands 5250-5350 MHz and 5470-5725 MHz (except in the frequency band 5600-5650 MHz), a transition period is required, see note 3 in Annex 1, and that during this transition period such use should be subject to a number of restrictions;
- i) that some CEPT countries may allow more flexibility on a national basis, where controlled and geographically restricted;
- j) that technical conditions for outdoor use of WAS/RLAN, including by Unmanned Aircraft System (UAS), in the band 5150-5250 MHz need to maintain the protection to MSS feeder links in that band;
- k) that unmanned aircraft operation in the bands 5150-5170 MHz, 5250-5350 MHz and 5470-5725 MHz has not been studied and is not considered appropriate in these bands;
- l) that in many countries there is an essential need for the operation of military and meteorological radars in the bands between 5250 and 5850 MHz and therefore protection from interference from the radiodetermination service cannot be requested by WAS/RLAN;
- m) that maritime companies could consider avoiding the 5600-5650 MHz band used by meteorological radars in providing connectivity on-board vessels;
- n) that technical and operational conditions for the use of WAS/RLAN need to ensure the protection of the other radio services including military and meteorological radars;
- o) that administrations may consider, on a national basis, their regulatory framework for WAS/RLAN in the bands subject to this Decision be on a non-interference, non-protected basis;

³ The installation and use of WAS/RLAN equipment inside an aircraft is regulated by administrations due to the specific certification required from the relevant aviation authorities.

- p) that studies prior to WRC-03 had shown that there is a need to specify appropriate e.i.r.p. limits and operational restrictions for WAS/RLAN in particular in the frequency band 5250-5350 MHz in order to protect systems in the Earth exploration-satellite service (active) and space research service (active);
- q) that besides studies in ITU-R, compatibility studies and spectrum investigations performed within CEPT have shown that sharing between WAS/RLAN and other services is possible and practicable in the bands 5150-5350 MHz and 5470-5725 MHz under conditions specified in ERC Reports 67 [7] and 72 [8];
- r) that the implementation of transmitter power control (TPC) in WAS/RLAN in the bands 5250-5350 MHz and 5470-5725 MHz will significantly reduce the aggregate interference, in order to facilitate sharing with satellite services;
- s) that studies have shown that sharing between the radars in the radiodetermination service and WAS/RLAN in the frequency bands 5250-5350 MHz and 5470-5725 MHz is only feasible with the application of mitigation techniques such as Dynamic Frequency Selection (DFS) for WAS/RLAN, as described in ETSI EN 301 893 [9] and Recommendation ITU-R M. 1652-1 [3];
- t) that the DFS mechanism will also be required to provide, on average, a near-uniform spread of the loading of the available spectrum to facilitate sharing with the satellite services;
- u) that currently CEPT has not been able to establish the effectiveness of DFS mechanisms when WAS/RLAN devices are in motion;
- v) that, in 5470-5725 MHz band, a WAS/RLAN device installed in a road vehicle can only be a WAS/RLAN slave device and can only transmit when under the control of a fixed WAS/RLAN DFS master device;
- w) that TPC and DFS are included into the ETSI EN 301 893, under the Radio Equipment Directive 2014/53/EU [6];
- x) that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the Radio Equipment Directive (RED). Conformity with the essential requirements of the RED may be demonstrated by compliance with the applicable harmonised European standard(s), cited in the Official Journal (OJ) of the European Union, or by using the other conformity assessment procedures set out in the RED.

DECIDES

1. that the purpose of this ECC Decision is to harmonise the use of the frequency bands 5150-5250 MHz, 5250-5350 MHz and 5470-5725 MHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN);
2. that CEPT administrations shall:
 - a) designate the frequency bands 5150-5350 MHz and 5470-5725 MHz for the use by WAS/RLAN equipment on a non-exclusive basis,
 - b) allow free circulation and use of WAS/RLAN devices operating in accordance with ANNEX 1,
 - c) exempt WAS/RLAN equipment operating in accordance with ANNEX 1 from individual licensing;
3. that, for the purpose of this ECC Decision, the technical and operational parameters as specified in detail in ANNEX 1 shall apply;
4. that this Decision enters into force on 2 July 2021;
5. that the preferred date for implementation of this Decision shall be 2 January 2022;
6. that CEPT administrations shall communicate the national measures implementing this Decision to the ECC chairman and the Office when the Decision is nationally implemented."

Note:

Please check the Office documentation database <https://docdb.cept.org/> for the up to date position on the implementation of this and other ECC Decisions.

ANNEX 1: HARMONISED TECHNICAL CONDITIONS

Table 1: 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 use, 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 Exceptions: <ul style="list-style-type: none"> • 40 mW maximum mean e.i.r.p. applies for installations inside train carriages with an attenuation loss on average of less than 12 dB; • 40 mW maximum mean e.i.r.p. applies for installations inside road vehicles.
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 outdoor antenna, fixed infrastructure or to the external body of road vehicles.	

Table 2: 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 (Note 2) 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 [3] 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 [9]. 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.
Note 2: Operation of WAS/RLAN installations in large aircraft ⁴ (excluding multi-engined helicopters) is permitted until 31 December 2028 with a maximum mean e.i.r.p. for in-band emissions of 100 mW.	

⁴ In line with the Commission Regulation (EU) No 1321/2014 [12], a large aircraft means an aircraft, classified as an aeroplane with a maximum take-off mass of more than 5700 kg, or a multi-engined helicopter. Multi-engined helicopters are excluded, however, from the scope of Notes 2 and 3.

Table 3: 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 are permitted only for Slave devices controlled by a fixed WAS/RLAN DFS Master device Installations in trains and aircraft (Note 3) and use for Unmanned Aircraft Systems are not permitted.
Maximum mean e.i.r.p. for in-band emissions	1 W Exceptions: <ul style="list-style-type: none"> 200 mW maximum mean e.i.r.p. applies for installations in road vehicles
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 [3] 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 [9]. 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.
Note 3: Operation of WAS/RLAN installations in large aircraft ⁴ (excluding multi-engined helicopters), except in the frequency band 5600-5650 MHz, is permitted until 31 December 2028 with a maximum mean e.i.r.p. for in-band emissions of 100 mW.	

ANNEX 2: LIST OF REFERENCES

- [1] ITU Radio Regulations, Edition of 2020
- [2] Recommendation ITU-R M.1450: “Characteristics of broadband radio local area networks”
- [3] 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”
- [4] [Explanatory Paper](#) related to RLAN equipment using the 5 GHz bands in vehicles, including the usage under the non-specific SRD regulation
- [5] 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)
- [6] 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
- [7] [ERC Report 67](#): “Study of the Frequency sharing between HIPERLANs and MSS feeder links in the 5 GHz band”, approved February 1999
- [8] [ERC Report 72](#): “Compatibility studies related to the possible extension band for HIPERLAN at 5 GHz”, approved May 1999
- [9] 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”
- [10] [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”, approved July 2021
- [11] [ECC Decision \(20\)01](#): “The harmonised use of the frequency band 5945-6425 MHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)”, approved November 2020
- [12] Commission Regulation (EU) No 1321/2014 of 26 November 2014 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks