CEPT Report 59

In response to the EC Permanent Mandate on the ”Annual update of the technical annex of the Commission Decision on the technical harmonisation of radio spectrum for use by short range devices”

Report approved on 17 June 2016 by the ECC

0 EXECUTIVE SUMMARY

This Report describes the proposed Sixth Update of the technical annex to the EC Decision on the technical harmonisation of radio spectrum for use by Short Range Devices (SRD) and has been developed in the 2015-2016 timeframe by the European Conference of Postal and Telecommunications Administrations (CEPT) in response to the Permanent Mandate to CEPT regarding the annual update of the technical annex of the Commission Decision on the technical harmonisation of radio spectrum for use by short range devices.

The update proposes the following changes to the annex:

Task a.) To consider making the bands recently added in ERC Recommendation 70-03 [6] available to SRD usage and eventual inclusion in the next update of the SRD Decision

- Possibilities for a partial implementation of SRDs within 870-876 MHz / 915-921 MHz will be further discussed and the outcome will be provided in an Addendum to this CEPT Report;
- It is proposed to include a new SRD category of 'Medical data acquisition systems' in the EC Decision for SRDs with a new entry in the frequency range 2483.5-2500 MHz for Medical Body Area Network System (MBANS);
- It is proposed to include for the frequency range 122-122.25 GHz a maximum e.i.r.p. density limit as part of the regulatory approach in the EC Decision for SRDs. The current harmonised European standard EN 305 550 [5] also reflects these limits. A 'grandfathering' of existing equipment on the market is considered unnecessary since it is not believed that the band 122-123 GHz is commercially used yet (only pre-compliance equipment such as prototypes);
- It is proposed to add to the EC Decision for SRDs a definition for 'multimedia streaming devices' which are used for combined audio/video transmissions and audio/video synchronisation signals;
- It is proposed to add to the EC Decision for SRDs a definition for 'alarm systems';
- CEPT proposes an amendment of the definition for the category "radiodetermination";
- It is proposed to include a new entry for ALD applications on a tuning range basis for the frequency range 173.965-216 MHz;
- CEPT took into consideration the decision from the European Commission not to develop a harmonisation measure at EU level for BDA2GC in the band 1900-1920 MHz and will assess the relevant impact of this decision in order to identify the best way forward for the future usage of this band ;
- CEPT proposes the inclusion of a new entry for an obstacle detection application for rotorcraft use in the frequency range 76-77 GHz;
- CEPT proposes to extend the existing entry for TTT category from 5795-5805 MHz to 5795-5815 MHz for road tolling applications. The vast majority of the existing road tolling networks using DSRC technology implemented in Europe operates via the whole 20 MHz. There is seen no issue with this extension in the EC Decision for SRDs for road tolling applications on the work under the 'WAS/RLAN extension' mandate;
- CEPT proposes to amend the duty cycle definition in the technical annex of the EC Decision for SRDs.

Task b.) To start investigations on assessing the requirements for cognitive radio enabled SRDs and any potential implications in terms of SRD harmonised technical conditions, taking into account the on-going work in ETSI under mandate M/512

- Cognitive radio enabled SRDs have the capacity to allow a variety of different application including SRD applications to operate in frequency bands which were not originally planned for such purpose. CEPT started investigations on assessing the requirements for cognitive radio enabled SRDs and understand that there is neither a proposal nor an intention to harmonise the usage of a database to allow new SRD application for the time being.

Task c.) To re-assess, on a demand basis from stakeholders, the relevance and appropriateness of 'other usage restrictions' for the relevant SRD categories

- It is proposed for the entry 16 in the frequency range 315-600 kHz and the entry 26 in the frequency range 12 500-20 000 kHz to delete them. In addition, the definition for animal implantable devices should be removed since it is no longer needed. This is considered to be superseded by entry 15 in the frequency range 148.5-5 000 kHz and entry 21 in the frequency range 5 000-30 000 kHz with nearly

identical limits and all known implementations operating within a bandwidth of substantially greater than 10 kHz;

- It is proposed to delete the entry 22b in the frequency range 6765-6795 kHz while entry 22a for the same frequency range should be kept. No other implementations are known than covered by entry 22a;
- It is proposed to delete the entry 28a in the frequency range 26 957- 27 283 kHz while entry 28b which is more flexible and with the same limit is kept;
- It is proposed to widen the RFID category for 13.56 MHz (entry 27b) to inductive applications but keep RFID under 'other usage restrictions'. This would be in line with the solutions for other entries in the technical annex of the EC Decision for SRDs. In addition, since spectrum mask and antenna requirements have to be met in combination with a new relaxed transmitter mask, a reference to the harmonised standard is proposed for entry 27b;
- It is proposed to move the information in entries 29 to 33 for model control devices operating without duty cycle restrictions to the additional parameters column since this is not an 'other usage restriction' but a liberalisation for model control applications;
- It is proposed to move the information under 'other usage restrictions' for entry 39b to the additional parameters column;
- It is proposed to remove the other usage restriction that video applications are excluded from entry 35 in the frequency range 40.66-40.7 MHz;
- It is proposed to merge entry 37b into entry 37c. This can be handled by introducing a relaxed duty cycle for metering devices (10%) to the additional parameters column;
- The entry 54a can be removed in its totality since it's included in entry 54b;
- CEPT proposes to withdraw the 'Low duty cycle/ High reliability' category and to relax it to 'non-specific SRDs'. The entire concept described in section 5.11.1 of this Report still supports reliable spectrum access opportunities for SRDs and will lead to the ultimate withdrawal of 'other usage restrictions';
- CEPT proposes to remove the 'Low latency/ continuous transmission' category and to replace it by "wireless audio and multimedia streaming systems" category;
- An additional informative column in the technical annex of the EC Decision for SRDs could be included to provide the information about the harmonised standard published in the OJEU in relation to the respective entry. This would mirror the format of national radio interfaces which also includes in its informative part the possibility to refer to harmonised standards. This will improve the presentation and will clarify the full regulatory framework.. In this context It is propose to change all the references for harmonized European standards from the R&TTE Directive 1999/5/EC [7] to the RE Directive 2014/53/EU [8].

Task d.) To consider merging the existent decisions pertaining to SRDs into one encompassing decision.

- CEPT proposes to include provisions for UHF RFID in the EC Decision for SRDs as set out in Annex 3 of this Report and to repeal Commission Decision 2006/804/EC [1]. Existing RFID systems which are not based on the 4-channel plan are allowed to continue to operate ('grandfathering');
- CEPT proposes to include the provisions of EC Decision 2007/131/EC [2] (the 'UWB regulation', amended by Decisions 2009/343/EC [3] and 2014/702/EU [9]) in the EC Decision for SRD as set out in Annex 4 of this Report. This includes updating of some references to harmonised European Standards. Commission Decisions 2007/131/EC, 2009/343/EC and 2014/702/EU can be repealed. Alternatively, the the UWB regulation could be covered by a Permanent Mandate to CEPT regarding future updates;
- It is proposed to add a new entry for PMR446 equipment for the harmonised implementation of analogue and digital PMR equipment within the range 446.0-446.2 MHz. The implementation date is proposed to coincide with transition deadline which is set in the ECC/DEC/(15)05 [4] to 1 January 2018. Harmonised implementation within Europe using the same implementation date would avoid different implementation dates across Europe for this type of hand-portable equipment.

Further investigations are required for the following items:

- CEPT will continue to monitor possibilities for further harmonisation in the 870-876 MHz/915-921 MHz frequency bands (see section 5.4 for further information);
- The 52nd Radio Spectrum Committee meeting agreed that smart-tachograph and weight and dimensions compatibility parameters should be added to the annex of the SRD Decision, in the context of its 7th update, in time for deployment of these applications (starting from 2019). A more detailed calendar of the works will be requested from the ECC;

- A more detailed review is proposed to be undertaken in the future to identify opportunities for cognitive radio enabled SRDs where rewarding principles could be introduced. However, a review will need to be supported by requests from stakeholders via the ETSI-CEPT/ECC cooperation process;
- CEPT will continue investigating more complex aspects of duty cycle mechanisms in cooperation with ETSI, as an enabler for further spectrum sharing;
- CEPT will continue to work with ETSI on additional parameters (channelling and/or channel access and occupation rules), as outlined in section 5.11, as a precondition for a future withdrawal of the existing related other usage restrictions. For this reason, SRDMG has been formally tasked by WGFM (new work item) to develop this. The EC may wish to consider mandating ETSI to develop the spectrum access mechanisms necessary in this regard for inclusion in European Harmonised standards;
- With regard to SRD applications operating below 9 kHz, it is proposed to wait for the outcome of current activities before any harmonisation approach can be followed up for the EC Decision for SRDs. In addition, it should be taken into account that the scope of the Radio Spectrum Decision is limited to the range from 9 kHz to 3000 GHz. Nevertheless spectrum below 9 kHz is currently used without any requirement for authorisation, so it should carefully be considered whether this liberal approach below 9 kHz needs to be changed;
- CEPT will conduct further studies on usage conditions for DECT/SRD in the 1900-1920 MHz band for the 7th update.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

Abbreviation	Explanation
AFA	Adaptive Frequency Agility
ALD	Assistive Listening Device
BMA	Building Material Analysis
BS	Base Station
CEPT	European Conference of Postal and Telecommunications Administrations
DAA	Detect And Avoid
DA2GC	Direct Air to Ground Communications
DC	Duty Cycle
DCS	Dynamic Channel Selection
DECT	Digital European Cordless Telecommunications
DFS	Dynamic Frequency Selection
DSRC	Dedicated Short Range Communications
DSAD	Dynamic Spectrum Access Devices
EAS	Electronic Article surveillance
EC	European Commission
ECC	Electronic Communications Committee
ECS	Electronic Communications Service
EESS	Earth Exploration Satellite Service
EFIS	ECO Frequency Information System
e.i.r.p	Equivalent isotropically radiated power
e.r.p.	Effective Radiated Power
EN	European Standard
ERC	European Radiocommunications Committee
ETSI	European Telecommunications Standards Institute
EU	European Union
FCC	Federal Communications Commission
GBSAR	Ground Based Synthetic Aperture Radar
GNSS	Global Navigation Satellite System
GPRS	General Packet Radio Service
GSE	Group Spectrum Efficiency
GSM	Global System for Mobile Communications
IoT	Internet of Things
ISM	Industrial, Scientific and Medical frequency band
ITS	Intelligent Transport Systems
ITU	International Telecommunication Union
LBT	Listen Before Talk
LDC	Low Duty cycle
LPR	Level Probing Radar
LTA	Location Tracking and sensor applications for Automotive and transportation environments
M2M	Machine-to-Machine

MBANS	Medical Body Area Network System
MCL	Minimum Coupling Loss
MFCN	Mobile Fixed Communications Network
MGWS	Multiple Gigabit Wireless Systems
NRP	Network Relay Points
OBU	On Board Unit
OOB	Out-Of-Band
PMSE	Programme Making and Special Events
QOS	Quality Of Service
RAS	Radio Astronomy Service
RED	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
RIS	Radio Interface Specification
RFID	Radio Frequency Identification
R&TTE	Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity
SAR	Synthetic Aperture Radar
SEAMCAT	Spectrum Engineering Advanced Monte Carlo analysis Tool
SRD	ShortRange Devices
SRR	ShortRange Radars
TCAM	Telecommunication Conformity Assessment and Market Surveillance Committee
TDD	Time Domain Duplex
TLPR	Tank Level Probing Radar
TR	Technical Report
TTT	Transport and Traffic Telematics
TVWS	TeleVision White Space
UE	User Equipment
UHF	Ultra High Frequency
UMTS	Universal Mobile Telecommunications System
UWB	Ultra-wideband
ULP-AMI	Ultra low power medical implant systems
WG FM	Working Group Frequency Management
WG SE	Working Group Spectrum Engineering
WIA	Wireless Industrial Applications
WiFi	Wireless Fidelity
WRC	World Radiocommunications Conference

1 INTRODUCTION

This Report has been developed in 2015/2016 by the European Conference of Postal and Telecommunications Administrations (CEPT) in response to the Permanent Mandate to CEPT regarding the annual update of the technical annex of the Commission Decision on the technical harmonisation of radio spectrum for use by short range devices.

Pursuant to Article 4 of the Radio Spectrum Decision, the Commission may issue mandates to the CEPT for the development of technical implementing measures with a view to ensuring harmonised conditions for the availability and efficient use of radio spectrum; such mandates shall set the task to be performed and the timetable thereof.

This Report for the **sixth update** of the technical annex of the SRD Decision 2006/771/EC [15] has been developed within SRD/MG and approved by WG FM and the ECC with contributions from administrations, ETSI and industry.

It was submitted to the European Commission in accordance with the timescales of the Guidance to CEPT regarding the annual update of the technical annex of the SRD Decision 2006/771/EC which is given in Annex 1 to this Report.

2 BACKGROUND

In July 2006, ECC adopted CEPT Report 14 [12] in response to a European Commission (EC) Mandate to develop a strategy to improve the effectiveness and flexibility of spectrum availability for Short Range Devices (SRDs). In order to take full benefits from this work, ECC/WGFM tasked the SRD/MG to review the ERC/ECC Recommendations contained in CEPT Report 14 and to identify practical steps to implement them.

The Report developed in response to this task was approved by ECC/WGFM at its meeting in Brussels in May 2008 as the "Plan for the implementation of SRD strategy given in the CEPT Report 14". As shown in the summary of this Plan, the periodical review of the technical annex of the EC Decision on SRDs plays an important role for improving the European regulatory framework for SRDs.

The EC Decision on Short Range Devices (SRD) providing the latest version of the technical annex, updates the Commission Decision of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices (Decision 2006/771/EC [15]). The technical annex of Decision 2006/771/EC is subject to regular amendments.

The purpose of the EC Decision on Short Range Devices (SRD) is to harmonise the frequency bands and the related technical parameters for the availability and efficient use of radio spectrum for short-range devices.

Given their pervasive use in the European Community and in the world, short-range devices are playing an increasing role in the economy and in the daily lives of citizens, with different types of applications such as alarm and metering devices, RFID, local fixed and mobile communications equipment, e.g. door and car openers or medical implants. The development of applications based on short-range devices in the European Community could also contribute to achieving specific Community policy goals, such as completion of the internal market, promotion of innovation and research, and development of the information society.

Those regular updates of the applicable technical conditions ensure innovation and shared spectrum access across the internal market for hundreds of millions of devices sold annually (order of magnitude of the number of devices set out in ECC Report 182 [37] (the Survey about the use of the frequency band 863-870 MHz) and recently confirmed by the preliminary study results of SMART 2014/0012 [75] on the identification of the market for radio equipment operating in license-exempt frequency bands.

Due to the rapid changes in technology and societal demands, new applications for short-range devices will emerge, which will require constant scrutiny of spectrum harmonisation conditions, taking into account the economic benefits of new applications and the requirements of industry and users. Member States will have to monitor these evolutions. Regular updates of the EC Decision for SRD will therefore be necessary to respond to new developments in the market and technology.

3 DISCUSSION

Some 'usage restrictions', currently in the technical annex of Decision 2006/771/EC [15] and amendments may hinder the quick deployment of SRD solutions in certain categories. In specific cases, it might be possible to relax such restrictions without substantially affecting the primary services operating in those bands, increasing market penetration and socio-economic benefits of SRDs. The Commission therefore invited CEPT to re-assess, on a demand basis from stakeholders, the relevance and appropriateness of 'other usage restrictions' for the relevant SRD categories.

Chapter 7 of this Report includes a review of the ‘other usage restrictions’. These are discussed based on new information, new request or new argument; otherwise the information in CEPT Report 44 [13] is referred to where a certain restriction is explained and justified.

It is of outmost importance to understand the need for reasonable stability for the existing SRD usage conditions. A survey for the band 863-870 MHz in 2012 (in ECC Report 182 [37]) clearly indicates this need for stability as of being of high importance for the SRD industry and end users.

4 GENERAL PRINCIPLES

This Report takes into account a number of general principles. Most of these principles are set out in ECC Reports or previous CEPT Reports on updates of the technical annex of the EC SRD Decision. References to the relevant reports are made to avoid copying of material.

SRD strategy: the SRD strategy is described in CEPT Report 14 [12], and a detailed explanation is in section 3.1 of CEPT Report 26 [23] . One important element from the strategy is not to create new application specific frequency designations, i.e. use existing SRD bands on the basis of equal access to spectrum (no exclusive access to spectrum) as much as possible. In addition to this, Appendix 1 of the ERC/REC 70-03 [6] provides an indication of the level of harmonisation of frequency bands for usage by SRDs within CEPT countries. The terminology “soft harmonisation” refers to situations when considering the removal of as many as possible of the national barriers within existing SRD designations whilst ensuring the protection of the radio services. This means the inclusion in ERC/REC 70-03 first and then achieves the status of “harmonised” or “nearly harmonised”. The same applies for the introduction of “new” (application neutral) frequency ranges.

Application and technology neutrality: The debate on application and technology neutrality for SRDs is set out in CEPT Report 44 [13] and ECC Report 181 [16]. The consensus is that application neutrality in ERC/REC 70-03 should be strived for as much as possible, but technology neutrality is in conflict with spectrum efficiency. This should, besides the need for protection of primary services, be the main argument to have technology specific requirements for different frequency ranges.

Predictable sharing environment: For intra-SRD sharing, this is the minimum set of technical regulatory parameters with which the harmonised European standard addresses the sharing question. ECC compatibility studies in combination with the required technical application performance provide the technical base for this regulation. Traditionally, the definition of an application category was used for this; nowadays CEPT works more towards a technical spectrum access definition. Section 5 of CEPT Report 44 provides a detailed explanation.

Requirements and technical parameters: CEPT will provide the Commission with only those requirements and technical parameters considered essential to meet the objectives of equitable and efficient sharing of spectrum by SRDs as formulated in the Radio Equipment Directive.

Spectrum efficiency for SRDs as a goal: Spectrum efficiency for SRDs is inter-alia described in ECC Report 181. ECC Report 181 outlines how to achieve good group spectrum efficiency by describing the sharing environment with a minimum set of technical parameters. The EC SRD Decision and ERC/REC 70-03 traditionally have their main focus on the physical and session layer of the OSI model, leaving the rest to be described in European harmonised standards. Developments in the area of cognitive radio may be beneficial to spectrum efficiency but also may require some guidance on solutions in the application layer, assisting the more technical physical and session layer based techniques. When doing so, one has to keep in mind the principle from CEPT Report 14 that intra-SRD sharing is addressed in harmonised European standards while the regulation has to ensure an equal access to the spectrum.

5 CONSIDERATION ON MAKING THE BANDS RECENTLY ADDED IN ERC/REC 70-03 AVAILABLE TO SRD USAGE

5.1 MEDICAL BODY AREA NETWORK SYSTEM (MBANS)

A Medical body area network system is a low power radio system intended to provide wireless networking of multiple body sensors and actuators used for monitoring the patient's physiological parameters, patient diagnosis and patient treatment. They are used primarily in healthcare facilities as well as in other healthcare monitoring situations such as the patient's home. The use of MBANS holds the promise of improved quality and efficiency of patient care by reducing or eliminating a wide array of hardwired, patient attached cables used by present monitoring technologies. Spectrum for MBANS operations serves the public interest in the light of the significant healthcare benefits provided by MBANS. A detailed description of MBANS can be found in ETSI system reference document TR 101 557 [24].

The frequency ranges for MBANS were discussed in CEPT in 2013-2014 and the selected frequency range is 2483.5-2500 MHz, to be shared with active medical implant devices. Two maximum power levels are available: 1mW e.i.r.p. for in hospital use and 10mW e.i.r.p. for use in patients' homes. Compatibility between Medical Body Area Network System (MBANS) and other systems operating in the same or adjacent frequency band was studied in ECC Report 201 [25].

MBANS cannot be seen as a safety critical application.

MBANS equipment shall implement a spectrum access mechanism as described in the applicable ETSI EN 303 203 [27] or an equivalent spectrum access mechanism.

The spectrum access mechanisms are set out in EN 303 203 and EN 301 559 [49].

Because of the expected advent of medical SRD applications in the band 2483.5-2500 MHz, specific deployment scenarios and adequate spectrum access mechanisms were recently developed to ensure the equal access to spectrum. It is therefore proposed to include a new definition and a new category in the technical annex of the EC SRD Decision for MBANS in order to cover these recently developed regulations.

The main reason for introducing a new category for "Medical data acquisition systems" is the fact that the existing categories defined for the medical devices in the technical annex of the EC SRD Decision are all for implanted devices, and MBANS cannot be accommodated in any of these categories since it is not an implantable device. MBANS was also not included in Annex 12 of ERC/REC 70-03 [6] for the same reason.

The existing categories defined for implanted devices on the other side cannot be limited to medical data acquisition systems only. Therefore it is not proposed to change any of the existing medical implant related existing categories.

Table 1: Medical body area network systems (MBANS)

Band no.	Frequency band [i]	Type of short-range device category [ii]	Transmit power limit/ field strength limit/power density limit [iii]	Additional parameters (channelling and/or channel access and occupation rules) [iv]	Other usage restrictions [v]	Implementation deadline
59a	2 483.5-2 500 MHz	Medical data acquisition (20)	1 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU [8] must be used. Modulation Bandwidth: ≤ 3 MHz. Duty cycle [vi]: ≤ 10%	The set of usage conditions is only available for medical body area network system (MBANS) (23) for indoor use within healthcare facilities	
59b	2 483.5-2 500 MHz	Medical data acquisition (20)	10 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Modulation Bandwidth: ≤ 3 MHz. Duty cycle [vi]: ≤ 2%	The set of usage conditions is only available for medical body area network system (MBANS) (23) for indoor use within the patient's home	

([20]) Note: The medical data acquisition category covers the transmission of non-voice data to and from non-implantable medical devices for the purpose of monitoring, diagnosing and treating patients in healthcare facilities or patient's home.

([23]) Note: Medical Body Area Network Systems (MBANSs), used for medical data acquisition, are intended to be used in healthcare facilities and patients' homes. They are low power radio systems used for the transmission of non-voice data to and from medical devices for the purposes of monitoring, diagnosing and treating patients as prescribed by duly authorised healthcare professionals and are defined in the context of medical applications only.

5.2 13.56 MHz

ETSI proposed in TR 103 059 [31] emission masks for two new RFID systems in the 13.56 MHz range which were subsequently considered in ECC studies and approved (see ECC Report 208 [32]). The two RFID applications described in TR 103 059 are short range wideband systems and extended range narrowband systems.

Market deployment data for the proposed new 13.56 MHz systems were compiled showing that the large majority of systems are using the short range wideband systems, while the extended range narrowband systems are deployed in significantly lower quantities and mainly used in industrial sites for indoor operations.

The new RFID systems were documented in field tests and measurements were made related to propagation and interference with regard to a short wave broadcasting receivers.

5.2.1 Results for short range wideband RFID systems

The proposed transmitter mask for short range wideband system complies with the present limits in EN 300 330 [29] for small frequency offsets (+/- 900 kHz) and with the wideband limit from ERC/REC 70-03 Annex 9 (i1 and i2) [6] for larger frequency offsets. Therefore, no compatibility studies were needed.

5.2.2 Results for extended range narrowband RFID systems

Regarding the extended range narrowband systems the ECC Report 208 covers compatibility calculations in the range of 13.360 MHz to 13.760 MHz where higher emission levels compared to the existing mask are requested (levels between -3.5 and 27 dBµA/m, see Figure 3). Protection distances were derived from theoretical calculations using the path loss model from ERC Report 69 [33] and from new performed field tests.

According to theoretical calculations the indoor operation of RFIDs yields the protection distances up to 120 m for a frequency offset (between RFID centre frequency and victim frequencies) of ≤100 kHz. Considering outdoor use of RFIDs also with a frequency offset of ≤100 kHz, the maximum protection distance is between 190 m (from the field testing) and 210 m (from theoretical calculations).

For higher frequency offsets (≥ 100 kHz) the distance becomes clearly less (e.g. 12 m for indoor operation) because the allowed limit of the RFIDs in the emission mask drops from +27 dBµA/m down to -3.5 dBµA/m.

Although the new transmitter mask for extended range narrowband RFID systems leads to higher protection distances compared to the existing mask, it was concluded that the risk for interference is low because of the combination of the following operating and deployment conditions:

a. deployment usually in industrial sites;
b. predominantly indoor operation;
c. expected low deployment rate;
d. low duty cycle;
e. it is expected that in most of the scenarios for extended range RFID system the transmitted power will be less than the proposed maximum limit.

Table 2: 13.56 MHz short range narrowband and wideband RFID systems

Frequency Band		Power / Magnetic Field	Spectrum access and mitigation requirements	Channel spacing	ECC/ERC Decision	Notes
f	13.553-13.567 MHz	42 dBµA/m at 10m	No requirement	No spacing		
f1	13.410-13.553 MHz 13.567-13.710 MHz	9 dBµA/m at 10m	No requirement	No spacing		For RFID only, Only in connection with band f
	13.110-13.410 MHz 13.710-14.010 MHz	-3.5 dBµA/m at 10m	No requirement	No spacing		For RFID only, Only in connection with band f
	12.660-13.110 MHz 14.010-14.460 MHz	-10 dBµA/m at 10m	No requirement	No spacing		For RFID only, Only in connection with band f
	11.810-12.660 MHz 14.460-15.310 MHz	-16 dBµA/m at 10m	No requirement	No spacing		For RFID only, Only in connection with band f
f2	13.553-13.567 MHz	60 dBµA/m at 10m	No requirement	No spacing		For RFID and EAS only
f3	13.460-13.553 MHz 13.567-13.660 MHz	27 dBµA/m at 10m	No requirement	No spacing		For RFID only, Only in connection with band f2
	13.360-13.460 MHz 13.660-13.760 MHz	Linear transition from 27 to -3.5 dBµA/m at 10m	No requirement	No spacing		For RFID only, Only in connection with band f2
	13.110-13.360 MHz 13.760-14.010 MHz	-3.5 dBµA/m at 10m	No requirement	No spacing		For RFID only, Only in connection with band f2
	12.660-13.110 MHz 14.010-14.460 MHz	-5 dBµA/m at 10m	No requirement	No spacing		For RFID only, Only in connection with band f2
I1	148.5 kHz - 5 MHz	-15 dBµA/m at 10 m	No requirement	No spacing		In case of external antennas only loop coil antennas may be employed. *The maximum field strength is specified in a bandwidth of 10 kHz.The maximum allowed total field strength is -5 dBµA/m at 10 m for systems operating at bandwidths larger than 10 kHz whilst keeping the density limit (-15 dBµA/m in a bandwidth of 10 kHz)*
I2	5 - 30 MHz	-20 dBµA/m at 10 m	No requirement	No spacing		In case of external antennas only loop coil antennas may be employed. *The maximum field strength is specified in a bandwidth of 10 kHz. The maximum allowed total field strength is -5 dBµA/m at 10 m for systems operating at bandwidths larger than 10 kHz whilst keeping the density limit (-20 dBµA/m in a bandwidth of 10 kHz)*

Sub-bands f) and f2)

RFIDs operating in the frequency band 13.56 MHz shall meet the spectrum masks given in EN 300 330 [29]. This will permit the simultaneous use of the sub-band f) together with the limits of the sub-bands f1), I1) and I2). The same applies for the sub-band f2) in in conjunction with the limits in sub-band f3).

In case of combining the sub-bands f1, I1 and I2 the antenna limits of band I1 and I2 apply also to band f1, the field strength needs to be read as peak field strength in any 10kHz bandwidth. Only equipment transferring data as its primary function is allowed and the used bandwidth should be justified by the system's data rate.

It is proposed to add a new relaxed mask and associated antenna restrictions in the technical Annex of the EC Decision for SRDs. These are going to be set out in the European harmonised standard adopted under Directive 2014/53/EU. These RFID applications operating at 13.56 MHz (entry 27b) are covered by the non-specific SRD standard EN 300 330 together with other inductive applications. Therefore it is proposed to use the inductive applications' category and include under other usage restrictions that the entry is only for RFID applications. This restriction is justified by the assumption about the deployment scenario being dominantly for indoor RFID installations. Since spectrum mask and antenna requirements have to be met in combination with a new relaxed transmitter mask, a reference to the harmonised standard is proposed for entry 27b.

5.3 SHORT RANGE RADIO EQUIPMENT BELOW 9 KHZ

In the frequency regulation (see also ITU Radio Regulations [17] and ERC Report 25 (ECA Table) [18]), the frequencies between 8.3 kHz and 275 GHz are allocated to radio services. The lower border was moved during the WRC-12 from 9 kHz to 8.3 kHz. Radio spectrum from 0 Hz to 8.3 kHz and between 275 GHz to 3 000 GHz is NOT ALLOCATED (footnote 5.565 of the ITU Radio Regulations identifies bands in the range between 275 GHz and 1000 GHz / 3000 GHz to be used for passive services).

The extended scope of the Radio Equipment Directive (RED), which will replace the R&TTE Directive by June 2017, and the related draft standardisation request on new harmonised standards for radio equipment operating below 9 kHz imply that equipment already on the market using this frequency range (e.g. automatic lawn mowers) need to be treated as radio equipment under RED and for which new harmonised standards should be available as soon as possible. Based on the tight transposition period (till June 2017), ETSI already initiated discussion on this issue and prepares related ETSI system reference documents to clarify the situation for radio equipment operating below 9 kHz [66].

Under the RED, short range radio equipment operating under 9 kHz may be operated in Member States that have not introduced National restrictions (art. 7 of the RED) and may be placed on the market throughout the Community unless all Member States have introduced National restrictions (art. 10.2 of the RED).

The list of existing short range radio applications operating below 9 kHz is extensive and includes (non-exhaustive list):

- autonomous ‘robot-like’ applications (e.g. robot lawn mowers);
- metal detectors / inductive detectors (e.g. automation in industry – to detect small metallic parts, then build-in/integrated in a product);
- inductive loop systems (e.g. hearing aids, ‘telecoils’);
- in railway networks (including trams and urban rail systems) or airfields in several countries, sensors using e.g. 500 Hz, 1 kHz and 2 kHz, shortly called ‘indusi’ have been in use since the 1930s, see Link. The Commission Decision of 28 March 2006 concerning the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European conventional rail system includes many inductive track circuit systems with frequencies in the range 0-115 kHz;
- applications to bar animals (e.g. for cats, dogs).

Many of these applications have existed for decades. No reports of interference problems are known. More information may need to be collected to know the precise regulatory provisions which were followed so far for these applications when being placed on the market.

WG FM is currently aware of two ETSI Documents under preparation:

- ETSI TR 103 359 to evaluate the current situation and possible future use of radio applications in the frequency range below 9kHz [70];
- ETSI TR 103 355 on Inductive loop systems for hearing aids, 0-20 kHz [69].

Possible way forward

Investigate need for general authorisation for radio applications (SRDs) below 9 kHz (up to a defined field strength limit for the different applications). Based on Annex 9 of ERC/REC 70-03 [6] and on appropriate harmonised standard (e.g. EN 300 330 [29]) taking into account market needs, the sufficiency of the existing regulatory framework and possible problems, if any. Alternatively, the existing frequency regulatory environment may be sufficient (no interference cases reported so far, although some applications have existed over a very long (1920s) period in the market). Both possibilities exist and CEPT likes to keep both options open at this stage.

Applications with relevance to certain safety aspects (e.g. used in railways or at airports) may need to be reflected in the European Common Allocation Table (ERC Report 25 [18]) in the future.

The discussions may also deal with radio applications requiring higher limits (e.g. Amateur Radio, see for information document FM(15)119 from the IARU - Region 1) [43] or Lightning Detection Systems (within the UK, EA Technology operate a service based on detection of frequencies in the band 920 – 1220 Hz, other systems may use frequencies between 1-350 kHz; the purpose of these systems in the electricity sector is to warn people working on overhead power lines of approaching lightning storms in order that they can descend safely from electricity pylons before any risk arises of a lightning strike.

CEPT proposes to conduct a thorough discussion and investigation before reaching conclusions. The absence of clearly defined limits in frequency regulation may make it difficult to identify clear pass/fail criteria in (a) harmonised European standard(s). So far, CEPT has not been requested to conduct studies. It is also not always clear where demarcation lies between radio and EMC is, e.g. pure transfer of energy/ no communication for wireless power transfer devices. The definition of method of measurements in conformity standards may also be difficult when performed at very low emission levels in combination with very long wavelengths.

Background on current regulation:

1. Directive 2014/53/EU [8] 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 (RED) [7]
   Article 2, Definitions:

   4) 'radio waves' means electromagnetic waves of frequencies lower than 3 000 GHz, propagated in space without artificial guide;

   → A lower limit (e.g. 9 kHz or 8.3 kHz) is not defined.

CEPT notes that no applications are declared in ECA table below 8.3 kHz. Nevertheless, some CEPT administrations may have issued specific authorisations in the past for some applications in response to market request/demands.

2. DECISION No 676/2002/EC [50] of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community (Radio Spectrum Decision)
   Article 2, Definition:

   For the purposes of this Decision, radio spectrum includes radio waves in frequencies between 9 kHz and 3 000 GHz; radio waves are electromagnetic waves propagated in space without artificial guide.

   → Frequencies below 9 kHz are excluded from the Radio Spectrum Decision. Therefore future updates of the EC Decision 2006/771/EC [15] (on SRDs), Implementing Act based on the Radio Spectrum Decision, may not cover SRD applications using frequencies below 9 kHz.

It is proposed to wait for the outcome of such activities before any harmonisation approach can be followed up for the EC Decision for SRDs. In addition, it should be taken into account that the scope of the Radio Spectrum Decision is limited to the range from 9 kHz to 3000 GHz. Nevertheless spectrum below 9 kHz is currently used without any requirement for authorisation, so it should carefully be considered whether this liberal approach below 9 kHz needs to be changed.

Almost all national radio regulations worldwide define a lower limit in line with the ITU-R radio regulations [17] not allocating spectrum below 8.3 kHz for a defined radio service. Existing applications have existed for many decades (see examples in railway applications or in industrial automation) and have not caused problems. Very often, these applications are placed on the market under EMC regulations, or under different directives, e.g. machine directive. Many applications use the simple existence of an electromagnetic field of an unmodulated carrier frequency or change of the field when a metallic body is passing or approaching. In this regard, there might be interpretation possibilities with regard to the definition of telecommunications in

1.3 of article 1 of the ITU-R radio regulations [17]. Other terminology such as 'necessary bandwidth' or 'occupied bandwidth' can also not be defined in these cases. This can avoid additional unnecessary regulations without any defined benefit by defining such applications as non-radio equipment. However, metal detectors are covered by the RE-D as used to determine the position of objects (art 1(3 of the RE-D). CEPT proposes to conduct a thorough discussion and investigation process and discussion first before reaching conclusions.

Two new harmonised European standards are under development in ETSI:

- EN 303 660 for radio applications below 9 kHz with related performance requirements and essential requirements in accordance with the Radio Equipment Directive 2014/53/EU Article 3(2) [8]. The EN will not cover devices for wireless power transfer;
- EN 303 348 [52] (Inductive loop for hearing impaired persons in 0- 20 kHz.

Note that the Low Power and EMC Directives no longer apply to RE-D equipment.

5.4 870-876 MHz / 915-921 MHz

Considerable effort has been expended within CEPT over the past four years leading to two published ECC Reports: ECC Report 200 [34] (Co-existence studies for proposed SRD and RFID applications in the frequency band 870-876 MHz and 915-921 MHz) and ECC Report 189 [30] (Future Spectrum Demand for Short Range Devices in the UHF Frequency Bands) [25, 29]. The socio-economic benefits of this spectrum have been shown for individual countries but the economies of scale from European harmonisation would be substantially greater.

At present the range 863 to 870 MHz is used extensively for SRDs. However, these ranges are filling up quickly and a lot of new developments are anticipated, as set out in ECC Report 182 [37] (Survey about the use of the frequency band 863-870 MHz) and by ETSI in a set of System Reference Documents as detailed in ECC Report 189. This includes rising spectrum demands for generic SRD, UHF RFID, Home Automation & Sub Metering, Automotive SRD, Smart Meters and Smart Grids, Metropolitan Mesh Machine Networks (M3N) applications, Alarm and Social Alarm systems, and Assistive Listening Devices (ALDs including hearing aids). In addition to capacity constraints, the bandwidth of the existing plans is limited to developing applications, e.g. a wider bandwidth for individual UHF RFID devices will improve their performance and function. With machine mesh networks, the required bandwidth of the systems would not fit into the existing narrow bandwidths that are available in the existing frequency band 863-870 MHz.

The ECC Report 189 prepared by the ECC's SRD Maintenance Group, used conclusions from ECC Report 200 to define recommended regulatory parameters for SRDs which are included in Recommendation ERC/REC/70-03 [6] in Annexes 1, 2, 5, 10 and 11. ECC Report 200 looks partly at the compatibility issues between different sorts of SRDs to investigate whether their use of the band is compatible with existing services. . This development has also been supported by the publication of new or revised harmonised European standards; see section 9 of this Report.

There are still additional spectrum engineering studies in CEPT, based on additional requests from ETSI with the deadline for this work in January 2017.

Possibilities for a partial implementation of SRDs within 870-876 MHz / 915-921 MHz will be further discussed and the outcome will be provided in an Addendum to this CEPT Report.

5.5 OBSTACLE DETECTION RADARS FOR ROTORCRAFT USE IN 76-77 GHz

CEPT received the ETSI report TR 103 137 V1.1.1 (2014-01) [41]. In the ETSI Report two different radar modes are presented; a short range mode operating in the 76 to 77 GHz band and a long range mode operating in the 76 to 79 GHz band. The request has been modified later on in the process towards this ECC/DEC/(16)01 [42] to limit the regulatory approach to one obstacle detection system only which operates in the 76 GHz to 77 GHz frequency range. The values of the technical requirements for the obstacle detection radar system to be regulated in this Decision do not exceed the values used in TR 103 137, the ECC Report 222 [44] and the corresponding separation distance calculations.

A harmonised European regulatory approach is essential to ensure that the spectrum utilised by obstacle detection radars on-board rotorcraft (e.g. helicopters) can be used in any national airspace that the aircraft is crossing, provided that the system conforms to agreed radio specification limits in order to prevent harmful interference.

The obstacle detection radar devices permitted under ECC/DEC/(16)01 on “The harmonised frequency range 76-77 GHz, technical characteristics, exemption from individual licensing and free carriage and use of obstacle detection radars for rotorcraft use” [42] operate on a non-interference and non-protected basis. It is also planned to refer to the new ECC Decision in ERC/REC 70-03 – Annex 5 [6].

Administrations should decide on a national level on the need for and the size of an exclusion zone to protect the RAS (or an equivalent measure to ensure the protection of their radio astronomy service). The information on these exclusion zones is provided in ECC/DEC/(16)01 and ETSI is creating a European Standard EN 303 360 [51] on the obstacle detection radar equipment which will also refer to/ contain this information.

It is proposed to include a new entry for this application in the technical annex of the EC Decision for SRDs.

Considering on one hand article 1 (2) and annex I (4) of the RE-Directive 2014/53/EU [8] and on the other hand articles 1(2), 3(c), 3(d), 4(1), 4(4) and annex II of Regulation (EC) No. 216/2008 [45] (“the EASA regulation”), the application is considered to fall either under the Regulation (EC) No 216/2008 and/or the RE-Directive 2014/53/EU.[1]

It must be assumed that such airborne products are only excluded from the RE-Directive if they are actually covered by the Regulation (EC) No. 216/2008 and not excluded by special exemptions in this Regulation. It is therefore at the present time neither clear nor excluded that ETSI EN 303 360 for 76-77 GHz heliborne obstacle detection radar equipment will become a European Harmonised Standard under the RE-Directive. CEPT is of the view that the application would benefit from the existence of two harmonised standards under the EASA regulation and the RE-Directive respectively to cover all relevant aspects including spectrum management aspects.

The application uses their own radio aperture separated from any aeronautical communications. In this case, the application is used to provide visual and sound alert information to the pilot.

Regulation No 216/2008 covers ‘parts and appliances’, shall mean any instrument, equipment, mechanism, part, apparatus, appurtenance or accessory, including communications equipment, that is used or intended to be used in operating or controlling an aircraft in flight and is installed in or attached to the aircraft. At the same time, article 1(2) of Regulation No 216/2008 states that the regulation does not apply

CEPT administrations have the freedom to specify and enforce exclusion zones for the protection of the radio astronomy service where the obstacle detection application for rotorcraft use shall not be used. This aspect in relation to the new proposed entry for the EC Decision for SRDs is proposed to be satisfied with a footnote in the technical annex (see Annex 3 of this Report) to clarify that Member States have the right to specify such exclusion zones. Even if these exclusion zones are essential to ensure proper coexistence, the inclusion of this information in the EC Decision for SRDs does not provide an added value and would

[1] At the time of writing this CEPT Report, a proposal was noted for a new regulation of the European Parliament and of the Council on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and repealing Regulation (EC) No 216/2008 of the European Parliament and of the Council

moreover make updates in the exclusion zone information more difficult in future when this would need to be reflected in the EC Decision for SRDs as well (next to the ECC/DEC/(16)01 [42] and EN 303 360 [51]).

Table 3: Technical requirements

Frequency Band	Power / Magnetic Field	Spectrum access and mitigation requirements	Notes
76-77 GHz	30 dBm peak e.i.r.p.	≤ 56 %/s duty cycle	3 dBm/MHz average power spectral density. For obstacle detection radars for rotorcraft application.

The obstacle detection radars for rotorcraft use cannot be used by un-manned rotorcrafts at the moment since pilots need to verify visually the information directly by themselves. The application is also connected to the GNSS positioning information available at the rotorcraft, so that automatic deactivation is ensured when approaching and flying into a defined protection zone around a radio astronomy telescope.

EASA defines that `rotorcraft`means a heavier-than-air aircraft that depends principally for its support in flight on the lift generated by one or more rotors. There are `small rotorcraft` and `large rotorcraft`. The certification specifications CS-27 for small rotorcraft and CS-29 for large rotorcraft apply. For rotorcraft up to 600 kg there is also CS-VLR for very light rotorcraft) (see [72]).

Separated from this, EASA defines Unmanned Aircraft Systems (UAS) and Remotely Piloted Aircraft Systems (RPAS) – see http://easa.europa.eu/unmanned-aircraft-systems-uas-and-remotely-piloted-aircraft-systems-rpas.

5.6 WIRELESS INDUSTRIAL APPLICATIONS

An entry for Wireless Industrial Applications (WIA) in the frequency band 5725-5875 MHz was included in ERC/REC 70-03 Annex 2 [6] in May 2015. WIA applications are to be used for wireless links in industrial environments including monitoring and worker communications, wireless sensors and actuators.

ETSI is in process of creating a new harmonised European Standard for WIA applications (EN 303 258 [47]).

A registration or notification may be necessary (e.g. general authorisation with registration/notification required) by administrations which prefer such a procedure, given the limited number of WIA installation sites according to the description of WIA applications in the ETSI system reference document [73] and related studies in ECC Report 206 [46] , i.e. application of a combination of mitigation techniques and careful (initial) approach to ensure geographical restriction of WIA to industrial use.

Regulatory framework defined in CEPT for this purpose includes a combination of complex mitigation techniques (DFS, DAA and Adaptive Power Control) to ensure coexistence with existing applications (radio services). These techniques are mandatory for WIA apparatus. Hence, an entry in the technical annex of the EC Decision for SRDs needs to refer to the harmonised standard for WIA applications (“Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU [8] must be used.”).

CEPT recognises that the mitigation techniques necessary to meet the requirement to be an SRD are not yet finalised in the draft EN 303 258. This includes in particular the detection of fast frequency hopping radars and the most sensitive BFWA implementation options.

Given that the mitigation techniques within EN 303 258 are fundamental to the successful introduction of WIA, CEPT does not propose mandatory harmonisation of 5.8 GHz WIA, under the 6th update of the EC Decision for SRD (2006/771/EC [15]).

Whilst the WIA community recognises the need to protect incumbent services in the band 5.8 GHz band, WIA industry recently informed CEPT that such mitigation techniques are not compatible with some more

critical WIA applications which have some stringent requirements such as low latency. As an example, the development of a modified DFS mechanism for the protection of fast frequency hopping military radars may be challenging and will certainly take time to be developed. WIA Industry indicates and clarifies their interest in a further harmonisation approach asking for other possible frequency bands which may be more appropriate to comply with their applications and their associated requirements.

Similar to the request made with regard to EN 301 893 [48] (see doc. FM(13)116 - Annex 17 [59]), CEPT continues to request ETSI to include provisions in EN 303 258 [47] that would prevent a user to have direct or indirect access to settings related to any of the mitigation techniques (DFS, DAA, APC, ..) that could result in the equipment no longer to be compliant with the provisions contained in Annex 2 of ERC/REC 70-03 [6] for WIA.

CEPT may review this decision once the EN 303 258 is mature.

5.7 ASSISTIVE LISTENING DEVICES IN VHF

CEPT has published the ECC Report 230 [26]. Based on the information from ECC Report 230 on ALD frequency issues in the band 174-216 MHz, WG FM has considered and adopted a revision of Annex 10 to the ERC/REC 70-03 [6] which includes a new entry with regulatory parameters for use of the band 173.965-216 MHz as a tuning range used by ALDs.

Table 4: Regulatory parameters

Frequency Band	Power / Magnetic Field	Spectrum access and mitigation requirements	Channel spacing	ECC/ERC Deliverable	Notes
173.965-216 MHz	10 mW e.r.p.	See notes 1 and 2 below	Modulation Bandwidth ≤ 50 kHz	ECC Report 230	For Assistive Listening Device (ALD) systems. On a tuning range basis. Individual licence may be required
Note 1: a threshold of 35 dBµV/m is required to ensure the protection of a DAB receiver located at 1.5m from the ALD device, subject to DAB signal strength measurements taken around the ALD operating site. Note 2: the ALD device should operate under all circumstances at least 300 kHz away from the channel edge of an occupied DAB channel.					

One of the conclusions of the ECC Report 230 was, among others, that ALDs usage of this band under general authorisation is possible if EN 300 422 [22] includes an installation test procedure for ALDs assuring that primary services are not interfered with. A revision of EN 300 422 is currently under preparation and already includes such a test.

ECC Report 230 outlines that it can be assumed that ALD applications and co-frequency PMSE as well PMR applications are typically not used at the same location. If they are, exceptionally, then this can be handled locally, e.g. by a school frequency plan. If there are co-frequent individually licensed applications or a change of DAB channel usage, it also means that the ALD applications have to move in frequency to ensure co-existence. Hence, the tuning range is part of the proposed entry.

In this context, it is important to note that individual licensed applications such as PMSE or PMR use higher emission levels (50mW and 5-25W) than ALD applications (<10mW) in the band 173.965-216 MHz, i.e. these applications tend to interfere with ALD applications before ALD applications start to interfere to these applications. PMSE and ALDs use analogue FM, PMR often uses analogue FM in these frequencies and the FM capture ratio actually fosters a better frequency re-use.

It is clear, due to the installation test procedure that the typical usage refers to ALD systems which are installed and not to portable ALD use, which under circumstances could cause interference to PMSE or PMR systems and which cannot easily be solved locally as described above.

A new entry on a tuning range basis in the EC Decision for SRDs is proposed. A reference to the harmonised European standard should be included (see proposal in Annex 3).

5.8 ENTRIES FOR UWB IN ERC/REC 70-03

Since the publication of CEPT Report 45 [19], two new entries for UWB location tracking systems type 2 (LT2) and for UWB location tracking application for emergency and disaster situations (LAES) were added in ERC/REC 70-03 [6] in order to follow the national implementation status for these applications set out in ECC/REC/(11)09 [57] and ECC/REC/(11)10 [58] respectively. A recent enquiry amongst CEPT administrations revealed only moderate market demands and limited requests from the market for early national implementations, i.e. the current level of implementation is low.

Both, LT2 and LAES are non-consumer like applications. In addition, ECC/REC/(11)09 and ECC/REC/(11)10 do not advocate these applications to be handled on a license-exempt basis.

In addition, ECC/REC/(11)09 for LT2 was revised in 2014/15 and includes a new additional recommendation to CEPT administrations that they may choose to adopt an individual authorisation scheme under the condition to not confer any individual protection rights to LT2 applications which are an underlay application.

Based on the above and considerations already set out in CEPT Report 45, there are no new entries for UWB applications in ERC/REC 70-03 which are proposed for a new entry in the EC Decision for SRDs.

On the other side, CEPT proposes to include the provisions of EC Decision 2007/131/EC [2] (the 'UWB regulation', amended by Decisions 2009/343/EC [3] and 2014/702/EU [9]) in the EC Decision for SRD as set out in Annex 4 of this Report. This includes updating of some references to harmonised European Standards. Commission Decisions 2007/131/EC, 2009/343/EC and 2014/702/EU can be repealed (see section 8.2).

5.9 122-123 GHz

ECC Report 190 [40] deals with the compatibility analysis between Short-Range Devices (SRD) and EESS (passive) in the 122-122.25 GHz band.

Although the ERC/REC 70-03 has contained for many years the band 122-123 GHz, there is no SRD application known at the time in the market (only prototypes available). RR Footnote 5.138 mentions the designation of the band 122-123 GHz for industrial, scientific and medical (ISM) applications, but here also, no applications are known and the standard CISPR 11 does not contain limits for this frequency band.

Given the uncertainties around the applications foreseen at 122 GHz, it was agreed to base the studies on the following assumptions:

- 1 SRD/household (in the long term) over a European Capital;
- 5% outdoor devices;
- 100% activity factor (for some outdoor applications, activity factor is likely to be below 50%);
- Indoor/outdoor attenuation > 60 dB (this leads to the fact that indoor applications will not be source of interference to EESS spatial sensors and that hence 95% indoor applications are not considered);
- Power level up to 20dBm could be reached in standard;
- Bandwidth likely to be above 500 MHz;
- Antenna will more than likely be directive with a gain up to around 35dBi.

The calculations presented in ECC Report 190 show that SRDs operated with the currently regulated 20 dBm maximum e.i.r.p. are not compatible with EESS (passive) sensors operating in the 122-122.25 GHz band:

- the single entry scenario requires an additional limit of 10dBm/250 MHz e.i.r.p density;

- the aggregated (hot-spot) impact of 2100 SRD devices deployed outdoor in an area of 100 km^2 require a reduction to -25 dBm/200 MHz e.i.r.p. density (or -48 dBm/MHz).

Considering both single entry and hot spot scenario calculations, it is suggested that, in addition to the maximum e.i.r.p. of 20 dBm pertaining to the 122-123 GHz band, SRDs using the 122-122.25 GHz sub-band should comply with both of the following limitations:

- **Maximum e.i.r.p. density : 10 dBm/250 MHz (rms) (Note)**
- **Maximum e.i.r.p. density above 30° elevation : -48 dBm/MHz (rms) (Note)**

Note: *These limits should be measured with an rms detector and an averaging time of 1 ms or less.*

In addition, since the studies in this Report have been performed with theoretical assumptions related to SRDs in the 122 GHz frequency range these conclusions are therefore valid on a generic basis.

In case any future specific SRD applications aiming at operating in the 122-122.25 GHz were shown not to comply with these limits, new studies could be recommended for that specific SRD application to investigate possible mitigation techniques that could provide relevant protection to EESS (passive) sensors.

Table 5: Technical conditions for SRDs in 122.0-122.25 GHz

Frequency Band		Power / Magnetic Field	Spectrum access and mitigation requirements	Modulation/ maximum occupied bandwidth	ECC/ERC Decision	Notes
I	122.0-122.25 GHz	10 dBm e.i.r.p/ 250 MHz and -48 dBm/MHz at > 30° elevation	These limits should be measured with an rms detector and an averaging time of 1 ms or less	No spacing		

It is therefore proposed to include for the frequency range 122-122.25 GHz the maximum e.i.r.p. density limits as part of the regulatory approach in the EC Decision for SRDs. EN 305 550 [5] also reflects these limits.

The current class 1 equipment subclass 107 (non-specific SRD in the frequency band 122-123 GHz) also needs to be changed.

5.10 PROPOSAL FOR AMENDMENT OF THE DUTY CYCLE DEFINITION

CEPT decided to amend and align the definition of Duty Cycle in the ERC/REC 70-03 [6] Appendix 5 with the definition in the EC Decision for SRDs.

ETSI members have been requested to actively participate in this process, to ensure the new definition of Duty Cycle is both robust and unambiguous.

CEPT proposes to amend the duty cycle definition in the technical annex of the EC Decision for SRDs as follows:

> *'Duty cycle' is defined as the ratio, expressed as a percentage, of $\Sigma(T_{on})/(T_{obs})$ where T_{on} is the "on" time of a single transmitter device and T_{obs} is the observation period. T_{on} is measured in an observation frequency band (F_{obs}). Unless otherwise specified in this technical annex, T_{obs} is a continuous one hour period and F_{obs} is the applicable frequency band in this technical annex.'*

The amendment includes the possibility in the future to have a different observation time than 1 hour in an individual frequency band entry in ERC/REC 70-03 as well as the technical annex of the EC Decision. In

such a case, the different observation time would be proposed to be stated in the additional parameters column of the technical annex for the respective entry after the necessary investigations would have come to the conclusion to make such a proposal. This provides for the possibility to also set specific duty cycle parameters to improve the spectrum sharing in a specific frequency band. This is only a possibility in the future since currently, no different observation time parameters are proposed for entries in the technical annex, i.e. the observation time is 1 hour as it was before.

CEPT considers it of importance that the definition of duty cycle is identical in both the ERC/REC 70-03 Appendix 5 and in the EC Decision for SRDs. The proposal eliminates the differences which existed before this amendment which led to questions about different possibilities for interpretation in the standardisation as well as application of the duty cycle limit.

CEPT will continue investigating more complex aspects of duty cycle mechanisms in cooperation with ETSI, as an enabler for further spectrum sharing.

5.11 PROPOSAL FOR CHANGE OF SRD CATEGORIES

5.11.1 Low duty cycle/ high reliability category

The new SRD type category low duty cycle/ high reliability does not fulfil the minimum criteria for an SRD type category. In the technical annex to the draft amending Decision, non-application-specific SRD categories are defined in addition to the generic default category for non-specific short-range devices. Each category is based on common spectrum access mechanisms or on similar deployment scenarios, with a transparent definition in a footnote. In addition, typical use cases are mentioned for each category in order to allow for transparent cross-referencing with one or more application-specific harmonised standards where appropriate (see footnotes 1, 3, 4, 5, 8, 9, 12, 13, 14, 15, and 16). This provides users with a clearly defined scope of the individual harmonisation measures as they have to be implemented in the internal market.

So far, the “Low duty cycle, High reliability” category designation does not provide any information with regard to

1. deployment scenarios;

2. the common spectrum access mechanism;

3. a transparent definition for a low duty cycle/high reliability SRD type category.

Therefore, other solutions should be considered.

Spectrum engineering studies in CEPT are on-going to increase the knowledge about the above mentioned aspects and to achieve consensus with regard to the appropriate SRD category and applicable spectrum access parameters. Hence, CEPT Report 44 [13] has already included this item in its to-do list for future updates of the SRD regulation.

What are the overall considerations for the requirements for wireless alarm usage in the spectrum?

Regarding the situation in the EC Decision, the new category (LDC/HR) only replaced alarm and social alarm applications while the same terms have still been included under ‘other usage restrictions’, so there was de-facto no change or widening of the application scope. This relates to the duty cycle and the high reliability “performance” of these applications, while there are other important features to be considered as well:

1. Equipment achieves high reliability by use of repeat transmissions (or redundancy in the transmission protocol) and/or acknowledgements. However, this is not addressed in any ETSI technical specifications at this moment (so far, there are only two work items in ETSI for the creation of new harmonised standards (parts of the EN 300 220 [21] series of standards, see section 9) for wireless alarms and another one for social alarms);

2. Usage scenario: low overall traffic, low data rate, limited geographical density, and low duty cycle operation. Especially the limited usage density and low overall traffic contributes greatly to the high

reliability considerations. The on-going studies also may consider further refinement of the LDC concept such as the definition of transmit on and off times/ cycles which may allow, if used by "new LDC applications", to widen the use of the spectrum and allow for improved sharing and more efficient spectrum use. Alternative mitigation techniques and combinations of mitigation techniques could also be considered in this context. Again, details are not addressed in any ETSI technical specifications at this moment;

3. The only degradation scenario for alarm applications is a gridlock (congestion)-scenario. It is not possible to exclude certain wireless alarms or have graceful degradation concepts (reduced service).

Low duty cycle is a technical characteristic which requires to be specified. However, the duty cycle specification illustrates or characterises a mechanism to access the spectrum under channelling and/or channel access and occupation rules and not as a category of equipment.

An alternative is therefore seen as categorising the entries for alarm systems only (in bands 49, 52, 53 and 55) and social alarms systems only (in band 51) under the SRD application-neutral category "non-specific SRD" with the respective usage restriction (e.g. alarms only) for the time being until the spectrum engineering work will have been finished.

CEPT proposes to change the 'Low duty cycle/ High reliability' category to 'non-specific SRDs'. This is a first step and has to be seen in relation to the amendment of the duty cycle definition. CEPT has requested ETSI to actively participate in this process, to ensure the new definition of Duty Cycle is both robust and unambiguous. CEPT will continue to work with ETSI on additional parameters (channelling and/or channel access and occupation rules) as a precondition for a future withdrawal of the existing related other usage restrictions. This concept still supports reliable spectrum access opportunities for SRDs (i.e. such opportunities will not become obsolete). The EC may wish to consider mandating ETSI to develop the spectrum access mechanisms necessary in this regard for inclusion in European Harmonised standards.

Following the appropriate definition of the duty cycle parameters under the new duty cycle definition, the 'other usage restriction could be withdrawn in the future, i.e. the result will be entries under 'non-specific SRDs' with appropriate duty cycle restrictions in the additional parameters (channelling and/or channel access and occupation rules) column of the technical annex of the EC Decision for SRDs.

This supports the application-neutral approach, still protects the wireless alarms systems and is open for future improvements when spectrum engineering studies will have been done. The results of these studies may or may not lead to additional spectrum access opportunities for SRD devices with similar characteristics as alarms in the respective frequency bands to be shared after withdrawal of the 'other usage restriction'. This reflects the intentions as stated at RSC#43 and avoids the implementation of an incompletely defined new SRD type category.

CEPT will continue to work with ETSI on additional parameters (channelling and/or channel access and occupation rules) as a precondition for a future withdrawal of the existing related other usage restrictions. For this reason, the SRDMG has been formally tasked by WGFM (new work item) to develop this. The EC may wish to consider mandating ETSI to develop the spectrum access mechanisms necessary in this regard for inclusion in European Harmonised standards.

Some initial studies in this direction have already been performed and are published in ECC Report 181 [16]. This Report, together with CEPT Report 14 [12] and CEPT Report 44 [13] promote the concept of application neutrality.

The proposal also improves the presentation of the technical annex to reflect best practices and decreases the number of SRD categories. The approach also provides guidance and clarity to standardisation since the setting out of the LDC/HR category has led to some confusion, now overcome, since the result is to develop parts of the EN 300 220 [21] series of standards, see section 9) for wireless alarms and for social alarms).

It should be noted that in the technical annex, both the note 3 (non-specific SRD definition) and the note 15 include alarms, i.e. no change is needed in this regard in the notes when changing the category from LDC/HR to non-specific SRDs.

Some CEPT administrations already allow non-specific SRD use in the related frequency bands.

In addition to this proposal, CEPT emphasised that alarm systems are mentioned as an applicative restriction but this terminology is not defined in the current EC Decision. Therefore it is proposed to define alarm systems as follows: **"An alarm system is a device which uses radio communication support for indicating an alert to a system or a person, as a main functionality, at a distant location when a problem or a specific situation occurs".**

5.11.2 Low latency/ continuous transmission' category

In some extent, the situation regarding the new category 'Low Latency / Continuous transmission' is similar.

So far, no assessment can be made with regard to:

1. deployment scenarios;
2. the common spectrum access mechanism;
3. a transparent definition for a 'Low Latency/continuous transmission SRD type category.

Therefore, other solutions should be considered.

An undefined SRD type category is not supported and contradicts the set out of a set of well-defined application-neutral SRD categories.

The definition as proposed by EC below should actually designate audio applications:

> *This category covers radio devices that rely on low latency and high duty cycle transmissions. Typical uses are for personal wireless audio systems, mobile phones, automotive or home entertainment system, low power FM transmitters, wireless microphones, cordless loudspeakers, cordless headphones, radio devices carried on a person, in-ear monitoring and wireless microphones for use at concerts or other stage productions.*

Considering that:

1. low latency is ensured by an availability of the channels which granted by a low density of equipment in a specific location. Increasing the number of application means that the entire band for such applications may be more and more crowded. This may result to not be in a position to ensure the criteria low latency;
2. the designation 'low latency / high duty cycle' transmission does not prevent that an application based on the permanent emission like beacon uses the available frequency band for such category. E.g. the compatibility between a system like "detection of avalanche system" and a wireless microphone could not be ensured;
3. this designation is also non consistent with other categories since this can also include ALD applications;
4. low Latency should be defined and the difficulty is that depending on the type of application the criteria may be different. It should be highlighted that for this point there are no on-going studies in ETSI;
5. a continuous transmission can be seen in contradiction with low latency application in term of sharing and equitable access to the spectrum. Always-on detection systems such as beacons etc. really have the potential to harm audio and multimedia streaming applications. In addition, this can attract applications that in always-on fashion occupy constantly the spectrum although needing it only for short time of real conveyance of information. This cannot be regarded as a very efficient spectrum use.

CEPT proposes to change the 'Low latency/ continuous transmission' category to wireless audio and multimedia streaming systems. This improves the presentation of the technical annex of the EC Decision for SRDs and also avoids an unnecessary SRD category as outlined above and which is not taken up in standardisation.

5.12 IMPROVEMENT OF THE DEFINITION OF THE RADIO DETERMINATION DEVICE CATEGORY

The radio determination device category covers radio devices that are used for determining the position, velocity and/or other characteristics of an object, or for obtaining information relating to these parameters.

Typical uses are various kinds of measurement applications. Radiodetermination equipment typically conducts measurements to obtain such characteristics. Any kind of point-to-point or point-to-multipoint radio communications is outside of this definition.

This definition is in line with the definition in the radio regulation. Some CEPT administrations observed mis-use of this SRD category by point-to-point and point-to-multipoint fixed installed radio links with considerable operating distance. The difficulty is also partially caused by the aspect that the non-specific harmonised standard EN 300 440 [71] was used and is referenced in the regulation for some entries of ERC/REC 70-03 Annex 6 [6]. No spectrum access or any other technical restriction does prevent the potential misuse of this regulation.

Hence, the scope of ERC/REC 70-03 Annex 6 was amended with the definition for radiodetermination equipment still to be in line with the radio regulations and with the adding that radiodetermination equipment typically conducts measurements to obtain such characteristics. Any kind of point-to-point or point-to-multipoint radio communications is outside of this definition.

CEPT proposes an amendment of the definition for radiodetermination devices for the technical annex of the EC Decision for SRDs. It is important that the definitions in ERC/REC 70-03 Annex 6 and the technical annex of the EC Decision do not deviate from each other.

6 INVESTIGATIONS ON ASSESSING THE REQUIREMENTS FOR COGNITIVE RADIO ENABLED SRDS AND ANY POTENTIAL IMPLICATIONS IN TERMS OF SRD HARMONISED TECHNICAL CONDITIONS

It is crucial to understand the demand (both from the applications and investment perspective) and the need for intra-SRD studies for cognitive SRD. Polite access solutions in general are understood to be covered by this work or any kind of information provision that potentially leads to more efficient use of the spectrum (see also document SRDMG(14)050 [35]).

The activities in ITU-R WP1B on Dynamic Spectrum Access Devices (DSAD) [36] are noted.

CEPT/ECC has taken on-board the task to start investigations to assess requirements for future cognitive radio enabled SRDs. The investigations included a call for information from potential stakeholder and interested parties in the SRD community.

It was clarified from the beginning that CEPT may rather present the initial results of these investigations and not include a proposal for a final regulatory approach/implementation. However it is intended to make a step forward and this may lead to an implementation proposal in a second step depending on the demand from stakeholders. This work is based on a permanent Mandate from the European Commission; the CEPT is tasked with regularly updating of the technical Annex of Decision 2006/771/EC [15] and its further amendments.

The ETSI Board adopted mandate M/512 on January 2013.

In ETSI, TC RRS was nominated as the lead ETSI Technical Body for the mandate M/512 on Reconfigurable Radio Systems. Other groups (OCG_RTTE, ERM, BRAN, MSG) have contributed to the mandate:

- TC BRAN developed EN 301 598 [67] on TV White Spaces;
- TC RRS developed EN 303 144 [68] on Cognitive Radio Systems and geo-location databases.

Cognitive radio enabled SRDs may use opportunities for SRD applications to co-exist with other radio applications and services, which use these frequencies already, and can be managed databases which identify where the white space opportunities are. This principle of 'geolocation', with better and more detailed databases, is at the heart of ideas to support access to locally unused space spectrum by cognitive devices i.e. cognitive as part of a wider system of management. The more autonomous element of 'cognitive' technique in radio transceivers is 'sensing', i.e. being able to detect what other signals are present and to respond accordingly to reduce the chance of interference. This principle is already used in techniques such as 'listen before talk' (LBT), and the Dynamic Frequency Selection (DFS) used in 5 GHz Radio Local Area Networks (RLANs) to ensure coexistence with radars.

Most current practical considerations on where the Cognitive Radio would operate focus on overlaying its use on an existing, more conventional system. Cognitive is therefore seen as a ’secondary’ usage, coexisting with itself and with the primary services. However, implementation of cognitive techniques could increase the effective capacity of bands designated for short-range devices.

Cognitive techniques need to be analysed not only from the perspective of the technical feasibility but also from the perspectives of the demand, fit to application and investment requirements, the level of technical complexity involved, and the long term predictability of the spectrum access.

6.1 WHITE SPACE DEVICES

EN 301 598 provides one solution on how TV white space devices (TVWSDs) controlled by a TV white space database (TVWSDB) may operate in the TV broadcast band 470 MHz to 790 MHz in Europe. The work item to revise EN 301 598 for the RE Directive is currently on hold.

This solution relies on two different types of WSD intended to operate within the Broadcast frequency bands 470 to 790 MHz.

- Master TV white space device (TVWSD)
- Slave TV white space device (TVWSD)

The standard dictates that the maximum power and the maximum power spectral density in any 100 kHz bandwidth within a DTT channel may not exceed a level specified by a data base.

However, as this permitted power level is set by local conditions, TVWS devices may operate at power levels not traditionally associated with SRD. (within the 25 to 1000 MHz EN 300 220 [21] limits SRD to a maximum of 500 mW).

The EN 301 598 [67] states that the control and monitoring requirements of TVWS devices:

- prevent a master TVWSD from transmitting in the absence of communications with an approved TVWSDB;
- prevent a slave TVWSD from transmitting in the absence of communications with a master TVWSD;
- require a master TVWSD or a slave TVWSD to transmit in accordance with instructions and parameters provided by approved TVWSDBs;
- prevent a master TVWSD from getting parameters from an TVWSDB that is not approved by the relevant national authority.

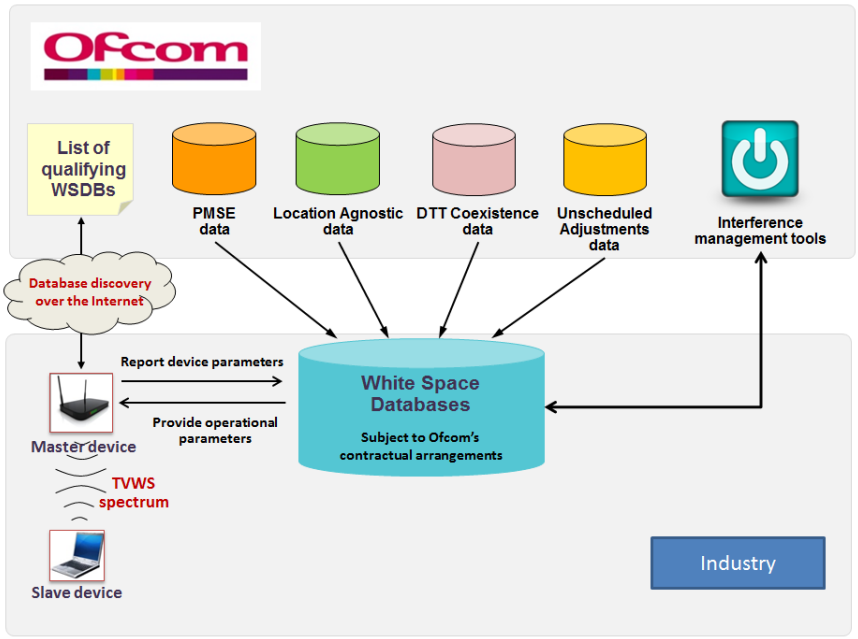

Figure 1: Framework for authorising the use of TVWS including the interactions between WSDs and white space databases (WSDBs)

6.2 CONCLUSION FOR WHITE SPACE DEVICES

WSD have the capacity to allow a variety of different application including SRD applications to operate in frequency bands which are not originally planned for such purpose. Further, without the controlling database, compliant WSD simply will not function.

CEPT understand that there is no proposal to harmonise the use of a WSD database. In addition, very limited demand has been expressed at the CEPT level in recent years and existing WSD implementation in the market has not progressed very much. Therefore, future developments on the market should be monitored in order to further progress on these investigations.

6.3 DEMAND FOR COGNITIVE SRD

CEPT/ECC has taken on-board the task to start investigations to assess requirements for future cognitive radio enabled SRDs. The investigations included a call for information from potential stakeholder and interested parties in the SRD community. The information collected is available in Annex 5. The information was discussed and assessed and the conclusions from this action included in the following section 6.4.

6.4 CONCLUSIONS FROM THE CALL AS WELL AS THE FOLLOWING ASSESSMENTS MADE IN CEPT

1. The demand expressed for cognitive-radio enabled SRDs, especially from end-users, is still very limited, when it comes to white space utilisation by means of a geolocation database or more sophisticated sensing solutions. The decision about more cognitivity for the use of spectrum by SRD applications cannot be left to industry alone. There is no real preference for a particular type of cognitivity;
2. Intra-SRD studies including time and location are always a pre-requisite; otherwise users will not trust that predictable spectrum access and sharing is provided. Cognitive techniques cannot be pushed forward without such studies. Only after such studies, one can decide on the split of the technical requirements into regulation and standardisation to have the optimal balance and best possible neutral approach in terms of SRD applications and technology as well as keeping the regulation as 'light' as possible;
3. The use of more cognitive spectrum access technologies should go together with rewarding the use of these techniques since they will lead to a more efficient use of the spectrum. Industry is not interested in investing in these techniques when there is no clear reward for them;
4. The cognitive techniques must fit to the application needs and also the investment considerations, i.e. the spectrum access must still be predictable and reliable enough in support of the applications. Nobody will place considerable investments in wireless installations if the cognitive spectrum access can lead to situations where access to spectrum could be temporarily or permanently impossible, now or in the future, and the intended services cannot be used. Spectrum must be available in the long term (even if the primary usage in the band changes) and a certain minimum capacity for SRDs must be guaranteed when new spectrum opportunities are provided for cognitive enabled SRDs;
5. New frequency bands for SRD usage could be envisaged to be opened by means of cognitive radio enabled SRDs whereby individually authorised services receive protection from harmful interference by the use of cognitive radio enabled SRDs. However, a certain minimum spectrum capacity needs to be guaranteed for generally authorised use at a given location. A benign alternative to cognitive radio enabled SRDs can be the use of low duty cycle restricted SRDs with indoor restriction (to reduce to great extent aggregated interference effects) as underlay regulation in such bands. The latter approach has also the advantage that new primary usage can be constructed in a way to be robust against the low duty cycle emission characteristics while it may be more difficult for an established 'cognitive SRD' band to follow changes in the primary service in the band under all circumstances;
6. National administrations, when using a geolocation database approach, should be carefully consider to add a geolocation requirement to white space devices that these would automatically provide accurate location information to white space databases in order to avoid inaccurate location information.

6.5 TIME DOMAIN ANALYSIS

Studies into the efficacy of cognitive techniques in facilitating more efficient use of SRD spectrum should – critically – take into account time-domain dynamics. Therefore, CEPT is in process of investigating tools and techniques to augment those currently available – MCL analysis and SEAMCAT simulations.

6.6 REWARDING POLITE COGNITIVE TECHNIQUES

Cognitive techniques allow radios to access available radio resources in time, frequency and space that might not otherwise be exploited. Polite spectrum access techniques further minimise unnecessary use and encourage equitable sharing of the scarce radio resource. By efficiently utilising these resources, additional services and applications can be offered to European citizens. This type of behaviour should be encouraged by the regulatory regime, for which precedents already exist, such as LBT+AFA techniques being rewarded with increased DC allowances.

A more detailed review is proposed to be undertaken in the future to identify opportunities for cognitive radio enabled SRDs where this rewarding principle could be introduced. However, a review will need to be supported by requests from stakeholders via the ETSI-CEPT/ECC cooperation process.

7 RE-ASSESSMENT, ON A DEMAND BASIS FROM STAKEHOLDERS, THE RELEVANCE AND APPROPRIATENESS OF 'OTHER USAGE RESTRICTIONS' FOR THE RELEVANT SRD CATEGORIES

7.1 ASSESSMENT OF "OTHER USAGE RESTRICTIONS IN 2013/752/EU

The guidance letter of 27 March 2014, RSCOM13-78rev1, noted that;

Some 'usage restrictions', currently in the annex of Decision 2006/771/EC [15], may hinder the quick deployment of SRD solutions in certain categories. In specific cases, it might be possible to relax such restrictions without substantially affecting the primary services operating in those bands, increasing market penetration and socio-economic benefits of SRDs.

The Commission invites CEPT to:

> *re-assess, on a demand basis from stakeholders, the relevance and appropriateness of 'other usage restrictions' for the relevant SRD categories;*
>
> Table 6: Review and Justification analysis therefore sets out the review of the "other usage restrictions" as requested.

It is proposed that the following restrictions can be removed or modified.

- It is proposed for the entry 16 in the frequency range 315-600 kHz and the entry 26 in the frequency range 12 500-20 000 kHz to remove the restriction to 'animal only' as well as to remove the definition for animal implantable devices. This is considered to be superseded by entry 15 in the frequency range 148.5-5 000 kHz and entry 21 in the frequency range 5 000-30 000 kHz with nearly identical limits and all known implementations operating within a bandwidth of substantially greater than 10 kHz;
- It is proposed to delete the entry 22b in the frequency range 6765-6795 kHz while entry 22a for the same frequency range should be kept. No other implementations are known than covered by entry 22a;
- It is proposed to delete the entry 28a in the frequency range 26 957- 27 283 kHz while entry 28b which is more flexible and with the same limit is kept;
- It is proposed to widen the RFID category for 13.56 MHz (entry 27b) to inductive applications but keep RFID under 'other usage restrictions'. This would be in line with the solutions for other entries in the technical annex of the EC Decision for SRDs. In addition, since spectrum mask and antenna requirements have to be met, a reference to the harmonised standard is proposed for entry 27b.
- It is proposed to move the information in entries 29 to 33 for model control devices may operate without duty cycle restrictions to the additional parameters column since this is not an 'other usage restriction' but a liberalisation for model control applications;
- It is proposed to move the information under 'other usage restrictions' for entry 39b to the additional parameters column;
- It is proposed to remove the other usage restriction that video applications are excluded from entry 35 in the frequency range 40.66-40.7 MHz;
- It is proposed to merge entry 37b into entry 37c. This can be handled by introducing a relaxed duty cycle for metering devices (10%) to the additional parameters column;
- The entry 54a can be removed in its totality since it's included in entry 54b.

However, it is recognised that some of the "other usage restrictions" may require additional definitions in order to have proper effect. It is proposed that definitions are drawn up for the following applications:

- It is proposed to add to the EC Decision for SRDs a definition for 'multimedia streaming devices' which are used for audio/video transmissions and audio/video synchronisation signals;
- CEPT proposes an amendment of the definition for radiodetermination (see section 5.12);
- It is proposed to add to the EC Decision for SRDs a definition for 'alarm systems' (as listed in entries 49, 52, 53, and 55. (see section 5.11.1)

Table 6: Review and Justification analysis

Band no	Frequency band (1)	Category of short-range devices (2)	Transmit power limit/field strength limit/power density limit (3)	Additional parameters (channelling and/or channel access and occupation rules) (4)	Other usage restrictions (5)	Keep/Remove "Other usage restriction"	Justification to keep "Other usage restriction"
1	9-59.750 kHz	Inductive devices (20)	72 dBµA/m at 10 metres				
2	9-315 kHz	Active medical implant devices (7)	30 dBµA/m at 10 metres	Duty cycle limit (6): 10 %	This set of usage conditions is only available to active implantable medical devices (13).	Keep	Note that the generic Inductive limit for power is greater than 30 dBµA/m at 10 metres below 148.5 kHz
3	59.750-60.250 kHz	Inductive devices (20)	42 dBµA/m at 10 metres				
4	60.250-74.750 kHz	Inductive devices (20)	72 dBµA/m at 10 metres				
5	74.750-75.250 kHz	Inductive devices (20)	42 dBµA/m at 10 metres				
6	75.250-77.250 kHz	Inductive devices (20)	72 dBµA/m at 10 metres				
7	77.250-77.750 kHz	Inductive devices (20)	42 dBµA/m at 10 metres				
8	77.750-90 kHz	Inductive devices (20)	72 dBµA/m at 10 metres				
9	90-119 kHz	Inductive devices (20)	42 dBµA/m at 10 metres				
10	119-128.6 kHz	Inductive devices (20)	66 dBµA/m at 10 metres				
11	128.6-129.6 kHz	Inductive devices	42 dBµA/m at 10				

		([20])	metres				
12	129.6-135 kHz	Inductive devices ([20])	66 dBµA/m at 10 metres				
13	135-140 kHz	Inductive devices ([20])	42 dBµA/m at 10 metres				
14	140-148.5 kHz	Inductive devices ([20])	37,7 dBµA/m at 10 metres				
15	148.5- 5 000 kHz ([23])	Inductive devices ([20])	– 15 dBµA/m at 10 metres in any bandwidth of 10 kHz. Furthermore the total field strength is – 5 dBµA/m at 10 m for systems operating at bandwidths larger than 10 kHz				
16	315-600 kHz	Active medical implant devices ([7])	– 5 dBµA/m at 10 m	Duty cycle limit ([6]): 10 %	This set of usage conditions is only available to animal implantable devices ([8]).	Remove restriction to 'animal' only.	Power Limit nearly identical to entry 15. Remove restriction to animal implants. Applications use a bandwidth of substantially greater than 10 kHz.
17	400-600 kHz	Radio Frequency Identification (RFID) devices ([18])	– 8 dBµA/m at 10 metres				
18	456.9-457.1 kHz	Non-specific short-range devices ([9])	7 dBµA/m at 10 m		This set of usage conditions is only available for emergency detections of buried victims and valuable items devices.	Keep	Liberalised in 5th update. Power limit is 12 dB above generic limit.
19	984-7 484 kHz	Transport and Traffic Telematics	9 dBµA/m at 10 m	Duty cycle limit ([6]): 1 %	This set of usage conditions is only	Keep	The 14 dB uplift on power over the generic Inductive SRD is

		devices (19)			available for Eurobalise transmissions in the presence of trains and using the 27 MHz band for telepowering.		only permitted due to the limitation on application.
20	3 155- 3 400 kHz	Inductive devices (20)	13,5 dBµA/m at 10 metres				
21	5 000- 30 000 kHz (24)	Inductive devices (20)	– 20 dBµA/m at 10 metres in any bandwidth of 10 kHz. Furthermore the total field strength is – 5 dBµA/m at 10 m for systems operating at bandwidths larger than 10 kHz				
22a	6 765- 6 795 kHz	Inductive devices (20)	42 dBµA/m at 10 metres			Keep	No other implementations are known. Keep only the entry 22a in the EC Decision for SRDs.
22b	6 765- 6 795 kHz	Non-specific short-range devices (9)	42 dBµA/m at 10 metres			Remove	
23	7 300- 23 000 kHz	Transport and Traffic Telematics devices (19)	– 7 dBµA/m at 10 m	Antenna restrictions apply as specified in the harmonised standards adopted under Directive 2014/53/EU.	This set of usage conditions is only available for Euroloop transmissions in the presence of trains and using the 27 MHz band for telepowering.	Keep	The antenna characteristics are completely different to generic inductive devices. The Euroloop antenna system is completely different
24	7 400- 8 800 kHz	Inductive devices (20)	9 dBµA/m at 10 metres				
25	10 200-	Inductive devices	9 dBµA/m at 10				

	11 000 kHz	([20])	metres				
26	12 500- 20 000 kHz	Active medical implant devices ([7])	– 7 dBµA/m at 10 m in a bandwidth of 10 kHz	Duty cycle limit ([6]): 10 %	This set of usage conditions is only available to indoor use by animal implantable devices ([8]).	Remove.	Power Limit nearly identical to line 21 and also using the same EN 300 330 standard. These applications use a bandwidth of substantially greater than 10 kHz.
27a	13 553- 13 567 kHz	Inductive devices ([20])	42 dBµA/m at 10 metres				
27b	13 553- 13 567 kHz	Radio Frequency Identification (RFID) devices ([18])	60 dBµA/m at 10 metres		The transmission mask and antenna requirements have to be met.	The category is actually wider for 'inductive devices' but keep RFID under 'other usage restriction'	Add a reference that technical restrictions apply as specified in the harmonised standards EN 300 330.
27c	13 553- 13 567 kHz	Non-specific short-range devices ([9])	42 dBµA/m at 10 metres				
28a	26 957- 27 283 kHz	Inductive devices ([20])	42 dBµA/m at 10 metres			Keep	Different technologies (e.m.f versus radiated power). Confusion is caused by wording 'which corresponds to 42 dBµA/m at 10 metres' in entry 28b. This is redundant and can be deleted.
28b	26 957- 27 283 kHz	Non-specific short-range devices ([9])	10 mW effective radiated power (e.r.p.), which corresponds to 42 dBµA/m at 10 metres			Keep	
29	26 990- 27 000 kHz	Non-specific short-range devices ([9])	100 mW e.r.p.	Duty cycle limit ([6]): 0,1 %	Model control devices may operate without duty cycle restrictions ([17]).	Move to *additional parameters* column.	This is not an "other usage restriction". It is a liberalisation for model control
30	27 040- 27 050 kHz	Non-specific short-range devices ([9])	100 mW e.r.p.	Duty cycle limit ([6]): 0,1 %	Model control devices may operate without duty cycle restrictions ([17]).	Move to *additional parameters* column.	This is not an "other usage restriction". It is a liberalisation for model control

31	27 090- 27 100 kHz	Non-specific short-range devices (9)	100 mW e.r.p.	Duty cycle limit (6): 0,1 %	Model control devices may operate without duty cycle restrictions (17).	Move to *additional parameters* column.	This is not an “other usage restriction”. It is a liberalisation for model control
32	27 140- 27 150 kHz	Non-specific short-range devices (9)	100 mW e.r.p.	Duty cycle limit (6): 0,1 %	Model control devices may operate without duty cycle restrictions (17).	Move to *additional parameters* column.	This is not an “other usage restriction”. It is a liberalisation for model control
33	27 190-2 7 200 kHz	Non-specific short-range devices (9)	100 mW e.r.p.	Duty cycle limit (6): 0,1 %	Model control devices may operate without duty cycle restrictions (17).	Move to *additional parameters* column.	This is not an “other usage restriction”. It is a liberalisation for model control
34	30-37.5 MHz	Active medical implant devices (7)	1 mW e.r.p.	Duty cycle limit (6): 10 %	This set of usage conditions is only available to ultra-low power medical membrane implants for blood pressure measurements within the definition of active implantable medical devices (13) in Directive 90/385/EEC.	Keep	No request from the market to do additional studies. No change since CEPT Report 44. An unlimited number of devices could cause interference to the services in these bands. It is likely that the usage description excludes any other application than medical implants at this moment. The bands should however not be excluded for other devices than medical. However, compatibility studies should prove coexistence for new applications.
35	40.66-40.7 MHz	Non-specific short-range devices (9)	10 mW e.r.p.		Video applications are excluded.	Remove	Bandwidth is 40 kHz. This in itself restricts video to about one frame every 8 seconds. De-facto may very likely not have a difference on the market. 40 kHz of spectrum is not very attractive for video applications.

36	87.5-108 MHz	100% duty cycle	50 nW e.r.p.	Channel spacing up to 200 kHz.	This set of usage conditions is only available to transmitters with analogue frequency modulation (FM).	Change category to wireless audio and multimedia streaming devices	Application neutral. Limitation to FM is to ensure compatibility with broadcast.
37a	169.4-169.475 MHz	Assistive Listening Devices (ALD) (10)	500 mW e.r.p.	Channel spacing: max 50 kHz.			Individual licence may be required
37b	169.4-169.475 MHz	Metering devices (11)	500 mW e.r.p.	Channel spacing: max 50 kHz. Duty cycle limit (6): 10.0 %.			This can be merged with entry 37c
37c	169.4-169.475 MHz	Non-specific short-range devices (9)	500 mW e.r.p.	Channel spacing: max 50 kHz. Duty cycle limit (6): 1.0 %.			It is proposed to merge entry 37b into this entry.
38	169.4-169.4875 MHz	Non-specific short-range devices (9)	10 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Duty cycle limit (6): 0.1 %.			
39a	169.4875-169.5875 MHz	Assistive Listening Devices (ALD) (10)	500 mW e.r.p.	Channel spacing: max 50 kHz.			
39b	169.4875-169.5875	Non-specific short-	10 mW e.r.p.	Techniques to access spectrum	Between 00.00 and 06.00 local time a	Move to *additional*	This is not a restriction.

	MHz	range devices (9)		and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Duty cycle limit (6): 0.001 %.	duty cycle limit (6) of 0.1 % may be used.	*parameters* column.	
40	169.5875-169.8125 MHz	Non-specific short-range devices (9)	10 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Duty cycle limit (6): 0.1 %.			
41	401-402 MHz	Active medical implant devices (7)	25 µW e.r.p.	Channel spacing: 25 kHz. Individual transmitters may combine adjacent channels for increased bandwidth up to 100 kHz.	This set of usage conditions is only available for systems specifically designed for the purpose of providing non-voice digital communications	Keep	No request from the market to do additional studies. No change since CEPT Report 44. An unlimited number of devices could cause interference to the services in

				Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Alternatively a duty cycle limit [6] of 0.1 % may also be used.	between active implantable medical devices [13] and/or body-worn devices and other devices external to the human body used for transferring non-time critical individual patient-related physiological information.		these bands. It is likely that the usage description excludes any other application than medical implants at this moment. The bands should however not be excluded for other devices than medical. However. compatibility studies should prove coexistence for new applications.
42	402-405 MHz	Active medical implant devices [7]	25 µW e.r.p.	Channel spacing: 25 kHz. Individual transmitters may combine adjacent channels for increased bandwidth up to 300 kHz. Other techniques to access spectrum or mitigate interference, including bandwidths greater than 300 kHz, can be used provided they result at least in an equivalent performance to the techniques described in	This set of usage conditions is only available to active implantable medical devices [13].	Keep	No request from the market to do additional studies. No change since CEPT Report 44. An unlimited number of devices could cause interference to the services in these bands. It is likely that the usage description excludes any other application than medical implants at this moment. The bands should however not be excluded for other devices than medical. However, compatibility studies should prove coexistence for new applications.

				harmonised standards adopted under Directive 2014/53/EU to ensure compatible operation with the other users and in particular with meteorological radiosondes.			
43	405-406 MHz	Active medical implant devices (7)	25 µW e.r.p.	Channel spacing: 25 kHz Individual transmitters may combine adjacent channels for increased bandwidth up to 100 kHz. Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Alternatively a duty cycle limit (6) of 0.1 % may also be used.	This set of usage conditions is only available for systems specifically designed for the purpose of providing non-voice digital communications between active implantable medical devices (13) and/or body-worn devices and other devices external to the human body used for transferring non-time critical individual patient-related physiological information.	Keep	No request from the market to do additional studies No change since CEPT Report 44. An unlimited number of devices could cause interference to the services in these bands. It is likely that the usage description excludes any other application than medical implants at this moment. The bands should however not be excluded for other devices than medical. However, compatibility studies should prove coexistence for new applications.
44a	433.05-434.04 MHz	Non-specific short-	1 mW e.r.p. and –	Voice applications	Audio and video	Keep	No change request from

		range devices (9)	13 dBm/10 kHz power density for bandwidth modulation larger than 250 kHz	are allowed with advanced mitigation techniques.	applications are excluded.		industry since CEPT Report 44.
44b	433.05-434.04 MHz	Non-specific short-range devices (9)	10 mW e.r.p.	Duty cycle limit (6): 10 %	Analogue audio applications other than voice are excluded. Analogue video applications are excluded.	Keep	No change request from industry since CEPT Report 44.
45a	434.04-434.79 MHz	Non-specific short-range devices (9)	1 mW e.r.p. and –13 dBm/10 kHz power density for bandwidth modulation larger than 250 kHz	Voice applications are allowed with advanced mitigation techniques.	Audio and video applications are excluded.	Keep	No change request from industry since CEPT Report 44.
45b	434.04-434.79 MHz	Non-specific short-range devices (9)	10 mW e.r.p.	Duty cycle limit (6): 10 %	Analogue audio applications other than voice are excluded. Analogue video applications are excluded.	Keep	No change request from industry since CEPT Report 44.
45c	434.04-434.79 MHz	Non-specific short-range devices (9)	10 mW e.r.p.	Duty cycle limit (6): 100 % subject to channel spacing up to 25 kHz. Voice applications are allowed with advanced mitigation techniques.	Audio and video applications are excluded.	Keep	No change request from industry since CEPT Report 44.
46a	863-865 MHz	Non-specific short-range devices (9)	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least	Analogue audio applications other than voice are excluded. Analogue video applications	Keep	Audio devices are clearly within scope of line 46b at 10mW but with unlimited duty cycle. This 0.1% duty cycle negates the 4dB increase in

				equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Alternatively a duty cycle limit (6) of 0.1 % may also be used.	are excluded.		power. The 0.1% duty cycle is sufficient in itself, to make this band unattractive to Video applications. However, the use of other undefined mitigation techniques could create difficulties, if the other usage restriction is removed.
46b	863-865 MHz	High duty cycle/continuous transmission devices	10 mW e.r.p.		This set of usage conditions is only available to wireless audio and multimedia streaming devices.	Change category to wireless audio and multimedia streaming devices	Definition of multimedia streaming is proposed to be amended. Multimedia streaming devices are used for 100% duty cycle audio/video transmissions and audio/video synchronisation signals.
47	865-868 MHz	Non-specific short-range devices (9)	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Alternatively a duty cycle limit (6) of 1 % may also be used.	Analogue audio applications other than voice are excluded. Analogue video applications are excluded.	Keep	Awaiting output of on-going studies. Possible removal of the analogue restrictions in this 1% duty cycle band in the future.

48	868-868.6 MHz	Non-specific short-range devices (9)	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Alternatively a duty cycle limit (6) of 1 % may also be used.	Analogue video applications are excluded.	Keep	Awaiting output of on-going studies. Possible removal of the analogue restrictions in this 1% duty cycle band in the future.
49	868.6-868.7 MHz	Low duty cycle/high reliability devices (21)	10 mW e.r.p.	Channel spacing: 25 kHz The whole frequency band may also be used as a single channel for high-speed data transmission. Duty cycle limit (6): 1.0 %	This set of usage conditions is only available to alarm systems.	Change category to non-specific SRD	Definition of Alarm Systems is proposed. Spectrum access rules are a better way of control.
50	868.7-869.2 MHz	Non-specific short-range devices (9)	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards	Analogue video applications are excluded.	Keep	Awaiting output of on-going studies. Possible removal of the analogue restrictions in this 0.1% duty cycle band in the future.

				adopted under Directive 2014/53/EU must be used. Alternatively a duty cycle limit (6) of 0.1 % may also be used.			
51	869.2-869.25 MHz	Low duty cycle/high reliability devices (21)	10 mW e.r.p.	Channel spacing: 25 kHz. Duty cycle limit (6): 0.1 %	This set of usage conditions is only available to social alarm devices (12).	Change category to non-specific SRD	Awaiting output of on-going studies. Spectrum access rules are a better way of control.
52	869.25-869.3 MHz	Low duty cycle/high reliability devices (21)	10 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit (6): 0.1 %	This set of usage conditions is only available to alarm systems.	Change category to non-specific SRD	Definition of Alarm Systems is proposed. Spectrum access rules are a better way of control.
53	869.3-869.4 MHz	Low duty cycle/high reliability devices (21)	10 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit (6): 1.0 %	This set of usage conditions is only available to alarm systems.	Change category to non-specific SRD	Definition of Alarm Systems is proposed. Spectrum access rules are a better way of control.
54a	869.4-869.65 MHz	Non-specific short-range devices (9)	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Alternatively a duty cycle limit (6) of 0.1 % may also be used.	Analogue audio applications other than voice are excluded. Analogue video applications are excluded.	Remove line 54a in totality.	All parameters are covered by line 54b.

54b	869.4-869.65 MHz	Non-specific short-range devices (9)	500 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Alternatively a Duty cycle limit (6) of 10 % may also be used.	Analogue video applications are excluded.	Keep	The restriction is necessary to balance the increased power limitation in this frequency band. This band is the only 500 mW band in 863-870 MHz.
55	869.65-869.7 MHz	Low duty cycle/high reliability devices (21)	25 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit (6): 10 %	This set of usage conditions is only available to alarm systems.	Change category to non-specific SRD	Definition of Alarm Systems is proposed. Spectrum access rules are a better way of control.
56a	869.7-870 MHz	Non-specific short-range devices (9)	5 mW e.r.p.	Voice applications allowed with advanced mitigation techniques.	Audio and video applications are excluded.	Keep	Limits on applications are needed to balance the 100% Duty Cycle limitation.
56b	869.7-870 MHz	Non-specific short-range devices (9)	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards	Analogue audio applications other than voice are excluded. Analogue video applications are excluded.	Keep	Awaiting output of on-going studies. Possible removal of the analogue restrictions in this 1% duty cycle band in the future.

				adopted under Directive 2014/53/EU must be used. Alternatively a duty cycle limit (6) of 1 % may also be used.			
57a	2 400- 2 483.5 MHz	Non-specific short-range devices (9)	10 mW equivalent isotropic radiated power (e.i.r.p.)				
57b	2 400- 2 483.5 MHz	Radio determination devices (15)	25 mW e.i.r.p.				
57c	2 400- 2 483.5 MHz	Wideband data transmission devices (22)	100 mW e.i.r.p. and 100 mW/100 kHz e.i.r.p. density applies when frequency hopping modulation is used. 10 mW/MHz e.i.r.p. density applies when other types of modulation are used	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.			
58	2 446- 2 454 MHz	Radio Frequency Identification (RFID) devices (18)	500 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised			

				standards adopted under Directive 2014/53/EU must be used.			
59	2 483,5- 2 500 MHz	Active medical implant devices (7)	10 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Channel spacing: 1 MHz. The whole frequency band may also be used dynamically as a single channel for high-speed data transmissions. Duty cycle limit (6) of 10 %.	This set of usage conditions is only available to active implantable medical devices (13). Peripheral master units are for indoor use only.	Keep	Note that MBANSs are to be added to the band, but with different technical parameters.
60	4 500- 7 000 MHz	Radio determination devices (15)	24 dBm e.i.r.p. (25)	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised	This set of usage conditions is only available to Tank Level Probing Radar (16).	Keep	Sharing studies only studied the compatibility of specific TLPR.

				standards adopted under Directive 2014/53/EU must be used.			
61	5 725- 5 875 MHz	Non-specific short-range devices (9)	25 mW e.i.r.p.				
62	5 795- 5 805 MHz	Transport and Traffic Telematics devices (19)	2 W e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	This set of usage conditions applies only to road tolling applications.	Keep and expand to 5795-5815 MHz for road tolling applications	ECC Report 250 including compatibility studies between TTT/DSRC road tolling applications in the band 5805-5815 MHz and other systems have been conducted.
63	6 000- 8 500 MHz	Radio determination devices (15)	7 dBm/50 MHz peak e.i.r.p. and –33 dBm/MHz mean e.i.r.p.	Automatic power control and antenna requirements as well as equivalent techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under	This set of usage conditions is only available to Level Probing Radar. Established exclusion zones around radio astronomy sites must be obeyed.	Keep	Sharing studies only studied the compatibility of specific LPR.

				Directive 2014/53/EU must be used.			
64	8 500- 10 600 MHz	Radio determination devices (15)	30 dBm e.i.r.p. (25)	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	This set of usage conditions is only available to Tank Level Probing Radar (16).	Keep	Sharing studies only studied the compatibility of specific TLPR.
65	17.1-17.3 GHz	Radio determination devices (15)	26 dBm e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	This set of usage conditions is only available to ground-based systems.	Keep	Sharing studies only demonstrated compatibility with specific Ground Based devices.
66	24.05-24.075 GHz	Transport and Traffic Telematics devices (19)	100 mW e.i.r.p.				
67	24.05-26.5 GHz	Radio determination devices (15)	26 dBm/50 MHz peak e.i.r.p. and –14 dBm/MHz	Automatic power control and antenna	This set of usage conditions is only available to Level	Keep	Sharing studies only studied the compatibility of specific LPR.

			mean e.i.r.p.	requirements as well as equivalent techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	Probing Radar. Established exclusion zones around radio astronomy sites must be obeyed.		
68	24.05-27 GHz	Radio determination devices (15)	43 dBm e.i.r.p. (25)	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	This set of usage conditions is only available to Tank Level Probing Radar (16).	Keep	Sharing studies only studied the compatibility of specific TLPR.
69a	24.075-24.15 GHz	Transport and Traffic Telematics devices (19)	100 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques	This set of usage conditions is only available to ground-based vehicle radars.	Keep	Sharing studies only completed in relation to police speed enforcement apparatus

				described in harmonised standards adopted under Directive 2014/53/EU must be used. Dwell time limits and frequency modulation range apply as specified in harmonised standards.			
69b	24.075-24.15 GHz	Transport and Traffic Telematics devices (19)	0.1 mW e.i.r.p.				
70a	24.15-24.25 GHz	Non-specific short-range devices (9)	100 mW e.i.r.p.				
70b	24.15-24.25 GHz	Transport and Traffic Telematics devices (19)	100 mW e.i.r.p.				
71	24.25-24.495 GHz	Transport and Traffic Telematics devices (19)	– 11 dBm e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Duty cycle limits (6) and frequency modulation	This set of usage conditions is only available to ground-based vehicle radars operating in the harmonised 24 GHz frequency range.	Keep	Sharing studies only studied the compatibility of “ground based vehicle radar” only

				ranges apply as specified in harmonised standards.			
72	24.25-24.5 GHz	Transport and Traffic Telematics devices (19)	20 dBm e.i.r.p. (forward-facing radars) 16 dBm e.i.r.p. (rear-facing radars)	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Duty cycle limits (6) and frequency modulation range apply as specified in harmonised standards.	This set of usage conditions is only available to ground-based vehicle radars operating in the harmonised 24 GHz frequency range.	Keep	Sharing studies only studied the compatibility of “ground based vehicle radar” only
73	24.495-24.5 GHz	Transport and Traffic Telematics devices (19)	– 8 dBm e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Duty	This set of usage conditions is only available to ground-based vehicle radars operating in the harmonised 24 GHz frequency range.	Keep	Sharing studies only studied the compatibility of “ground based vehicle radar” only

				cycle limits (6) and frequency modulation range apply as specified in harmonised standards.			
74a	57-64 GHz	Non-specific short-range devices (9)	100 mW e.i.r.p., a maximum transmit power of 10 dBm and a maximum e.i.r.p. power spectral density of 13 dBm/MHz				
74b	57-64 GHz	Radio determination devices (15)	43 dBm e.i.r.p. (25)	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	This set of usage conditions is only available to Tank Level Probing Radar (16).	Keep	Sharing studies only studied the compatibility of specific TLPR.
74c	57-64 GHz	Radio determination devices (15)	35 dBm/50 MHz peak e.i.r.p. and –2 dBm/MHz mean e.i.r.p.	Automatic power control and antenna requirements as well as equivalent techniques to access spectrum and mitigate interference that provide at least equivalent	This set of usage conditions is only available to Level Probing Radar.	Keep	Sharing studies only studied the compatibility of specific LPR.

				performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.			
75	57-66 GHz	Wideband data transmission devices (22)	40 dBm e.i.r.p. and 13 dBm/MHz e.i.r.p. density	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	Fixed outdoor installations are excluded.	Keep	Higher power devices, than line 74a, require the limitation to ensure compatibility with other services.
76	61-61,5 GHz	Non-specific short-range devices (9)	100 mW e.i.r.p.				
77	63-64 GHz	Transport and Traffic Telematics devices (19)	40 dBm e.i.r.p.		This set of usage conditions is only available to vehicle-to-vehicle, vehicle-to-infrastructure and infrastructure-to-vehicle systems.	Keep	ECC/DEC/(09)01 revision in 2015 [38].
78a	75-85 GHz	Radio determination devices (15)	34 dBm/50 MHz peak e.i.r.p. and –3 dBm/MHz mean e.i.r.p.	Automatic power control and antenna requirements as well as equivalent techniques to	This set of usage conditions is only available to Level Probing Radar. Established exclusion zones	Keep	Sharing studies only studied the compatibility of specific LPR.

				access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	around radio astronomy sites must be obeyed.		
78b	75-85 GHz	Radio determination devices (15)	43 dBm e.i.r.p. (25)	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.	This set of usage conditions is only available to Tank Level Probing Radar (16).	Keep	Sharing studies only studied the compatibility of specific TLPR.
79	76-77 GHz	Transport and Traffic Telematics devices (19)	55 dBm peak e.i.r.p. and 50 dBm mean e.i.r.p. and 23,5 dBm mean e.i.r.p. for pulse radars		This set of usage conditions is only available to ground-based vehicle and infrastructure systems.	Keep	Limitation to ground based system only is required to ensure compatibility with these 55 dBm devices.
80	122-123 GHz	Non-specific short-range devices (9)	100 mW e.i.r.p.				
81	244-246 GHz	Non-specific short-range devices (9)	100 mW e.i.r.p.				

7.2 TTT ROAD TOLLING APPLICATIONS

TTT road tolling based on 5.8 GHz DSRC technology is used in 18 countries in Europe and 2015 there were more than 29 million OBUs in use, according to statistics from ASECAP members [63]. The revenue for all kinds of tolling are 29 billion EUR and the TTT based tolling is a substantial part of this. There are also other road toll operators which are not members of ASECAP. In summary, revenues from TTT road toll systems are an important income to build and maintain road infrastructure in Europe. Besides the existing entry in the EC Decision for SRDs for the frequency range 5795-5805 MHz, most countries in Europe did also allocate 5805-5815 MHz based on ERC/REC 70-03 [6] for road tolling applications.

The majority of European countries have practical implementations of RTTT DSRC systems either as nationwide road tolling systems or local road tolling systems (major bridges, individual toll roads or city toll system). The majority of such installations comply with ETSI EN 300 674 [64] and use all four 5 MHz wide channels up to 2 watts e.i.r.p. per channel for the road site units. A few implementations only use the 5795-5805 MHz range such as the French national road tolling system.

There are also more than 1 000 small systems implemented throughout Europe over the last 15-20 years which are operated in individual buildings, pre-dominantly in parking garages, which are not strictly speaking “road tolling” systems. Other known implementations outside of pure road tolling are found at ferry operators. These applications operate under a more relaxed national regulatory regime.

The ongoing studies related to the response on the Mandate on the 'WAS/RLAN extension bands' identified the need for mitigation techniques to foster the co-existence of the road tolling and WAS/RLAN applications. These mitigation techniques will take into account the full 20 MHz used by road tolling applications according to existing work items in standardisation. RLANs in vehicles can already use the existing SRD regulation with 25 mW e.i.r.p. There is seen no issue with this extension in the EC Decision for SRDs for road tolling applications on the work under the ‘WAS/RLAN extension’ mandate.

CEPT has conducted compatibility studies in ECC Report 250 [65] between the allocated radio services (in particular the radiolocation service) and the TTT road tolling applications in the band 5805-5815 MHz.

Both traditional fixed road tolling stations and movable road toll stations (mobile enforcement vehicles) were studied.

The following radio systems were studied:

- Radiolocation systems below 5850 MHz
- BFWA in the band 5725-5875 MHz
- SRDs in the band 5725-5875 MHz

The results of the studies indicate:

1. that existing fixed installed road tolling applications can co-exist with the radiolocation service. Radiolocation applications are relatively robust against the narrower TTT road tolling air interface bandwidth;
2. radiolocation services tend to interfere much earlier into the road-tolling application than road tolling applications into the radiolocation service;
3. The impact of road tolling applications on the radiolocation service is not greater than the impact from non-specific SRDs with 25 mW in the 5725-5875 MHz band on the radiolocation service;
4. that additional national agreements are possible concerning the precise usage of the fixed installed road tolling application and the radiolocation service to further ease co-existence;
5. For the protection of BFWA from existing stationary road tolling systems theoretically separation distances up to 1 km are required. This could already be seen as manageable and the impact here is comparable to the impact of available SRD devices with up to 25 mW e.i.r.p. on BFWA;
6. Fixed road tolling systems with down tilted antennas have been used for almost 20 years and in the most countries all four channels are used.

Based on these assessments, hence on the studies carried out so far, CEPT proposes to extend the existing entry for TTT road tolling applications from 5795-5805 MHz to 5795-5815 MHz.

Actually, according to the relevant standard which has been taken as a basis for compatibility studies, fixed road tolling systems operate with a maximum e.i.r.p. of 33 dBm for an elevation angle of the interrogator between -30° and -90°otherwise the e.i.r.p. is limited to 18 dBm.

Finally, additional studies will be conducted for new applications such as smart-tachograph and weight and dimensions once the detailed specifications will be available, and this should be dealt with during the 7th update of the EC Decision for SRDs.

Worst case calculations in ECC Report 250 [65] show that SRDs with 25mW have the potential to impact road tolling systems. Further studies maybe required to better understand the potential problem.

8 MERGING EXISTENT DECISIONS PERTAINING TO SRDS INTO ONE ENCOMPASSING DECISION

8.1 UHF RFID

CEPT Report 44 [13] has already set out that the regulatory approach in the Decision 2006/804/EC [1] should be integrated into the EC Decision for SRDs:

A comparison of the definitions and the approach in the Commission Decision of 23 November 2006 on harmonisation of the radio spectrum for radio frequency identification (RFID) devices operating in the Ultra High Frequency (UHF) band and the EC Decision for SRD is shown in Table 7.

Table 7: Definitions for RFID

Definition / Parameter	2006/804/EC	2006/771/EC and amendments	Differences - Proposal
Definition RFID	'RFID devices' means devices for, inter alia, tracking and identification of items by the use of a radio system, consisting on the one hand of passive devices (tags) mounted on items and, on the other, of transmitter/receiver units (readers) which activate the tags and receive data back;	The radio frequency identification (RFID) device category covers tag/interrogator based radio communications systems, consisting of radio devices (tags) attached to animate or inanimate items and of transmitter/receiver units (interrogators) which activate the tags and receive data back. Typical uses include the tracking and identification of items, such as for electronic article surveillance (EAS), and collecting and transmitting data relating to the items to which tags are attached, which may be either battery-less, battery assisted or battery powered. The responses from a tag are validated by its interrogator and passed to its host system.	The definition in 2008/804/EC is covered by the Definition in 2006/771/EC. It is proposed to keep the RFID definition as it currently stands in 2006/771/EC.
Regulatory status	'non-interference, and non-protected basis'	'non-interference, and non-protected basis'	Identical – no change needed

The technical annex of Decision 2006/804/EC contains the following provisions:

UHF Frequency band	Specific conditions	
	Max. power/Field strength	Channel spacing
Sub-band A: 865-865,6 MHz	100 mW e.r.p.	200 kHz
Sub-band B: 865,6-867,6 MHz	2 W e.r.p.	200 kHz
Sub-band C. 867,6-868 MHz	500 mW e.r.p.	200 kHz

Channel centre frequencies are 864,9 MHz + (0,2 MHz × channel number).

The available channel numbers for each sub-band are:

Sub-band A: channel numbers 1 to 3;

Sub-band B: channel numbers 4 to 13;

Sub-band C: channel numbers 14 and 15.

Note: The same equipment is allowed to operate in several sub-bands.

In ERC/REC 70-03 Annex 11 [6], the following format is chosen:

Table 8: Regulatory parameters for UHF RFIDs

Frequency Band		Power / Magnetic Field	Spectrum access and mitigation requirements	Modulation/ maximum occupied bandwidth	Notes
a1	865.0-865.6 MHz	100 mW e.r.p.	No requirement	≤ 200 kHz	(note 2)
a2	865.6-867.6 MHz	2 W e.r.p.	No requirement	≤ 200 kHz	(note 2)
a3	867.6-868.0 MHz	500 mW e.r.p.	No requirement	≤ 200 kHz	(note 2)
a	865-868 MHz	2 W e.r.p. (note1)	(note 3)	≤ 200 kHz	Operation only when necessary to perform the intended operation, i.e. when RFID tags are expected to be present

Note 1: Interrogator transmissions in band a) at 2 W e.r.p. are only permitted within the four channels centred at 865.7 MHz, 866.3 MHz, 866.9 MHz and 867.5 MHz; each with a maximum bandwidth of 200 kHz.

Note 2: RFID interrogator devices placed on the market before the repeal date of EC Decision 2006/804/EC are 'grandfathered', i.e. they are continuously permitted to be used in line with the provisions set out in EC Decision 2006/804/EC (see sub-bands a1), a2), and a3)) before the repeal date.

Note 3: The maximum period of continuous interrogator transmission on a channel shall not exceed 4s and the period between consecutive transmissions of an interrogator on the same channel shall be at least 100ms in order to ensure most efficient use of available channels for the general benefit of all users.

Harmonised Standards

EN 302 208 [53] Sub-bands a), a1), a2), a3)

Technical parameters also referred to in the harmonised standard

Sub-band a):

In addition, antenna beamwidth limits shall be observed as described in the standard EN 302 208.

Frequency issues

Sub-bands a1), a2) and a3)
Channel centre frequencies are 864.9 MHz + (0.2 MHz * channel number).

The available channel numbers for each sub-band are:

- b1: channel numbers 1 to 3
- b2: channel numbers 4 to 13
- b3: channel numbers 14 to 15.

Note: The same equipment is allowed to operate in several sub-bands.

Frequency hopping or other spread spectrum techniques shall not be used. This requirement set out in ERC/REC 70-03 [6] can be considered as redundant and is not necessarily needed to be added in the technical annex of the EC Decision for SRDs (note: channel bandwidth is limited to 200 kHz).

The initial version of the RFID standard EN 302 208v1.1.1 specified the use of DAA with tags responding in the same channel used by the interrogator. This arrangement permitted the use of 10 channels at 2 W, 2 channels at 500 mW and 3 channels at 100 mW. In 2006 the frequency plan was published in an Annex to Decision 2006/804/EC [1].

While this concept performed satisfactorily for small to medium sized installations, it was considered unacceptable by users with large distribution centres. These organisations required the ability to read tagged items passing simultaneously through all of the dock doors in a distribution centre. Typically this amounted to approximately 100 portals.

To respond to this request the RFID industry developed a completely new method of operation called the 4-channel plan. This was made possible by the release of a new feature in the chip for the tag, which was called the “dense interrogator mode”. This feature enabled tags to respond in the channels adjacent to the high power channel used by the interrogator. Under the 4-channel plan the high power channels were spaced at intervals of 600 kHz while the tags responded in the adjacent low power channels. This arrangement improved system performance and minimised the generation of inter-modulation products. The 4-channel plan also allowed low power SRDs to share the band with RFID.

The 4-channel plan, which had the support of RFID manufacturers, was subjected to an extensive series of tests at a major distribution centre. These tests are described in input documents for the meeting of ERM-TG34#14 at 14-03, 14-05 and 14-07. The conclusions reached by ERM_TG34 from the tests were that, if acceptable to CEPT, the 4-channel plan should be adopted by RFID for use at UHF.

A draft SRDoc (TR 102 649-1) [54] describing the 4-channel plan was considered by ERM-RM in January 2007 and sent to WGFM as advance information. (The SRDoc was subsequently adopted by ERM for publication at their meeting in March 2007.) WGFM forwarded the SRDoc to WGSE and SRD-MG requesting their comments. WGSE noted that: *“2 W RFID is currently already allowed in the band 865.6 to 867.6 MHz, but the use of LBT is mandatory. The current proposal is to remove the requirement for using LBT but at the same time to restrict the 2 W RFID to only 4 channels in the band 865.6 to 867.6 MHz”.* WGSE requested SE24 to undertake a compatibility study on the SRDoc.

The results of the compatibility study by SE24 were reviewed at their meeting in May 2007. Delegates concluded that the compatibility study had demonstrated that RFID operating in accordance with the RFID channel plan proposed in the SRDoc ETSI TR 102 649-1 will satisfactorily co-exist with other services and SRDs that operate in both the same and adjacent bands. The report goes on to say “*Arguably the situation*

under the four channel plan will be better since high power transmissions by RFID will be confined to just 4 channels whereas previously it was up to 10."

WGSE considered the report from SE 24 at their meeting of WGSE#47 in June 2007 and agreed to a liaison statement, which was sent to WGFM and copied to SRD-MG. The liaison statement, which forms Annex 21 of the meeting report, endorsed the conclusions in the compatibility study by SE24. In addition they recommended that, based on the work undertaken within ETSI and WG SE, Annex 11 of ERC/REC 70-03 [6] should be revised as shown in Appendix 1 to their liaison statement (including the insertion of a reference bandwidth for the limits).

At the meeting of SRD-MG#40 in June 2007 delegates reviewed the LS from WGSE. This stated that the proposed 4-channel plan would satisfactorily co-exist with other services and SRDs that operate in both the same and adjacent bands (subject to certain conditions). SRD-MG noted that, to ensure European observance of the 4 channel plan, the RFID industry had requested revision of Annex 11 of ERC/REC 70-03. to include specification of the four high-powered channels. All administrations present were content with this proposal. However some said that they were unable to implement the changes in their interface regulations because they were contrary to the Decision 2006/804/EC [1] for UHF RFIDs. For this reason delegates considered that the text proposed by WGSE for insertion in Annex 11 of ERC/REC 70-03 should be considered again at SRD-MG#41

The topic was again discussed at the meeting of SRD-MG#41 in September 2007. Following further consideration of the issues a modified version of Annex 11 to ERC/REC 70-03 was agreed and submitted to WGFM for approval. This version is available at Annex 6 of SRDMG(07)85.

At WGFM#61 delegates considered the proposed revision to Annex 11, which apart from reservations by two administrations, met with general approval. The Chairman therefore said that the revised Annex 11 should go out for public consultation. However during the discussion the EC Counsellor pointed out that the 4-channel plan fell within the boundaries set by the EC RFID Decision 2006/804/EC. For the present it was therefore unnecessary for it to be revised. The Chairman considered that it would be better to await the results of the public consultation before advising the EC of the decision by WGFM.

Since the public consultation ended on 30 December 2007, the results in document FM(08)008 were considered in February 2008 at the meeting of WGFM#62. Only one comment (from Spain) was received, which supported the adoption of the revised Annex 11. WG FM decided to adopt the draft revised Annex 11 for publication (see Annex 21 in the WGFM Minutes).

In April 2008 ETSI published a new version of the RFID standard at UHF (EN 302 208 v1.2.1) [53], which included specification of the 4-channel plan. The standard was quickly implemented by the RFID industry and continues to be used successfully.

It is proposed that the Spectrum Decision for RFID should be amended to reflect the situation that exists today.

The whole of this clause assumes the availability of the 4-channel plan. For this reason it is fundamental that it forms part of the Sixth Update of the EC Decision for SRDs. In May 2015, ECC WGFM endorsed the proposals of the SRD/MG to include the current regulation for UHF RFID in the technical annex of the EC Decision for SRDs. For UHF RFID, WGFM agreed that the proposal for inclusion in the EC Decision for SRDs should be based on the 4-channel RFID plan since it fosters a more efficient use and sharing of the spectrum.

CEPT proposes to include provisions for UHF RFID in the EC Decision for SRDs as set out in Annex 3 of this Report and to repeal Decision 2006/804/EC. Existing RFID systems which are not based on the 4-channel plan are allowed to continue to operate ("grandfathering").

RFID interrogator devices placed on the market before the repeal date of Decision 2006/804/EC which operate outside of the provisions of the standardised 4-channel plan are considered to be 'grandfathered'. I.e. they should be continuously permitted to be used in line with the provisions set out in Decision 2006/804/EC before the repeal date. It is considered that the number of such RFID interrogator devices on the market is extremely small.

CEPT is changing the entry for UHF RFID in 865-868 MHz in Annex 11 of ERC/REC 70-03 accordingly to avoid any discrepancies at the time of this Report undergoing the CEPT approval process.

It has to be stressed that RFID interrogators shall transmit only when necessary to perform the intended operation, i.e. when RFID tags are expected to be present. In addition, the maximum period of continuous interrogator transmission shall not exceed 4s and the period between consecutive transmissions of an interrogator on the same channel shall be at least 100ms in order to ensure most efficient use of available channels for the general benefit of all users. Antenna beamwidth limits shall be observed as described in the standard EN 302 208 [53].

Hence, the proposed new entry in the technical annex of the EC Decision for SRDs is proposed to refer to the techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU [8].

8.2 UWB

All UWB-technology based wireless applications are de-facto short range devices.

The regulatory approach for UWB and SRD is the same, i.e. the regulatory status is always on a 'non-interference and non-protected basis'. Decision 2007/131/EC [2] focusses on UWB applications below 10.6 GHz while ERC/REC 70-03 [6] includes references to many more applications using UWB technology such as TLPR, LPR, automotive radars etc.

A benefit of the merging of the UWB regulation contained in the EC Decision on UWB (2007/131/EC and its amendments) into the EC Decision for SRDs is seen in the fact that there is the permanent mandate on updating the Technical Annex to the SRD Decision. In this regard, new results from compatibility studies or new regulatory provisions for UWB-technology based SRDs can be included in the technical annex when agreed and without the need for a specific new mandate to CEPT.

However, the merger of the existing technical requirements of the regulatory approach for UWB technology based SRD into the format of the table in the technical annex of the EC Decision for SRDs is extraordinarily complex and not advisable. A pragmatic solution is seen in a subdivision of the technical annex of the SRD Decision in two parts:

- one sub-part to include the table on harmonised frequency bands and technical parameters for short-range devices and;

- a second sub-part to include the provisions of the EC Decision on UWB in a format identical to the one of today as in the Decision 2014/702/EU [9] of 7 Oct 2014 amending 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community;

- the definition sections for UWB and SRD can be merged.

This approach would also benefit the Member States which have already implemented the EC Decision for UWB since it would not require any changes of their current national implementations. Alternatively, the UWB regulation could be covered by a Permanent Mandate to CEPT regarding future updates.

Text from latest Decision 2014/702/EU is shown at Annex 4. The proposal is to add this to this EC Decision for SRDs, but with two amendments to correct references to harmonised European standards:

- Annex 4 clause 5.1 on material sensing devices. Below the table there is a reference to the LBT mechanism being described in EN 302 498-2 [10]. The correct reference should be to EN 302 065-4 [11];

- Annex 4 clauses 5.1 (material sensing devices) and 5.2 on BMA. There are references to the "representative wall". Two standards are referenced. The representative wall is described in EN 302 065-4. Therefore the reference to EN 302 498-2 should be removed.

The main effect would be streamlining of the regulatory environment. All detailed information about mitigation techniques would only be covered in the harmonised European standards. This is a benefit for the future when changes might be necessary. The revision of harmonised European standards is in most cases sufficient – in line with compatibility studies in the CEPT. This concept was outlined in CEPT Report 45.[19] Changes in harmonised standards may be acceptable if regulation includes clearly the applicable mitigation techniques in respective frequency bands.

Change of the CEPT/ECC and EC Decision for SRD, setting out the regulatory approach are only necessary if new mitigation techniques and/or mitigation techniques in additional frequency bands will be incorporated.

Finally, incorporation of the UWB regulation in the EC Decision for SRD means that the EC Decision 2007/131/EC [2] and its amendments can be repealed.

8.3 OTHER USE UNDER GENERAL AUTHORISATIONS AND USING ALREADY HARMONISED FREQUENCIES

This section includes consideration of some other applications which are under general authorisation and for which the spectrum use in Europe is greatly harmonised.

8.3.1 PMR446

CEPT approved in July 2015 a new ECC/DEC/(15)05 [4] on the harmonised frequency range 446.0-446.2 MHz, technical characteristics, exemption from individual licensing and free carriage and use of analogue and digital PMR 446 applications. This ECC Decision repeals the earlier ERC/DEC/(98)25 [61] and ECC/DEC/(05)12 [62] and combines the whole frequency range for both, analogue and digital usage. A key driver in this proposed change is to improve spectral efficiency so that all the permitted equipment should be 6.25 kHz (or equivalent) per voice channel.

The new ECC Decision defines a transition period to go towards the new ‘combined’ designation of the 446.0-446.2 MHz frequency range. Given the portable nature of PMR446 equipment, it is recommended to harmonise the change towards the combined frequency range in the EC Decision for SRDs. Co-existence of different rules (old ones, new ones) could cause difficulties. Note that analogue and digital PMR446 has already had class 1 equipment status, i.e. the frequency bands for PMR446 are European-wide implemented (except Azerbaijan, Belarus, Georgia and Russian Federation).

All PMR446 equipment is hand portable and shall use only integral antenna and an effective radiated power not exceeding 500 mW e.r.p., while any base station, repeater or fixed infrastructure use is excluded Analogue PMR446 equipment operating in the frequency range 446.1-446.2 MHz should use more robust receivers as specified in ETSI TS 103 236 or equivalent technical specifications. All PMR446 radio equipment should have reception capability and a specified maximum transmitter time-out feature. These are important features which guarantee the best possible and efficient use of the PMR446 frequencies in line with market expectations as was found in a review conducted by ETSI and CEPT in the recent years. ETSI is creating a harmonised standard under the RE-D for PMR446 and it is proposed to refer to the harmonised European standard in a suitable way in the technical annex of the EC Decision.

The implementation date is proposed to coincide with a transition deadline, which is set in the ECC Decision to 1 January 2018.

It should further be noted that some products on the market use the PMR446 frequencies as well as the 433/434 MHz entries and that also from this perspective; it is seen as an advantage to have the full regulatory framework for harmonisation set out for both frequency ranges within the EC Decision for SRDs.

ETSI has adopted a new work item to create a specific harmonised European standard for analogue and digital PMR446 equipment which will become available by the proposed implementation date on 1 January 2018.

It is further proposed to include a definition for PMR446 equipment in the EC Decision for SRDs: “PMR446 equipment for hand portable (no base station or repeater use) and uses integral antennas only in order to

maximise sharing and minimise interference. PMR 446 equipment operates in short range peer-to-peer mode and shall be used neither as a part of infrastructure network nor as a repeater."

8.3.2 DECT

CEPT revised in 2013 the ERC/DEC/(98)22 [55]. This Decision determines:

- that CEPT administrations shall exempt from individual licensing DECT equipment, operating within the 1880-1900 MHz band that complies with EN 301 406 [60] and the following usage conditions:

    a. nominal transmit power of up to 250 mW (24 dBm)
    and

    b. equivalent isotropic radiated power (e.i.r.p.) of up to:

    – 26 dBm for omni-directional antennas;

    – 30 dBm for directional antennas.

The Harmonised Standard EN 301 406 contains technical requirements for DECT in the frequency band 1880-1900 MHz. This includes also spectrum access requirement including DCS (Dynamic Channel Selection).

Both the ERC/DEC/(98)22 and the harmonised standard EN 301 406 do not define any specific scope of application (full application neutrality), i.e. this in line with the considerations in CEPT Report 14 [12] , CEPT Report 44 [13] and CEPT Report 52 [39], the application field can be considered as for non-specific SRD applications. Since there are more and more applications supported by the DECT technology, this fulfils also the expectations from stakeholders and the general public. Some example applications are crane control, industrial automation, some alarm systems or Machine-to-Machine (M2M).

Class 1 equipment subclass 18 is in place for DECT equipment referring in the normative part to the Harmonised European standard EN 301 406, 250 mW peak e.r.p. and the spectrum access in TDD mode.

EN 301 406 defines a maximum channel bandwidth of 1.728 MHz.

The approaches for DECT users within the band 1880-1900 MHz and the SRD users in 1900-1920 MHz are identical with regard to equal and non-exclusive access to spectrum under exemption from individual authorisation. DECT is however protected and has priority within its designated frequency band 1880-1900 MHz (ERC/DEC/(94)03) [74].

8.4 THE BAND 1900-1920 MHz

CEPT analysed the usage of the unpaired terrestrial 2 GHz bands and came to the conclusion that those bands were mostly unused. In summary, the band 1900-1920 MHz, although licensed in many countries, remains largely unused.

CEPT Report 52, the 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" has been published in March 2015. This Report did foresee usage of the frequency band 1900-1920 MHz as follows:

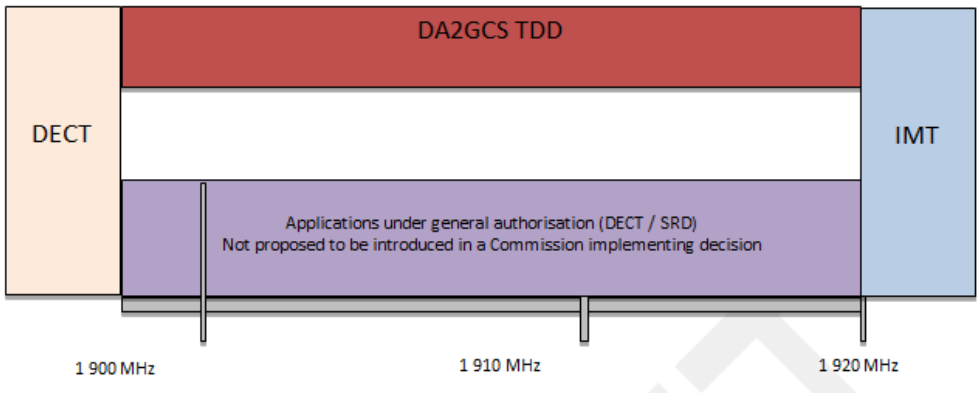

Figure 2: 1900-1920 MHz used by broadband DA2GC and Short Range Devices

Currently, all or parts of the frequency band 1900-1920 MHz is licensed to mobile operators for the provision of electronic communications services in 34 CEPT countries, whereby the licences are mainly limited to UMTS/IMT-2000 TDD technology. The mobile licences (UMTS TDD) in force on the unpaired 2 GHz bands are not in use in Europe, noting also that the lack of interest of mobile operators for spectrum in the unpaired terrestrial 2 GHz band has been demonstrated during the auctions in some CEPT countries in 2011. The duration of those licences vary from country to country, see in Figure 3 below:

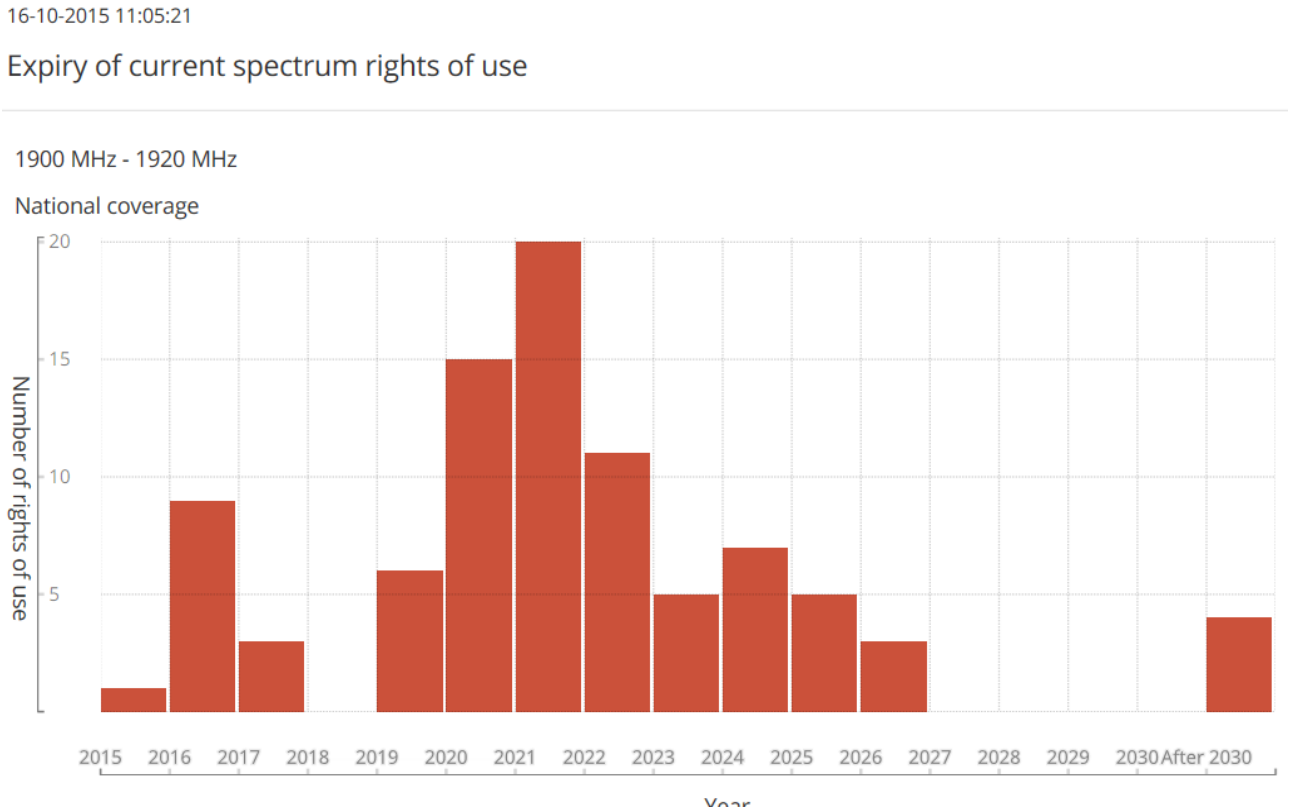

Figure 3: Current Licences in 1900-1920 according to their expiry dates (ECO Report 03 information in the EFIS database)

At the RSC meeting on 7 October 2015, the proposal for an EC implementing Decision for DA2GC in the 1900-1920 MHz was cancelled taking into account the latest developments.

CEPT Report 52 [39] did not aim to propose the band 1900-1920 MHz exclusively for SRDs/DECT.

The unpaired 2 GHz bands have been removed from the revision of ECC/DEC/(06)01 [56] and it was concluded that further investigations were needed to develop a suitable ECC framework for those bands. Such a framework would benefit from further clarity about the long term intended use of this frequency band. Noting the absence of use for primary services a transition to license-exempt use should be contemplated in the context of the 7th update of the SRD Decision when the technical conditions will be stable enough.

8.4.1 Existing compatibility Results for DECT/SRD

DECT and SRD are both seeking to use spectrum, without coordination, under a general authorisation regime and usage restrictions to protect primary services.

Compatibility between DECT/SRD above 1900 MHz and DECT below 1900 MHz

In the DECT case, the same technology is used above and below 1900 MHz (DECT core band in 1880-1900 MHz), therefore compatibility is achieved for DECT. SRD applications above 1900 MHz with duty cycle restriction are also considered to be compatible with the DECT in the core band.

Compatibility with MFCN above 1920 MHz

The ECC Report 220 [34] studies the impact of DECT devices on MFCN BS and shows that DECT devices can operate in the 1900-1920 MHz band. However DECT stations with directional antenna should not use DECT channels F20 and F21. These considerations are also representative for other unlicensed applications such as SRDs with duty cycle and indoor usage restrictions. Some SRDs receivers may suffer interference from MFCN terminal OOB emission limits. This means that new SRD applications in 1900-1920 MHz should adapt their receiver specifications in order to take this into account.

DECT stations with directional antenna should not use DECT channels F20 and F21, in order to ensure coexistence with MFCN BS above 1920 MHz.

8.4.2 DECT/SRD related considerations

It is essential for the effective use of DECT in the band 1900-1920 MHz, that the use of this band is always accessed as an extension to the DECT core band in 1880-1900 MHz.

Additional functionality can and may need to be added to the DECT instant dynamic channel selection procedures, to improve coexistence with non-DECT compatible technologies using the band 1900-1920 MHz as follows:

1. DECT only using the core band 1880-1900 MHz for RFP beacon transmissions;
2. Use the Least Interfered Channel within the entire 1880-1920 MHz for initial traffic bearer set up. If the setup is made on a channel within the extended band 1900-1920 MHz, and if the radio link is interfered, then the Least Interfered Channel selection for the intra-cell handover shall be limited to the DECT core band 1880-1900 MHz.

With this the quality mark, the DECT band can be preserved, because escape possibilities to the “interference free” 1880-1900 MHz are always available, when or if local and/or temporary severe interference would occur within the extension band 1900-1920 MHz.

Application Grouping:

DECT and SRD are candidates to use the spectrum under a general authorisation regime. There may be a possibility of having a common set of technical parameters to enable equal spectrum access.

The possibility of operating under general authorisation enables DECT extension as well as application and technology-neutral access to spectrum in line with principles set out in CEPT Report 014 [12] and CEPT Report 044 [13] (SRD strategy and principles).

During the Call for Inputs for CEPT Report 52 [39], the responding CEPT administrations clearly indicated that DECT should operate under a generic SRD regulation on a shared basis with other technology on a non-protected non-interfered basis. Spectrum access techniques should be mutually compatible and

frequency segmentation amongst such applications should be avoided. It is important that the regulation also in practice provides an opportunity for alternative technologies to use the spectrum so that a competitive market is created.

Follow up actions

- CEPT took into consideration the decision from the European Commission not to develop a harmonisation measure at EU level for BDA2GC in the band 1900-1920 MHz and will assess the relevant impact of this decision in order to identify the best way forward for the future usage of the band 1900-1920 MHz;
- CEPT will conduct further studies on usage conditions for DECT/SRD in the 1900-1920 MHz band for the 7th update.

Taking into account the current situation, SRD/DECT are subject to a soft harmonisation in the ERC/REC 70-03 [6] and therefore, it is not proposed to introduce a Commission implementing decision in this part of the spectrum for DECT/SRD at this moment.

9 IMPACT OF AVAILABILITY OF NEW HARMONISED EUROPEAN STANDARDS

Harmonised European Standards play an important role in regulating spectrum and radio equipment in Europe. The following Table 9 includes the Harmonised European Standards which are currently foreseen as Candidate Harmonised European Standards in ETSI covering the essential requirements of article 3.2 of the RE-Directive 2014/53/EU [8] and which are in relation to the existing and proposed entries in the technical annex of the EC Decision as shown in Annex 3.

More and more entries in the technical annex of the EC Decision for SRDs refer to harmonised European standards. The existing EC Decision for UWB also uses references to the harmonised European standards.

An additional column in the technical annex of the EC Decision for SRDs could be included to inform about the harmonised standard published in the OJEU in relation to the respective entry. This would mirror the format of national radio interfaces which also includes in its informative part the possibility to refer to harmonised standards. This will improve the presentation of the full regulatory approach. Otherwise, publication of an explanatory document, as has been the current practice, is highly advisable. In this context It is propose to change all the references for harmonized European standards from the R&TTE Directive 1999/5/EC [7] to the RE Directive 2014/53/EU.

Normally, the application of a specific harmonised standard for one of the given entries in the technical annex of the EC Decision does not change. Updates in the OJEU can happen more frequently, e.g. introducing a new version of the respective harmonised standard. The date of withdrawal of the earlier version of the standard is set to ensure a transition period where two versions of the standard may be used. CEPT is of the view that it is possible to include an informative reference for the harmonised standards in the presentation of the technical annex without specifying a specific version of a standard as well as giving the impression that the application of the standard is mandatory (this is not the case) because the RE-Directive includes several options how a manufacturer can declare conformity with the essential requirements. The latter aspect is already addressed in the current approach including the wording '*equivalent performance to the techniques described in harmonised standards*'.

The RE-Directive 2014/53/EU includes that receiver requirements are emphasised in the context of harmonised conditions for availability and effective use adopted under the Radio Spectrum Decision (676/2002/EC).

Table 9: Harmonised European Standards

Harmonised European Standard	Scope	Published/ foreseen publication by ETSI	Mitigation techniques/Remarks
EN 300-220-2 V3.2.1	Non-specific SRD radio equipment	12/2016	Minimum receiver category 2 LBT/AFA, DC
EN300 220-2 V3.1.1	Non-specific SRD radio equipment	12/2016	Minimum receiver category 3 LBT/AFA, DC Transition period until December 2018.
EN 300 220-3-1	Social alarms when operating in 869.2-869.25 MHz designated band	12/2016	Minimum receiver category 1 DC

EN 300 220-3-2	Wireless alarms when operating in the designated bands 868.6-868.7; 869.250-869.4 and 869,65-869.7 MHz	12/2016	Minimum receiver category 2 DC
EN 300 220-4	Metering radio equipment in designated bands	12/2016	Entry 37b EC Decision for SRDs DC
EN 303 406	Social alarms equipment in 25-1000 MHz	12/2016	Social alarms when operating outside the designated band 869.2-869.25 MHz Minimum receiver category 1
EN 303 348	Inductive loop systems for hearing impaired persons in 0- 20kHz	08/2016	Specific measurements for low frequency inductive loop techniques
EN 300 330	Non-specific SRDs between 9 kHz and 25 MHz	12/2016	Specific measurements for low frequency inductive techniques, antenna requirements
EN 300 328	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques	12/2016	Includes specific spectrum access/ medium utilisation requirements
EN 300 440	Non-specific SRDs SRD between 1 GHz to 40 GHz	01/2017	Radiodetermination applications, e.g. in 2400-2483.5 MHz, are also using this non-specific standard. This can cause difficulties. Typical uses are various kinds of measurement applications but it should not be used for communications. The scope of EN 300 440 clearly addresses this.
EN 300 422	Wireless microphones, Audio PMSE in 25 MHz - 3 GHz	12/2016	In-situ measurement procedure VHF band HEN specifies implementation issues concerning ‘handheld’ applications Planned to cover also inductive loop receivers (T-coil). ALDs may be covered in a separate part, EN 300 422-3.

EN 300 718	Avalanche beacon equipment for buried people	12/2016	Harmonised Standard needs a wider scope to fit to the EC Decision for SRDs as well as ERC/REC 70-03.
EN 300 674-2-1	Transport and Traffic Telematics (TTT); Dedicated Short Range Communication (DSRC) transmission equipment in the 5,8 GHz band; Road Side Units (RSU)	12/2016	
EN 300 674-2-2	Transport and Traffic Telematics (TTT); Dedicated Short Range Communication (DSRC) transmission equipment in the 5,8 GHz band; On-board Units (OBU)	12/2016	Decribes robustness/perfromance of OBUs against adjacent spectrum interference. May include mitigations used in the technology in the future.
EN 301 091-1	Radar equipment operating in the 76 GHz to 77 GHz range; Ground based vehicular radar	12/2016	
EN 301 091-2	Radar equipment operating in the 76 GHz to 77 GHz range; Fixed infrastructure radar equipment	12/2016	May include mitigations used in the technology in the future for improved co-existence with vehicular radar application.
EN 301 091-3	Radar equipment operating in the 76 GHz to 77 GHz range; Railway/Road Crossings obstacle detection system applications	12/2016	Specific installation requirements at level crossings
EN 301 357	Cordless audio devices	12/2016	
EN 301 559	LP-AMI equipment in 2483,5-2500 MHz		LBT/AFA and DC
EN 301 839	ULP-AMI and associated Peripherals (ULP-AMI-P) operating in the frequency range 402 MHz to 405 MHz	05/2016	LBT/AFA, LP/LDC

EN 302 065-1	Generic UWB SRD equipment using Ultra Wide Band technology (UWB) below 10GHz	12/2016	Test methods for UWB
EN 302 065-2	Requirements for UWB location tracking	12/2016	LDC, DAA
EN 302 065-3	Requirements for UWB devices for ground based vehicular applications	12/2016	LDC, DAA, TPC, exterior limit
EN 302 065-4	Material Sensing devices using UWB technology below 10.6GHz	12/2016	LBT, DC, transmitter switch-off, representative wall
EN 302 195	ULP-AMI in 9 kHz to 315 kHz	12/2016	DC
EN 302 208	UHF RFID	10/2016	DC and antenna beamwidth. Introduces also additional RFID receiver parameters.
EN 302 372	Tank Level Probing Radar (TLPR) operating in the frequency bands 5,8 GHz, 10 GHz, 25 GHz, 61 GHz and 77 GHz	12/2016	Specific measurement procedure for tank-based level probing radar equipment
EN 302 510	Radio equipment in the frequency range 30 MHz to 37,5 MHz for ULP Active Medical Membrane Implants and Accessories	12/2016	DC
EN 302 536	ULP-AID in 315-600 kHz	12/2016	DC
EN 302 537	ULP Medical Data Service Systems operating in the frequency range 401 MHz to 402 MHz and 405 MHz to 406 MHz	12/2016	LBT/AFA, LP/LDC
EN 302 567	Multiple-Gigabit WAS/RLAN equipment operating in the 60 GHz band	10/2016	Inclusion of an LBT mechanism to ensure effective use of the spectrum

EN 302 608	Radio equipment for Eurobalise railway systems	11/2016	Specific measurements for Eurobalise system
EN 302 609	Radio equipment for Euroloop railway systems	09/2016	Defines measurements for Euroloop specific loop antenna system
EN 302 686	ITS in 63-64 GHz	05/2017	
EN 302 729	Level Probing Radar (LPR) equipment operating in the frequency ranges 6 GHz to 8,5 GHz, 24,05 GHz to 26,5 GHz, 57 GHz to 64 GHz, 75 GHz to 85 GHz	12/2016	Downward orientation, maximum antenna beamwidth, and maximum spectral density limits on half-sphere
EN 302 858	Transport and Traffic Telematics (TTT); Radar equipment operating in the 24,05 GHz to 24,25 GHz or 24,05 GHz to 24,50 GHz range range	12/2016	Specific duty cycle requirements
EN 303 203	MBANSs operating in the 2483,5-2500 MHz range	11/2015	LBT/AFA and DC
EN 303 204 [28]	Network Based Short Range Devices (SRD); Radio Equipment to be used in the 870 MHz to 876 MHz frequency range with power levels ranging up to 500mW	05/2016	DC and LBT (LBT for NRPs only) Short Control Signalling Transmissions Channel Adaptivity Co-ordination of NRPs Provides essential higher power and Duty Cycle capabilities required for Smart Energy and Smart City infrastructure systems.
EN 303 405	Analogue and Digital PMR446 Equipment	05/2017	Robust receiver requirements, transmitter time-out, only handportable devices
EN 305 550	Non-specific SRDs in the 40-246 GHz	01/2017	Power spectral density limitation and limited emissions > 30° elevation at 122-122.25 GHz
EN 303 660	Non-specific SRDs below 9 kHz	12/2016	

ETSI also develops some non-harmonised standards for generic and specific SRD applications including the measurement procedures and/or mitigation techniques:

Table 10: ETSI Standards

ETSI Standard	Scope	ETSI – Planned publication	Mitigation techniques	Impact
EN 300 220-1	General Technical characteristics and test methods: All SRDs	12/2016	Includes the test methods used by other parts of EN 300 220	Important for full description of measurement methods and mitigation techniques Minimum receiver category 1.5 covered by EN 300 220 part 1 & part 2
EN 303 083	UWB measurement techniques including measurement procedure for LDC	10/2016	UWB Measurement techniques LDC	Linked to EN 302 065
EN 303 360	76 GHz to 77 GHz Heliborne Obstacle Detection Radar	12/2016	Specific duty cycle and antenna RAS protection zones	Equipment may fall under the Regulation 216/2008 ('EASA regulation') [46] and/or the RE Directive (still to be decided). Un-maned rotorcraft use of this application is not possible.
EN 303 396	Measurement Techniques for Automotive and Surveillance Radar Devices using 24.05GHz to 24.5GHz or 76GHz to 81GHz.	12/2016		Important for full description of measurement methods

10 OVERVIEW OF CEPT PROPOSAL

The update proposes the following changes to the technical annex of the EC Decision for SRD:

Task a.) To consider making the bands recently added in ERC Recommendation 70-03 [6] available to SRD usage and eventual inclusion in the next update of the SRD Decision

- Possibilities for a partial implementation of SRDs within 870-876 MHz / 915-921 MHz will be further discussed and the outcome will be provided in an Addendum to this CEPT Report;
- It is proposed to include a new SRD category of 'Medical data acquisition systems' in the EC Decision for SRDs with a new entry in the frequency range 2483.5-2500 MHz for Medical Body Area Network System (MBANS);
- It is proposed to include for the frequency range 122-122.25 GHz a maximum e.i.r.p. density limits as part of the regulatory approach in the EC Decision for SRDs. The current harmonised European standard EN 305 550 [5] also reflects these limits. A 'grandfathering' of existing equipment on the market is considered unnecessary since it is not believed that the band 122-123 GHz is commercially used yet (only pre-compliance equipment such as prototypes);
- It is proposed to add to the EC Decision for SRDs a definition for 'multimedia streaming devices' which are used for combined audio/video transmissions and audio/video synchronisation signals;
- It is proposed to add to the EC Decision for SRDs a definition for 'alarm systems';
- CEPT proposes an amendment of the definition for the category "radiodetermination";
- It is proposed to include a new entry for ALD applications on a tuning range basis for the frequency range 173.965-216 MHz;
- CEPT took into consideration the decision from the European Commission not to develop a harmonisation measure at EU level for BDA2GC in the band 1900-1920 MHz and will assess the relevant impact of this decision in order to identify the best way forward for the future usage of this band;
- CEPT proposes the inclusion of a new entry for an obstacle detection application for rotorcraft use in the frequency range 76-77 GHz;
- CEPT proposes to extend the existing entry for TTT category from 5795-5805 MHz to 5795-5815 MHz for road tolling applications. The vast majority of the existing road tolling networks using DSRC technology implemented in Europe operates via the whole 20 MHz. There is seen no issue with this extension in the EC Decision for SRDs for road tolling applications on the work under the 'WAS/RLAN extension' mandate;
- CEPT proposes to amend the duty cycle definition in the technical annex of the EC Decision for SRDs.

Task b.) To start investigations on assessing the requirements for cognitive radio enabled SRDs and any potential implications in terms of SRD harmonised technical conditions, taking into account the on-going work in ETSI under mandate M/512

- Cognitive radio enabled SRDs have the capacity to allow a variety of different application including applications to operate in frequency bands which are not originally planned for such purpose. CEPT started investigations on assessing the requirements for cognitive radio enabled SRDs and understand that there is neither a proposal nor an intention to harmonise the usage of a database to allow new SRD application for the time being.

Task c.) To re-assess, on a demand basis from stakeholders, the relevance and appropriateness of 'other usage restrictions' for the relevant SRD categories

- It is proposed for the entry 16 in the frequency range 315-600 kHz and the entry 26 in the frequency range 12 500-20 000 kHz to delete them. In addition, the definition for animal implantable devices should be removed since it is no longer needed. This is considered to be superseded by entry 15 in the frequency range 148.5-5 000 kHz and entry 21 in the frequency range 5 000-30 000 kHz with nearly identical limits and all known implementations operating within a bandwidth of substantially greater than 10 kHz;
- It is proposed to delete the entry 22b in the frequency range 6765-6795 kHz while entry 22a for the same frequency range should be kept. No other implementations are known than covered by entry 22a;
- It is proposed to delete the entry 28a in the frequency range 26 957- 27 283 kHz while entry 28b which is more flexible and with the same limit is kept;

- It is proposed to widen the RFID category for 13.56 MHz (entry 27b) to inductive applications but keep RFID under 'other usage restrictions'. This would be in line with the solutions for other entries in the technical annex of the EC Decision for SRDs. In addition, since spectrum mask and antenna requirements have to be met in combination with a new relaxed transmitter mask, a reference to the harmonised standard is proposed for entry 27b;
- It is proposed to move the information in entries 29 to 33 for model control devices operating without duty cycle restrictions to the additional parameters column since this is not an 'other usage restriction' but a liberalisation for model control applications;
- It is proposed to move the information under 'other usage restrictions' for entry 39b to the additional parameters column;
- It is proposed to remove the other usage restriction that video applications are excluded from entry 35 in the frequency range 40.66-40.7 MHz;
- It is proposed to merge entry 37b into entry 37c. This can be handled by introducing a relaxed duty cycle for metering devices (10%) to the additional parameters column;
- The entry 54a can be removed in its totality since it's included in entry 54b;
- CEPT proposes to withdraw the 'Low duty cycle/ High reliability' category and to relax it to 'non-specific SRDs'. The entire concept described in section 5.11.1 of this Report still supports reliable spectrum access opportunities for SRDs and will lead to the ultimate withdrawal of 'other usage restrictions';
- CEPT proposes to remove the 'Low latency/ continuous transmission' category and to replace it by "wireless audio and multimedia streaming systems" category;
- An additional informative column in the technical annex of the EC Decision for SRDs could be included to provide the information about the harmonised standard published in the OJEU in relation to the respective entry. This would mirror the format of national radio interfaces which also includes in its informative part the possibility to refer to harmonised standards. This will improve the presentation and will clarify the full regulatory framework.. In this context It is propose to change all the references for harmonized European standards from the R&TTE Directive 1999/5/EC [7] to the RE Directive 2014/53/EU [8].

Task d.) To consider merging the existent decisions pertaining to SRDs into one encompassing decision.

- CEPT proposes to include provisions for UHF RFID in the EC Decision for SRDs as set out in Annex 3 of this Report and to repeal Commission Decision 2006/804/EC [1]. Existing RFID systems which are not based on the 4-channel plan are allowed to continue to operate ('grandfathering');
- CEPT proposes to include the provisions of EC Decision 2007/131/EC [2] (the 'UWB regulation', amended by Decisions 2009/343/EC [3] and 2014/702/EU [9]) in the EC Decision for SRD as set out in Annex 4 of this Report. This includes updating of some references to harmonised European Standards. Commission Decisions 2007/131/EC, 2009/343/EC and 2014/702/EU can be repealed. Alternatively, the the UWB regulation could be covered by a Permanent Mandate to CEPT regarding future updates;
- It is proposed to add a new entry for PMR446 equipment for the harmonised implementation of analogue and digital PMR equipment within the range 446.0-446.2 MHz. The implementation date is proposed to coincide with transition deadline which is set in the ECC/DEC/(15)05 [4] to 1 January 2018. Harmonised implementation within Europe using the same implementation date would avoid different implementation dates across Europe for this type of hand-portable equipment.

11 WORK ITEMS FOR FURTHER INVESTIGATIONS

The following items for further work were identified:

- CEPT will continue to monitor possibilities for further harmonisation in the 870-876 MHz/915-921 MHz frequency bands (see section 5.4 for further information);
- The 52nd Radio Spectrum Committee meeting agreed that smart-tachograph and weight and dimensions compatibility parameters should be added to the annex of the SRD Decision, in the context of its 7th update, in time for deployment of these applications (starting from 2019). A more detailed calendar of the works will be requested from the ECC;
- A more detailed review is proposed to be undertaken in the future to identify opportunities for cognitive radio enabled SRDs where rewarding principles could be introduced. However, a review will need to be supported by requests from stakeholders via the ETSI-CEPT/ECC cooperation process;
- CEPT will continue investigating more complex aspects of duty cycle mechanisms in cooperation with ETSI, as an enabler for further spectrum sharing;
- CEPT will continue to work with ETSI on additional parameters (channelling and/or channel access and occupation rules), as outlined in section 5.11, as a precondition for a future withdrawal of the existing related other usage restrictions. For this reason, SRDMG has been formally tasked by WGFM (new work item) to develop this. The EC may wish to consider mandating ETSI to develop the spectrum access mechanisms necessary in this regard for inclusion in European Harmonised standards;
- With regard to SRD applications operating below 9 kHz, it is proposed to wait for the outcome of current activities before any harmonisation approach can be followed up for the EC Decision for SRDs. In addition, it should be taken into account that the scope of the Radio Spectrum Decision is limited to the range from 9 kHz to 3000 GHz. Nevertheless spectrum below 9 kHz is currently used without any requirement for authorisation, so it should carefully be considered whether this liberal approach below 9 kHz needs to be changed;
- CEPT will conduct further studies on usage conditions for DECT/SRD in the 1900-1920 MHz band for the 7th update.

ANNEX 1: GUIDE TO CEPT REGARDING THE ANNUAL UPDATE OF THE TECHNICAL ANNEX OF THE SRD COMMISSION DECISION 2011/829/EU [1]

EUROPEAN COMMISSION
Communications Networks Content & Technology Directorate-General

Electronic Communications Networks & Services
Spectrum

Brussels, 02 July 2014
DG CONNECT/B4

RSCOM13-78rev3

RADIO SPECTRUM COMMITTEE

Subject: Timeframe and guidance to CEPT for the sixth update of the SRD Decision

1. INTRODUCTION

The SRD Decision (Decision 2006/771/EC) harmonises frequency bands and the related technical parameters for spectrum usage by short-range devices (SRDs). The harmonisation of frequency bands throughout the European Union ensures that a growing number of wireless devices benefits from economies of scale that can be achieved within the internal market. SRDs play an important role in the daily life of citizens, with numerous types of wireless applications such as alarms, local communications equipment, RFID, door openers, medical devices and intelligent transport systems.

A regular update of the SRD Decision is foreseen in the Decision itself[1] based on an annual review. Regular updates of the harmonised spectrum usage conditions for SRDs are necessary due to rapid changes in technology and societal demands as well as the emergence of new short-range applications. The SRD Decision foresees the update of the technical parameters for spectrum use by SRDs. The permanent Mandate to CEPT on SRDs[2] supports this update.

Those regular updates of the applicable technical conditions ensure innovation and shared spectrum access across the internal market for tens of millions of devices sold annually. The technical annex to the SRD Decision (Decision 2006/771/EC) was amended for a fifth time by Commission Decision 2013/752/EU which was adopted on

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1 Recital 11 of Commission Decision 2006/771/EC states that: "……. *Regular updates of this Decision will therefore be necessary to respond to new developments in the market and technology. The Annex will be reviewed at least once every year on the basis of the information collected by Member States and provided to the Commission.*"

2 RSCOM 06-27 Rev (5 July 2006)

13 December 2013. During RSC#47 a sixth amendment of the SRD Decision will be discussed (document RSCOM13-78rev1) with the aim of agreement.

2. TIMEFRAMES FOR THE AMENDMENT OF THE SRD DECISION

According to the permanent Mandate, CEPT should deliver a proposal for the amendment of the technical annex to the SRD Decision in July of each year. Additionally, the Commission services may provide guidance to CEPT on the priorities of update exercise.

Taking account of concerns on the part of Member States that the decreasing number of urgent additions and changes to the technical annex if implemented on an annual basis would cause a regulatory burden for Member States, the Commission services had proposed to allow more time for CEPT to study certain issues but to retain the permanent Mandate in order to maintain the ability to respond to technological developments.

Accordingly, for the sixth update a draft of the guidance document to CEPT is annexed to this document describing the broad lines for the sixth update.

Member States are invited to give their final comments on the revised draft of the guidance document, which takes into account comments received from Member States following the last RSC meeting as well as the discussions in CEPT (see RSCOM14-25). The aim is to finalise the text for submission to CEPT.

ANNEX

GUIDANCE TO CEPT

ON THE SIXTH UPDATE OF THE SRD DECISION

PERMANENT MANDATE ON UPDATING THE TECHNICAL ANNEX TO THE SRD DECISION

This document provides the Commission services' guidance to CEPT for the sixth update of the technical annex to the SRD Decision. Such guidance is foreseen in the permanent Mandate to CEPT regarding the annual update of the technical annex of the Commission Decision on harmonisation of radio spectrum for use by short range devices[3].

Recommended focus for the next update

The recently published ECC report 189 [Feb 2014] assesses future demand and technical feasibility for the deployment of key SRD applications, including Internet of Things [IoT] applications. Report 189 also emphasises that increasing the spectrum available for use by SRDs is key to meet forecasted future demand and boost the social-economic potential of SRDs in the short-medium term. Furthermore, emerging SRD applications like home automation, smart metering, smart grids and mesh networks, will also create additional demand for more spectrum in the short/medium term. The technical parameters recommended by the report are now part of ERC recommendation 70-03 of Feb 2014.

The Commission invites CEPT to:

a. *consider making the bands recently added in ERC Recommendation 70-03 available to SRD usage and eventual inclusion in the next update of the SRD decision;*

Also, in response to the Commission's mandate M/512, ETSI is currently working on standards for Reconfigurable Radio Systems (RRS). Although the on-going work is more focused on TV white space devices and associated geolocation databases, Cognitive Radio is a potentially interesting approach for fast SRD deployment in spectrum bands that are problematic due to diversified and/or sensitive primary usage.

The Commission invites CEPT to:

b. *start investigations on assessing the requirements for cognitive radio enabled SRDs and any potential implications in terms of SRD harmonised technical conditions, taking into account the on-going work in ETSI under mandate M/512;*

Some 'usage restrictions', currently in the annex of Decision 2006/771/EC, may hinder the quick deployment of SRD solutions in certain categories. In specific cases, it might be possible to relax such restrictions without substantially affecting the primary services operating in those bands, increasing market penetration and socio-economic benefits of SRDs.

[3] RSCOM06-27 Rev.

The Commission invites CEPT to:

c. *re-assess, on a demand basis from stakeholders, the relevance and appropriateness of 'other usage restrictions' for the relevant SRD categories;*

At the present there are three Commission Decisions dealing with SRD harmonisation: the SRD decision itself [2006/771/EC]; the RFID decision [2006/804/EC] and the UWB decision [2007/131/EC]. In order to streamline the SRD regulatory framework it would be desirable to integrate these three decisions into just one decision.

The Commission invites CEPT to:

d. *consider merging the existent decisions pertaining to SRDs into one encompassing decision.*

The above does not pre-empt CEPT to pursue their investigations on the specific work items already identified in CEPT report #44.

Roadmap for the 2014/2015/2016 update cycle

1. ECC (August 2014): launch of the sixth update cycle. CEPT starts work on the update proposal pursuant to the permanent Mandate and this guidance document.
2. RSC (March 2016): CEPT to submit its report (subject to public consultation) pursuant to the permanent Mandate. Commission services examine the CEPT proposal for amendment of the technical annex.
3. RSC (July 2016): CEPT submits final CEPT report and the Commission services present a draft Commission Decision updating the technical annex to the SRD Decision. If agreement is reached swiftly on the draft text, publication can be envisaged for early 2017.

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ANNEX 2: EC MANDATE TO CEPT

EUROPEAN COMMISSION
Information Society and Media Directorate-General

Electronic Communications Policy
Radio Spectrum Policy

Brussels, 5 July 2006
DG INFSO/B4

FINAL

PERMANENT MANDATE TO CEPT REGARDING THE ANNUAL UPDATE OF THETECHNICAL ANNEX OF THE COMMISSION DECISION ON THE TECHNICAL HARMONISATION OF RADIO SPECTRUM FOR USE BY SHORT RANGE DEVICES

This mandate is issued to the CEPT without prejudice to the one-month right of scrutiny by the European Parliament, pursuant to Council Decision 1999/468/EC of 28 June 1999 (OJ L 184, 17.7.1999, p. 23) on Comitology procedure.
This one-month period is extended until 28 September 2006.

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Title

Permanent Mandate to CEPT regarding the annual update of the technical annex of the Commission Decision on the technical harmonisation of radio spectrum for use by short range devices.[5]

Purpose

Pursuant to Article 4 of the Radio Spectrum Decision, the Commission may issue mandates to the CEPT for the development of technical implementing measures with a view to ensuring harmonised conditions for the availability and efficient use of radio spectrum; such mandates shall set the task to be performed and the timetable therefor.

Pursuant to this permanent Mandate, CEPT shall provide the Commission with a yearly report on needs for revising the technical annex of the Commission Decision on the technical harmonisation of radio spectrum for use by short range devices (SRDs).

The yearly proposal will serve as a basis for an amendment, when needed, of the technical annex of the Commission Decision on SRDs.

Justification

The Commission Decision for SRDs foresees a regular update of the list of frequencies, as well as their associated conditions of use. This update should be performed on a regular basis in order to take due account of the rapid technological and market developments prevailing in this area. This permanent Mandate to CEPT is to formalise the preparation of the yearly proposal by CEPT for updating the technical annex of Commission Decision on SRDs.

Objectives

In addition to the core objectives of the Decision itself, the aim of this permanent mandate is to provide relevant technical information necessary to:

1. Modify, whenever appropriate, the technical conditions of use of the frequency bands included in the technical annex;
2. Identify new frequency bands and/or new applications (types of SRDs) which should be added to the list included in the technical annex of the Decision in order to further the "Class I" equipment category and providing such equipment with legal certainty on EU level, thereby consolidating the Single Market through spectrum harmonisation;
3. Remove frequency bands (and hence types of SRDs) from the list included in the technical annex, when required and duly justified (e.g. in case a particular use has become obsolete);
4. Continuously improve the presentation of the technical annex to reflect best practices.

[5]Commission Decision 2006/ 771/EC on the technical harmonisation of radio spectrum for use by short range radio devices.

The European Commission may provide, on a yearly basis, input and orientation to CEPT reflecting EU policy priorities requiring special attention in the context of spectrum usage by SRDs. This input and orientation, which aims at focussing the CEPT analysis, would be delivered in time to allow to be taken into account by CEPT when preparing the annual report with proposals for revising the technical annex.

The Commission, with the assistance of the Radio Spectrum Committee (RSC) pursuant to the Radio Spectrum Decision, may consider applying the results of this permanent Mandate in the European Union.

Duration

This mandate will be kept as long as the Commission Decision on SRDs is applicable.

However, the Commission, having received the advice of the RSC in the matter and with due consultation with CEPT, may terminate or modify this mandate at a specified point in time in case it would have become redundant, obsolete or needs to be updated.

Order and Schedule

1. CEPT is hereby mandated to undertake all relevant work to meet the objectives stated above.
2. The CEPT is mandated to produce a yearly report to the European Commission including the proposed revision of the technical annex of the Commission Decision on SRDs. This report shall take into account the input and orientation given by the Commission if provided. The CEPT report shall be delivered in **July** of each year.
3. An indicative schedule of the process is given in table 1.
4. In implementing this mandate, the CEPT shall, where relevant, take the utmost account of Community law applicable, notably the RTTE Directive, 1999/5/EC, and to support the principles of technological neutrality, non-discrimination and proportionality.

Table 1 – **Schedule for review of SRD Decision** (revolving cycle)

The reference date of the annual cycle of revision of the technical annex of the Commission Decision on SRDs is July of each year at which time CEPT is expected to deliver its annual report containing the proposal for revising the technical annex of the Commission Decision on SRDs.

Year Y -1

November-December	Optional: input and orientation presented by the Commission to the RSC in view of formal transmission to CEPT by the end of year Y-1

Year Y

July	CEPT to finalise the response to the Mandate for year Y and submit formally a report to the Commission.

ANNEX 3: PROPOSED AMENDMENTS TO THE TECHNICAL ANNEX OF THE EC DECISION FOR SRDS

Table 11: Harmonised frequency bands and technical parameters for short-range devices

Band no	Frequency band [i]	Category of short-range devices [ii]	Transmit power limit/ field strength limit/power density limit [iii]	Additional parameters (channelling and/or channel access and occupation rules) [iv]	Other usage restrictions [v]	Implementation deadline
1	9-59.750 kHz	Inductive devices [14]	72 dBµA/m at 10 metres			1 July 2014
2	9-315 kHz	Active medical implant devices [1]	30 dBµA/m at 10 metres	Duty cycle limit [vi]: 10 %	This set of usage conditions is only available to active implantable medical devices [7].	1 July 2014
3	59.750-60.250 kHz	Inductive devices [14]	42 dBµA/m at 10 metres			1 July 2014
4	60.250-74.750 kHz	Inductive devices [14]	72 dBµA/m at 10 metres			1 July 2014
5	74.750-75.250 kHz	Inductive devices [14]	42 dBµA/m at 10 metres			1 July 2014
6	75.250-77.250 kHz	Inductive devices [14]	72 dBµA/m at 10 metres			1 July 2014
7	77.250-77.750 kHz	Inductive devices [14]	42 dBµA/m at 10 metres			1 July 2014
8	77.750-90 kHz	Inductive devices [14]	72 dBµA/m at 10 metres			1 July 2014
9	90-119 kHz	Inductive devices [14]	42 dBµA/m at 10 metres			1 July 2014
10	119-128.6 kHz	Inductive devices [14]	66 dBµA/m at 10 metres			1 July 2014
11	128.6-129.6 kHz	Inductive devices [14]	42 dBµA/m at 10 metres			1 July 2014
12	129.6-135 kHz	Inductive devices [14]	66 dBµA/m at 10 metres			1 July 2014
13	135-140 kHz	Inductive devices [14]	42 dBµA/m at 10 metres			1 July 2014
14	140-148.5 kHz	Inductive devices [14]	37.7 dBµA/m at 10 metres			1 July 2014
15	148.5-5 000 kHz [17]	Inductive devices [14]	-15 dBµA/m at 10 metres in any bandwidth of 10 kHz. Furthermore the total field strength is -5 dBµA/m at 10 m for systems operating at bandwidths larger than 10 kHz			1 July 2014
~~16~~	~~315-600 kHz~~	~~Active medical implant devices [1]~~	~~-5 dBµA/m at 10 m~~	~~Duty cycle limit [vi]: 10 %~~	~~This set of usage conditions is only available to animal implantable devices [2].~~	~~1 July 2014~~

17	400-600 kHz	Radio Frequency Identification (RFID) devices [12]	-8 dBµA/m at 10 metres			1 July 2014
18	456.9-457.1 kHz	Non-specific short-range devices [3]	7 dBµA/m at 10 m		This set of usage conditions is only available for emergency detections of buried victims and valuable items devices.	1 July 2014
19	984-7484 kHz	Transport and Traffic Telematics devices [13]	9 dBµA/m at 10 m	Duty cycle limit [vi]: 1 %	This set of usage conditions is only available for Eurobalise transmissions in the presence of trains and using the 27 MHz band for telepowering.	1 July 2014
20	3 155-3 400 kHz	Inductive devices [14]	13.5 dBµA/m at 10 metres			1 July 2014
21	5 000-30 000 kHz [18]	Inductive devices [14]	-20 dBµA/m at 10 metres in any bandwidth of 10 kHz. Furthermore the total field strength is -5 dBµA/m at 10 m for systems operating at bandwidths larger than 10 kHz			1 July 2014
22~~a~~	6 765-6 795 kHz	Inductive devices [14]	42 dBµA/m at 10 metres			1 July 2014
~~22b~~	~~6 765-6 795 kHz~~	~~Non-specific short-range devices [3]~~	~~42 dBµA/m at 10 metres~~			~~1 July 2014~~
23	7 300-23 000 kHz	Transport and Traffic Telematics devices [13]	-7 dBµA/m at 10 m	Antenna restrictions apply as specified in the harmonised standards adopted under Directive 2014/53/EU~~1999/5/EC~~.	This set of usage conditions is only available for Euroloop transmissions in the presence of trains and using the 27 MHz band for telepowering.	1 July 2014
24	7 400-8 800 kHz	Inductive devices [14]	9 dBµA/m at 10 metres			1 July 2014
25	10 200-11 000 kHz	Inductive devices [14]	9 dBµA/m at 10 metres			1 July 2014
~~26~~	~~12 500 -20 000 kHz~~	~~Active medical implant devices [1]~~	~~-7 dBµA/m at 10 m in a bandwidth of 10 kHz~~	~~Duty cycle limit [vi]: 10 %~~	~~This set of usage conditions is only available to indoor use by animal implantable~~	~~1 July 2014~~

					~~devices [2].~~	
27a	13 553-13 567 kHz	Inductive devices [14]	42 dBµA/m at 10 metres			1 July 2014
27b	13 553-13 567 kHz	Inductive devices [14]~~Radio Frequency Identification (RFID) devices [12]~~	60 dBµA/m at 10 metres	The transmission mask and antenna requirements for all combined frequency segments have to be met as described in harmonised standards adopted under Directive 2014/53/EU.	This set of usage conditions is only available to Radio Frequency Identification (RFID) devices [12]	1 July 2014
27c	13 553-13 567 kHz	Non-specific short-range devices [3]	42 dBµA/m at 10 metres			1 July 2014
~~28a~~	~~26 957-27 283 kHz~~	~~Inductive devices [14]~~	~~42 dBµA/m at 10 metres~~			~~1 July 2014~~
28~~b~~	26 957-27 283 kHz	Non-specific short-range devices [3]	10 mW effective radiated power (e.r.p.)~~, which corresponds to 42 dBµA/m at 10 metres~~			1 July 2014
29	26 990-27 000 kHz	Non-specific short-range devices [3]	100 mW e.r.p.	Duty cycle limit [vi]: 0.1 %. Model control devices may operate without duty cycle restrictions [11].	~~Model control devices may operate without duty cycle restrictions [11].~~	1 July 2014
30	27 040-27 050 kHz	Non-specific short-range devices [3]	100 mW e.r.p.	Duty cycle limit [vi]: 0.1 %. Model control devices may operate without duty cycle restrictions [11].	~~Model control devices may operate without duty cycle restrictions [11].~~	1 July 2014
31	27 090-27 100 kHz	Non-specific short-range devices [3]	100 mW e.r.p.	Duty cycle limit [vi]: 0.1 %. Model control devices may operate without duty cycle restrictions [11].	~~Model control devices may operate without duty cycle restrictions [11].~~	1 July 2014
32	27 140-27 150 kHz	Non-specific short-range devices [3]	100 mW e.r.p.	Duty cycle limit [vi]: 0.1 %. Model control devices may operate without duty cycle restrictions [11].	~~Model control devices may operate without duty cycle restrictions [11].~~	1 July 2014
33	27 190-27 200 kHz	Non-specific short-range devices [3]	100 mW e.r.p.	Duty cycle limit [vi]: 0.1 %. Model control devices may operate without duty cycle restrictions [11].	~~Model control devices may operate without duty cycle restrictions [11].~~	1 July 2014
34	30-37.5 MHz	Active medical implant devices [1]	1 mW e.r.p.	Duty cycle limit [vi]: 10 %	This set of usage conditions is only available to ultra-low power medical	1 July 2014

					membrane implants for blood pressure measurements within the definition of active implantable medical devices [7] in Directive 90/385/EEC.	
35	40.66-40.7 MHz	Non-specific short-range devices [3]	10 mW e.r.p.		~~Video applications are excluded.~~	~~1 July 2014~~
36	87.5-108 MHz	Wireless audio and multimedia streaming devices~~High duty cycle/continuous transmission devices [8]~~	50 nW e.r.p.	Channel spacing up to 200 kHz.	This set of usage conditions is only available to transmitters with analogue frequency modulation (FM).	1 July 2014
37a	169.4-169.475 MHz	Assistive Listening Devices (ALD) [4]	500 mW e.r.p.	Channel spacing: max 50 kHz.		1 July 2014
~~37b~~	~~169.4-169.475 MHz~~	~~Metering devices [5]~~	~~500 mW e.r.p.~~	~~Channel spacing: max 50 kHz. Duty cycle limit [vi]: 10.0 %.~~		~~1 July 2014~~
37c	169.4-169.475 MHz	Non-specific short-range devices [3]	500 mW e.r.p.	Channel spacing: max 50 kHz. Duty cycle limit [vi]: 1.0 %. For metering devices [5], the duty cycle limit [vi] is 10.0%		1 July 2014
38	169.4-169.4875 MHz	Non-specific short-range devices [3]	10 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Duty cycle limit [vi]: 0.1%.		1 July 2014
39a	169.4875-169.5875 MHz	Assistive Listening Devices (ALD) [4]	500 mW e.r.p.	Channel spacing: max 50 kHz.		1 July 2014
39b	169.4875-169.5875 MHz	Non-specific short-range devices [3]	10 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent	~~Between 00:00h and 06:00h local time a duty cycle limit [vi] of 0.1 % may be used.~~	1 July 2014

				performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Duty cycle limit [vi]: 0.001%. Between 00:00h and 06:00h local time a duty cycle limit [vi] of 0.1 % may be used.		
40	169.5875-169.8125 MHz	Non-specific short-range devices [3]	10 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Duty cycle limit [vi]: 0.1 %.		1 July 2014
New	173.965-216 MHz	Assistive Listening Devices (ALD) [4]	10 mW e.r.p.	On a tuning range basis [25]. Channel spacing: max 50 kHz. A threshold of 35 dBµV/m is required to ensure the protection of a DAB receiver located at 1.5m from the ALD device, subject to DAB signal strength measurements taken around the ALD operating site.The ALD device should operate under all circumstances at least 300 kHz away from the channel edge of an occupied DAB channel. Techniques to access spectrum and mitigate		

				interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.			
41	401-402 MHz	Active medical implant devices [1]	25 µW e.r.p.	Channel spacing: 25 kHz. Individual transmitters may combine adjacent channels for increased bandwidth up to 100 kHz. Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Alternatively a duty cycle limit [vi] of 0.1% may also be used.	This set of usage conditions is only available for systems specifically designed for the purpose of providing non-voice digital communications between active implantable medical devices [7] and/or body-worn devices and other devices external to the human body used for transferring non-time critical individual patient-related physiological information.	1 July 2014	
42	402-405 MHz	Active medical implant devices [1]	25 µW e.r.p.	Channel spacing: 25 kHz. Individual transmitters may combine adjacent channels for increased bandwidth up to 300 kHz. Other techniques to access spectrum or mitigate interference, including bandwidths greater than 300 kHz, can be used provided they result at least in an equivalent performance to the techniques described in harmonised standards	This set of usage conditions is only available to active implantable medical devices [7].	1 July 2014	

				adopted under Directive 2014/53/EU ~~1999/5/EC~~ to ensure compatible operation with the other users and in particular with meteorological radiosondes.		
43	405-406 MHz	Active medical implant devices [1]	25 µW e.r.p.	Channel spacing: 25 kHz Individual transmitters may combine adjacent channels for increased bandwidth up to 100 kHz. Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Alternatively a duty cycle limit [vi] of 0,1 % may also be used.	This set of usage conditions is only available for systems specifically designed for the purpose of providing non-voice digital communications between active implantable medical devices [7] and/or body-worn devices and other devices external to the human body used for transferring non-time critical individual patient-related physiological information.	1 July 2014
44a	433.05-434.04 MHz	Non-specific short-range devices [3]	1 mW e.r.p. and - 13 dBm/10 kHz power density for bandwidth modulation larger than 250 kHz	Voice applications are allowed with advanced mitigation techniques.	Audio and video applications are excluded.	1 July 2014
44b	433.05-434.04 MHz	Non-specific short-range devices [3]	10 mW e.r.p.	Duty cycle limit [vi]: 10 %	Analogue audio applications other than voice are excluded. Analogue video applications are excluded.	1 July 2014
45a	434.04-434.79 MHz	Non-specific short-range devices [3]	1 mW e.r.p. and – 13 dBm/10 kHz power density for bandwidth modulation larger than 250 kHz	Voice applications are allowed with advanced mitigation techniques.	Audio and video applications are excluded.	1 July 2014
45b	434.04-434.79 MHz	Non-specific short-range devices [3]	10 mW e.r.p.	Duty cycle limit [vi]: 10 %	Analogue audio applications other than	1 July 2014

					voice are excluded. Analogue video applications are excluded.	
45c	434.04-434.79 MHz	Non-specific short-range devices [3]	10 mW e.r.p.	Duty cycle limit [vi]: 100 % subject to channel spacing up to 25 kHz. Voice applications are allowed with advanced mitigation techniques.	Audio and video applications are excluded.	1 July 2014
New	446.0-446.2 MHz	PMR446 [21]	500 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.		1 January 2018
46a	863-865 MHz	Non-specific short-range devices [3]	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Alternatively a duty cycle limit [vi] of 0.1 % may also be used.	~~Analogue audio applications other than voice are excluded. Analogue video applications are excluded.~~	~~1 July 2014~~
46b	863-865 MHz	Wireless audio and multimedia streaming devices~~High duty cycle/continuous transmission devices [8]~~	10 mW e.r.p.		~~This set of usage conditions is only available to wireless audio and multimedia streaming devices.~~	1 July 2014
47	865-868 MHz	Non-specific short-range devices [3]	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide	Analogue audio applications other than voice are excluded.	1 July 2014

				at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Alternatively a duty cycle limit [vi] of 1 % may also be used.	Analogue video applications are excluded.	
47a	865-868 MHz	Radio Frequency Identification (RFID) devices [12]	2 W e.r.p. Interrogator transmissions at 2 W e.r.p. are only permitted within the four channels centred at 865.7 MHz, 866.3 MHz, 866.9 MHz and 867.5 MHz; each with a maximum bandwidth of 200kHz. RFID interrogator devices placed on the market before the repeal date of EC Decision 2006/804/EC are 'grandfathered', i.e. they are continuously permitted to be used in line with the provisions set out in EC Decision 2006/804/EC before the repeal date.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used.		
48	868-868.6 MHz	Non-specific short-range devices [3]	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	Analogue video applications are excluded.	1 July 2014

				Alternatively a duty cycle limit [vi] of 1 % may also be used.		
49	868.6-868.7 MHz	Non-specific short-range devices [3]~~Low duty cycle /high reliability devices [15]~~	10 mW e.r.p.	Channel spacing: 25 kHz The whole frequency band may also be used as a single channel for high-speed data transmission. Duty cycle limit [vi]: 1.0 %	This set of usage conditions is only available to alarm systems[22].	1 July 2014
50	868.7-869.2 MHz	Non-specific short-range devices [3]	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Alternatively a duty cycle limit [vi] of 0,1 % may also be used.	Analogue video applications are excluded.	1 July 2014
51	869.2-869.25 MHz	Non-specific short-range devices [3]~~Low duty cycle /high reliability devices [15]~~	10 mW e.r.p.	Channel spacing: 25 kHz. Duty cycle limit [vi]: 0.1 %	This set of usage conditions is only available to social alarm devices [6].	1 July 2014
52	869.25-869.3 MHz	Non-specific short-range devices [3]~~Low duty cycle /high reliability devices [15]~~	10 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit [vi]: 0.1 %	This set of usage conditions is only available to alarm systems [22].	1 July 2014
53	869.3-869.4 MHz	Non-specific short-range devices [3]~~Low duty cycle /high reliability devices [15]~~	10 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit [vi]: 1.0 %	This set of usage conditions is only available to alarm systems [22].	1 July 2014
~~54a~~	~~869.4-869.65 MHz~~	~~Non-specific short-range devices [3]~~	~~25 mW e.r.p.~~	~~Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards~~	~~Analogue audio applications other than voice are excluded. Analogue video applications are excluded.~~	1 July 2014

				~~adopted under Directive 1999/5/EC must be used. Alternatively a duty cycle limit [vi] of 0,1 % may also be used.~~		
54~~b~~	869.4-869.65 MHz	Non-specific short-range devices [3]	500 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Alternatively a Duty cycle limit [vi] of 10% may also be used.	Analogue video applications are excluded.	1 July 2014
55	869.65-869.7 MHz	Non-specific short-range devices [3]~~Low duty cycle /high reliability devices [15]~~	25 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit [vi]: 10 %	This set of usage conditions is only available to alarm systems [22].	1 July 2014
56a	869.7-870 MHz	Non-specific short-range devices [3]	5 mW e.r.p.	Voice applications allowed with advanced mitigation techniques.	Audio and video applications are excluded.	1 July 2014
56b	869.7-870 MHz	Non-specific short-range devices [3]	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Alternatively a duty cycle limit [vi] of 1 % may also be used.	Analogue audio applications other than voice are excluded. Analogue video applications are excluded.	1 July 2014
57a	2 400-2 483.5 MHz	Non-specific short-range devices [3]	10 mW equivalent isotropic radiated power (e.i.r.p.)			1 July 2014
57b	2 400-2 483.5 MHz	Radio determination	25 mW e.i.r.p.			1 July 2014

		devices [9]				
57c	2 400-2 483.5 MHz	Wideband data transmission devices [16]	100 mW e.i.r.p. and 100 mW/100 kHz e.i.r.p. density applies when frequency hopping modulation is used, 10 mW/MHz e.i.r.p. density applies when other types of modulation are used	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.		1 July 2014
58	2 446-2 454 MHz	Radio Frequency Identification (RFID) devices [12]	500 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.		1 July 2014
59	2 483.5-2 500 MHz	Active medical implant devices [1]	10 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Channel spacing: 1 MHz. The whole frequency band may also be used dynamically as a single channel for high-speed data transmissions. Duty cycle limit [vi] of 10 %.	This set of usage conditions is only available to active implantable medical devices [7]. Peripheral master units are for indoor use only.	1 July 2014
59a	2 483.5-2 500 MHz	Medical data acquisition [20]	1 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide	The set of usage conditions is only available for medical	

				at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Modulation Bandwidth: ≤ 3 MHz. Duty cycle [vi]: ≤ 10%	body area network system (MBANS) [23] for indoor use within healthcare facilities	
59b	2 483.5-2 500 MHz	Medical data acquisition [20]	10 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU must be used. Modulation Bandwidth: ≤ 3 MHz. Duty cycle [vi]: ≤ 2%	The set of usage conditions is only available for medical body area network system (MBANS) [23] for indoor use within the patient's home	
60	4 500-7 000 MHz	Radio determination devices [9]	24 dBm e.i.r.p. [19]	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	This set of usage conditions is only available to Tank Level Probing Radar [10].	1 July 2014
61	5 725-5 875 MHz	Non-specific short-range devices [3]	25 mW e.i.r.p.			1 July 2014
62	5 795-5 8~~10~~5 MHz	Transport and Traffic Telematics devices [13]	2 W e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive	This set of usage conditions applies only to road tolling applications.	~~1 July 2014~~

				2014/53/EU ~~1999/5/EC~~ must be used.		
63	6 000-8 500 MHz	Radio determination devices [9]	7 dBm/50 MHz peak e.i.r.p. and -33 dBm/MHz mean e.i.r.p.	Automatic power control and antenna requirements as well as equivalent techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	This set of usage conditions is only available to Level Probing Radar. Established exclusion zones around radio astronomy sites must be obeyed.	1 July 2014
64	8 500-10 600 MHz	Radio determination devices [9]	30 dBm e.i.r.p. [19]	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	This set of usage conditions is only available to Tank Level Probing Radar [10].	1 July 2014
65	17.1-17.3 GHz	Radio determination devices [9]	26 dBm e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	This set of usage conditions is only available to ground-based systems.	1 July 2014
66	24.05-24.075 GHz	Transport and Traffic Telematics devices [13]	100 mW e.i.r.p.			1 July 2014
67	24.05-26.5 GHz	Radio determination devices [9]	26 dBm/50 MHz peak e.i.r.p. and -14 dBm/MHz mean e.i.r.p.	Automatic power control and antenna requirements as well as equivalent techniques to access	This set of usage conditions is only available to Level Probing Radar.	1 July 2014

				spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	Established exclusion zones around radio astronomy sites must be obeyed.	
68	24.05-27 GHz	Radio determination devices [9]	43 dBm e.i.r.p. [19]	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	This set of usage conditions is only available to Tank Level Probing Radar [10].	1 July 2014
69a	24.075-24.15 GHz	Transport and Traffic Telematics devices [13]	100 mW e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Dwell time limits and frequency modulation range apply as specified in harmonised standards.	This set of usage conditions is only available to ground-based vehicle radars.	1 July 2014
69b	24.075-24.15 GHz	Transport and Traffic Telematics devices [13]	0.1 mW e.i.r.p.			1 July 2014
70a	24.15-24.25 GHz	Non-specific short-range devices [3]	100 mW e.i.r.p.			1 July 2014
70b	24.15-24.25 GHz	Transport and Traffic Telematics devices [13]	100 mW e.i.r.p.			1 July 2014
71	24.25-24.495 GHz	Transport and Traffic Telematics devices [13]	-11 dBm e.i.r.p.	Techniques to access spectrum and mitigate	This set of usage conditions is only	1 July 2014

				interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Duty cycle limits [vi] and frequency modulation ranges apply as specified in harmonised standards.	available to ground-based vehicle radars operating in the harmonised 24 GHz frequency range.	
72	24.25-24.5 GHz	Transport and Traffic Telematics devices [13]	20 dBm e.i.r.p. (forward-facing radars) 16 dBm e.i.r.p. (rear-facing radars)	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Duty cycle limits [vi] and frequency modulation range apply as specified in harmonised standards.	This set of usage conditions is only available to ground-based vehicle radars operating in the harmonised 24 GHz frequency range.	1 July 2014
73	24.495-24.5 GHz	Transport and Traffic Telematics devices [13]	-8 dBm e.i.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used. Duty cycle limits [vi] and frequency modulation range apply as specified in harmonised standards.	This set of usage conditions is only available to ground-based vehicle radars operating in the harmonised 24 GHz frequency range.	1 July 2014
74a	57-64 GHz	Non-specific short-range	100 mW e.i.r.p., a			1 July 2014

		devices [3]	maximum transmit power of 10dBm and a maximum e.i.r.p. power spectral density of 13dBm/MHz			
74b	57-64 GHz	Radio determination devices [9]	43 dBm e.i.r.p. [19]	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	This set of usage conditions is only available to Tank Level Probing Radar [10].	1 July 2014
74c	57-64 GHz	Radio determination devices [9]	35 dBm/50 MHz peak e.i.r.p. and -2 dBm/MHz mean e.i.r.p.	Automatic power control and antenna requirements as well as equivalent techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU~~1999/5/EC~~ must be used.	This set of usage conditions is only available to Level Probing Radar.	1 July 2014
75	57-66 GHz	Wideband data transmission devices [16]	40 dBm e.i.r.p. and 13 dBm/MHz e.i.r.p. density	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	Fixed outdoor installations are excluded.	1 July 2014
76	61-61.5 GHz	Non-specific short-range devices [3]	100 mW e.i.r.p.			1 July 2014
77	63-64 GHz	Transport and Traffic Telematics devices [13]	40 dBm e.i.r.p.		This set of usage conditions is only	1 July 2014

					available to vehicle-to-vehicle, vehicle-to-infrastructure and infrastructure-to-vehicle systems.	
78a	75-85 GHz	Radio determination devices [9]	34dBm/50 MHz peak e.i.r.p. and -3 dBm/MHz mean e.i.r.p.	Automatic power control and antenna requirements as well as equivalent techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	This set of usage conditions is only available to Level Probing Radar. Established exclusion zones around radio astronomy sites must be obeyed.	1 July 2014
78b	75-85 GHz	Radio determination devices [9]	43 dBm e.i.r.p. [19]	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 2014/53/EU ~~1999/5/EC~~ must be used.	This set of usage conditions is only available to Tank Level Probing Radar [10].	1 July 2014
79a	76-77 GHz	Transport and Traffic Telematics devices [13]	55 dBm peak e.i.r.p. and 50 dBm mean e.i.r.p. and 23.5 dBm mean e.i.r.p. for pulse radars		This set of usage conditions is only available to ground-based vehicle and infrastructure systems.	1 July 2014
79b	76-77 GHz	Transport and Traffic Telematics devices [13]	30 dBm peak e.i.r.p. and 3 dBm/MHz average power spectral density	Duty cycle limit [vi]: ≤ 56 %/s	This set of usage conditions is only available to obstacle detection systems for rotorcraft use [24].	
80a	122-122.25 GHz	Non-specific short-range devices [3]	10 dBm e.i.r.p/ 250 MHz and -48 dBm/MHz at 30°			

			elevation			
80b	122.25-123 GHz	Non-specific short-range devices [3]	100 mW e.i.r.p.			~~1 July 2014~~
81	244-246 GHz	Non-specific short-range devices [3]	100 mW e.i.r.p.			1 July 2014

[i] Member States must allow adjacent frequency bands within this table to be used as a single frequency band provided the specific conditions of each of these adjacent frequency bands are met.

[ii] As defined in Article 2(3).

[iii] Member States must allow the usage of spectrum up to the transmit power, field strength or power density given in this table. In accordance with Article 3(3), they may impose less restrictive conditions, i.e. allow the use of spectrum with higher transmit power, field strength or power density, provided that this does not reduce or compromise the appropriate coexistence between short-range devices in bands harmonised by this Decision.

[iv] Member States may only impose these 'additional parameters (channelling and/or channel access and occupation rules)', and shall not add other parameters or spectrum access and mitigation requirements. Less restrictive conditions within the meaning of Article 3(3) mean that Member States may completely omit the 'additional parameters (channelling and/or channel access and occupation rules)' in a given cell or allow higher values, provided that the appropriate sharing environment in the harmonised band is not compromised.

[v] Member States may only impose these 'other usage restrictions' and shall not add additional usage restrictions. As less restrictive conditions may be introduced within the meaning of Article 3(3), Member States may omit one or all of these restrictions, provided that the appropriate sharing environment in the harmonised band is not compromised.

[vi] 'Duty cycle' cycle' is defined as the ratio, expressed as a percentage, of Σ(Ton)/(Tobs) where Ton is the "on" time of a single transmitter device and Tobs is the observation period. Ton is measured in an observation frequency band (Fobs). Unless otherwise specified in this technical annex, Tobs is a continuous one hour period and Fobs is the applicable frequency band in this technical annex..~~means the ratio of time during any one-hour period when a single device is actively transmitting.~~ Less restrictive conditions within the meaning of Article 3(3) mean that Member States may allow a higher value for 'duty cycle'.

[1] The active medical implant device category covers the radio part of active implantable medical devices that are intended to be totally or partially introduced, surgically or medically, into the human body or that of an animal, and where applicable their peripherals.

~~[2] "Animal implantable devices" are transmitting devices which are placed inside the body of an animal for the purpose of performing diagnostic functions and/or delivery of therapeutic treatment.~~

[3] The non-specific short-range device category covers all kinds of radio devices, regardless of the application or the purpose, which fulfil the technical conditions as specified for a given frequency band. Typical uses include telemetry, telecommand, alarms, data transmissions in general and other applications.

[4] The assistive listening device (ALD) category covers radio communications systems that allow persons suffering from hearing disability to increase their listening capability. Typical system~~s~~ installations include one or more radio transmitters and one or more radio receivers.

[5] The metering device category covers radio devices that are part of bidirectional radio communications systems which allow remote monitoring, measuring and transmission of data in smart grid infrastructures, such as electricity, gas and water.

[6] 'Social alarm devices' are radio communications systems that allow reliable communication for a person in distress in a confined area to initiate a call for assistance. Typical uses of social alarm are to assist elderly or disabled people.

[7] 'Active implantable medical devices' as defined in Council Directive 90/385/EEC of 20 June 1990 on the approximation of the laws of the Member States relating to active implantable medical devices (OJ L 189, 20.7.1990, p. 17).

[8] ~~The high duty cycle/continuous transmission device category covers radio devices that rely on low latency and high duty cycle transmissions.~~ Typical uses are for personal wireless audio and multimedia streaming systems used for combined audio/video transmissions and audio/video sync signals, mobile phones, automotive or home entertainment system, wireless microphones, cordless loudspeakers, cordless headphones, radio devices carried on a person, assistive listening devices, in-ear monitoring, wireless microphones for use at concerts or other stage productions, and low power analogue FM transmitters (band 36).

[9] The radio determination device category covers radio devices that are used for determining the position, velocity and/or other characteristics of an object, or for obtaining information relating to these parameters. ~~Typical uses are various kinds of measurement applications.~~Radiodetermination equipment typically conducts measurements to obtain such characteristics. Any kind of point-to-point or point-to-multipoint radio communications is outside of this definition.

[10] 'Tank Level Probing Radar' (TLPR) is a specific type of radiodetermination application, which is used for tank level measurements and is installed in metallic or reinforced concrete tanks, or similar structures made of material with comparable attenuation characteristics. The purpose of the tank is to contain a substance.

[11] 'Model control devices' are a specific kind of telecommand and telemetry radio equipment that is used to remotely control the movement of models (principally miniature representations of vehicles) in the air, on land or over or under the water surface.

[12] The radio frequency identification (RFID) device category covers tag/interrogator based radio communications systems, consisting of radio devices (tags) attached to animate or inanimate items and of transmitter/receiver units (interrogators) which activate the tags and receive data back. Typical uses include the tracking and identification of items, such as for electronic article surveillance (EAS), and collecting and transmitting data relating to the items to which tags are attached, which may be either battery-less, battery assisted or battery powered. The responses from a tag are validated by its interrogator and passed to its host system.

[13] The transport and traffic telematics device category covers radio devices that are used in the fields of transport (road, rail, water or air, depending on the relevant technical restrictions), traffic management, navigation, mobility management and in intelligent transport systems (ITS). Typical applications are used for interfaces between different modes of transport, communication between vehicles (e.g. car to car), between vehicles and fixed locations (e.g. car to infrastructure) as well as communication from and to users.

[14] The inductive device category covers radio devices that use magnetic fields with inductive loop systems for near field communications. Typical uses include devices for car immobilisation, animal identification, alarm systems, cable detection, waste management, personal identification, wireless voice links, access control, proximity sensors, anti-theft systems, including RF anti-theft induction systems, data transfer to hand-held devices, automatic article identification, wireless control systems and automatic road tolling.

[15] ~~The low duty cycle/high reliability device category covers radio devices that rely on low overall spectrum utilisation and low duty cycle spectrum access rules to ensure highly reliable spectrum access and transmissions in shared bands. Typical uses include alarm systems that use radio communication for indicating an alert condition at a distant location and social alarms systems that allow reliable communication for a person in distress.~~

[16] The wideband data transmission device category covers radio devices that use wideband modulation techniques to access the spectrum. Typical uses include wireless access systems such as radio local area networks (WAS/RLANs).

[17] In band 20 higher field strengths and additional usage restrictions apply for inductive applications.

[18] In bands 22a, 24, 25, 27a, and 28a higher field strengths and additional usage restrictions apply for inductive applications.

[19] The power limit applies inside a closed tank and corresponds to a spectral density of -41,3 dBm/MHz e.i.r.p. outside a 500 litre test tank."

[20] The medical data acquisition category covers the transmission of non-voice data to and from non-implantable medical devices for the purpose of monitoring, diagnosing and treating patients in healthcare facilities or patient's home.

[21] PMR446 equipment is hand portable (no base station or repeater use) and uses integral antennas only in order to maximise sharing and minimise interference. PMR 446 equipment operates in short range peer-to-peer mode and shall be used neither as a part of infrastructure network nor as a repeater;

[22]. An alarm system is a device which uses radio communication support for indicating an alert to a system or a person, as a main functionnality, at a distant location when a problem or a specific situation occurs. Radio alarms include social alarms and alarms for security and safety.

[23] Medical Body Area Network Systems (MBANSs), used for medical data acquisition, are intended to be used in healthcare facilities and patients' homes. They are low power radio systems used for the transmission of non-voice data to and from medical devices for the purposes of monitoring, diagnosing and treating patients as prescribed by duly authorised healthcare professionals and are defined in the context of medical applications only;

[24]Member States can specify exclusion zones or equivalent measures in which the obstacle detection application for rotorcraft use shall not be used for the protection of the radioastronomy service or other national use. Rotorcraft is defined as EASA CS-27 and CS-29 (resp. JAR-27 and JAR-29 for former certifications);

[25] Devices shall implement the whole frequency range on a tuning range basis.

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ANNEX 4: UWB REGULATION

EUROPEAN
COMMISSION

Brussels, 7.10.2014
C(2014) 7083 final

COMMISSION IMPLEMENTING DECISION

of 7.10.2014

amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community

COMMISSION IMPLEMENTING DECISION

of 7.10.2014

amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,
Having regard to Decision No 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 (Radio Spectrum Decision)[6], and in particular Article 4(3) thereof,

Whereas:

(1) Commission Decision 2007/131/EC[7] of 21 February 2007, modified by Commission Decision 2009/343/EC of 21 April 2009, harmonises the technical conditions for radio equipment using ultra-wideband (hereinafter "UWB") technology in the Union. It ensures that the radio spectrum is available across the Union under harmonised conditions, eliminates barriers to the uptake of UWB technology and creates an effective single market for UWB systems with significant economies of scale and benefits to the consumer.

(2) Rapid changes in technology and in the use of the radio spectrum need to be adequately reflected in the regulation of UWB technology, to allow European society to benefit from the introduction of innovative applications based on this technology, while ensuring that other spectrum users are not adversely affected. The latest version of Decision 2007/131/EC therefore needs to be amended.

(3) For this reason, on 28 May 2012 the Commission issued a Fifth Mandate, pursuant to Decision No 676/2002/EC, to the European Conference of Postal and Telecommunications Administrations (CEPT) on UWB technology, to clarify technical parameters in the light of a potential update to Commission Decision 2007/131/EC.

(4) In CEPT Report 45, approved on 21 June 2013 by the Electronic Communications Committee (ECC) and submitted in response to the fifth mandate, CEPT advised the Commission to take a more streamlined approach on subsequent amendments of Decision 2007/131/EC, taking into account the description of mitigation techniques with all the relevant detailed parameters within the harmonised European standards developed by the European Telecommunications Standards Institute (ETSI).

(5) CEPT Report 45 clarified the technical conditions under which specific mitigation techniques enable UWB equipment to be operated with higher transmission powers, while offering equivalent protection for existing UWB limits on generic use, Automotive and railway vehicles use and location-tracking equipment. In addition to the recommendations from this report, which should be applied across the EU, the definitions and the technical parameters of these mitigation techniques should also be made binding, as set out in the

[6] OJ L 108 24.4.2002, p. 1.

[7] Commission Decision 2007/131/EC of 21 February 2007 on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community (OJ L 55, 23.2.2007, p. 33).

relevant standards, as these techniques only provide a mitigation effect when used with appropriate operational parameters.

(6) UWB equipment onboard aircraft should be permitted only on the condition that they fulfil air safety standards, with appropriate airworthiness certification and other relevant aeronautical provisions, and electronic communication standards. Airworthiness certificates valid throughout the Community are issued by the European Aviation Safety Agency, pursuant to Commission Regulation (EU) No 748/2012[8].

(7) Material sensing devices have a number of uses in detecting and characterising objects and materials or taking pictures of pipes, wires and other intra-wall structures in residential or commercial buildings. CEPT has advised the Commission that more relaxed limits on the use of material sensing devices are possible, as the way they are used, combined with their very low deployment densities and activity factors, further mitigate the possibility of harmful interference to radio-communication services. The revised limits are set out in ECC Decision ECC/DEC/(07)01 of 30 March 2007, as amended on 26 June 2009.

(8) Pursuant to Directive 1999/5/EC of the European Parliament and of the Council[9], the Commission has given mandate M/407 to the European standardisation organisations to draw up a set of harmonised standards. These will cover UWB equipment to be recognised under this Directive, and there will be a presumption of conformity with its requirements. In response to mandate M/407 from the Commission, ETSI has developed the harmonised standards: EN 302 065-1 on common technical requirements for short-range devices using UWB, EN 302 065-2, on requirements for UWB location tracking and EN 302 065-3 on requirements for UWB devices for road and rail vehicles.

(9) The Memorandum of Understanding between the ECC and ETSI, signed on 20 October 2004, ensures coordination of the development of harmonised standards and the regulatory conditions for the use of the spectrum relevant to such standards. Technical details of mitigation techniques are set through ETSI-harmonised European standards and ECC Decision (06)04, and these will remain aligned in any subsequent modifications, as set out in the ECC-ETSI Memorandum of Understanding. As a result, the Commission Decision should only list appropriate mitigation techniques.

(10) Decision 2007/131/EC should therefore be amended accordingly.

(11) The measures provided for in this Decision are in accordance with the opinion of the Radio Spectrum Committee,

HAS ADOPTED THIS DECISION:

Article 1

Decision 2007/131/EC is amended as follows:

(1) in Article 2, points 6, 7 and 8 are replaced by:

"6. 'e.i.r.p' means equivalent isotropically radiated power, which is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

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[8] Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1).

[9] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (OJ L 91, 7.4.1999, p. 10).

7. 'maximum mean power spectral density', specified as e.i.r.p. of the radio device under test at a particular frequency, is the average power per unit bandwidth (centred on that frequency) radiated in the direction of the maximum level under the specified conditions of measurement;
8. 'peak power', specified as e.i.r.p., contained within a 50 MHz bandwidth at the frequency at which the highest mean radiated power occurs, radiated in the direction of the maximum level under the specified conditions of measurement;";

(2) in Article 2, point 9 is deleted;

(3) in Article 2, point 11 is replaced by:

"11. ‘total radiated power spectral density’ means the average of the mean power spectral density values measured over a sphere around the measurement scenario with a resolution of at least 15 degree. The detailed measuring setup is contained within ETSI EN 302 435 "[11];

(4) in Article 2, the following points 12 and 13 are added:

"12. ‘onboard aircraft’ means the use of radio links for intra-aircraft communications purposes inside an aircraft;

13. ‘LT1’ are systems intended for general location tracking of people and objects that can be put into service on an unlicensed basis.";

(5) Article 3, is replaced by the following:

"Article 3

The Member States shall allow the use of the radio spectrum on a non-interference and non-protected basis by equipment using ultra-wideband technology provided that such equipment meets the conditions set out in the Annex and it is used indoors or, if it is used outdoors, it is not attached to a fixed installation, a fixed infrastructure or a fixed outdoor antenna. Equipment using ultra-wideband technology which meets the conditions set in the Annex shall also be allowed in automotive and railway vehicles";

(6) the Annex is replaced by the text in the Annex to this Decision.

Article 2

This Decision shall take effect from 1 February 2015.

Article 3

This Decision is addressed to the Member States.

Done at Brussels, 7.10.2014

For the Commission
Neelie KROES
Vice-President

CERTIFIED COPY
For the Secretary-General,

Jordi AYET PUIGARNAU
Director of the Registry
EUROPEAN COMMISSION

Annex

1 - GENERIC UWB USAGE

Technical requirements		
Frequency range	**Maximum mean power spectral density (e.i.r.p)**	**Maximum peak power (e.i.r.p) (defined in 50 MHz)**
f ≤ 1.6 GHz	-90 dBm/MHz	-50 dBm
1.6 < f ≤ 2.7 GHz	-85 dBm/MHz	-45 dBm
2.7 < f ≤ 3.1 GHz	-70 dBm/MHz	-36 dBm
3.1 < f ≤ 3.4 GHz	-70 dBm/MHz or -41.3 dBm/MHz using LDC[1]or DAA[2]	-36 dBm or 0 dBm
3.4 < f ≤ 3.8 GHz	-80 dBm/MHz or -41.3 dBm/MHz using LDC[1] or DAA[2]	-40 dBm or 0 dBm
3.8 < f ≤ 4.8 GHz	-70 dBm/MHz or -41.3 dBm/MHz using LDC[1] or DAA[2]	-30 dBm or 0 dBm
4.8 < f ≤ 6 GHz	-70 dBm/MHz	-30 dBm
6 < f ≤ 8.5 GHz	-41.3 dBm/MHz	0 dBm
8.5 < f ≤ 9 GHz	-65 dBm/MHz or -41.3 dBm/MHz using DAA[2]	-25 dBm or 0 dBm
9 < f ≤ 10.6 GHz	-65 dBm/MHz	-25 dBm
f > 10.6 GHz	-85 dBm/MHz	-45 dBm

[1] Within the band 3.1GHz to 4.8GHz. The Low Duty Cycle mitigation technique and its limits are defined in ETSI Standard EN 302 065-1.

[2] Within the band 3.1GHz to 4.8GHz and 8.5GHz to 9GHz. The Detect and Avoid mitigation technique and its limits are defined in ETSI Standard EN 302 065-1.

2 - LOCATION TRACKING SYSTEMS Type 1 (LT1)

Technical requirements		
Frequency range	**Maximum mean power spectral density (e.i.r.p)**	**Maximum peak power (e.i.r.p) (defined in 50 MHz)**
f ≤ 1.6 GHz	-90 dBm/MHz	-50 dBm
1.6 < f ≤ 2.7 GHz	-85 dBm/MHz	-45 dBm
2.7 < f ≤ 3.4 GHz	-70 dBm/MHz	-36 dBm
3.4 < f ≤ 3.8 GHz	-80 dBm/MHz	-40 dBm
3.8 < f ≤ 6.0 GHz	-70 dBm/MHz	-30 dBm
6 < f ≤ 8.5 GHz	-41.3 dBm/MHz	0 dBm
8.5 < f ≤ 9 GHz	-65 dBm/MHz or -41.3 dBm/MHz using DAA[1]	-25 dBm or 0 dBm
9 < f ≤ 10.6 GHz	-65 dBm/MHz	-25 dBm
f > 10.6 GHz	-85 dBm/MHz	-45 dBm

[1] The Detect and Avoid mitigation technique and its limits are defined in ETSI Standard EN 302 065-2

3 - UWB DEVICES INSTALLED IN ROAD AND RAIL VEHICLES

Technical requirements		
Frequency range	**Maximum mean power spectral density (e.i.r.p)**	**Maximum peak power (e.i.r.p) (defined in 50 MHz)**
f ≤ 1.6 GHz	-90 dBm/MHz	-50 dBm
1.6 < f ≤ 2.7 GHz	-85 dBm/MHz	-45 dBm
2.7 < f ≤ 3.1 GHz	-70 dBm/MHz	-36 dBm
3.1 < f ≤ 3.4 GHz	-70 dBm/MHz or -41.3 dBm/MHz using LDC[1] + e.l.[4] or -41.3 dBm/MHz using TPC[3]+ DAA[2] + e.l.[4]	-36 dBm or ≤0 dBm or ≤0 dBm
3.4 < f ≤ 3.8 GHz	-80 dBm/MHz or -41.3 dBm/MHz using LDC[1] + e.l.[4] or -41.3 dBm/MHz using TPC[3]+DAA[2] + e.l.[4]	-40 dBm or ≤0 dBm or ≤0 dBm
3.8 < f ≤ 4.8 GHz	-70 dBm/MHz or -41.3 dBm/MHz using LDC[1] + e.l.[4] or -41.3 dBm/MHz using TPC[3]+DAA[2] + e.l.[4]	-30 dBm or ≤0 dBm or ≤0 dBm
4.8 < f ≤ 6 GHz	-70 dBm/MHz	-30 dBm
6 < f ≤ 8.5 GHz	-53.3 dBm/MHz or -41.3 dBm/MHz using LDC[1] + e.l.[4] or -41.3 dBm/MHz using TPC[3]+e.l.[4]	-13.3 dBm or ≤0 dBm or ≤0 dBm
8.5 < f ≤ 9 GHz	-65 dBm/MHz or -41.3 dBm/MHz using TPC[3]+DAA[2] + e.l.[4]	-25 dBm or ≤0 dBm

9 < f ≤ 10.6 GHz	-65 dBm/MHz	-25 dBm
f > 10.6 GHz	-85 dBm/MHz	-45 dBm

[1] The Low Duty Cycle (LDC) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3

[2] The Detect and Avoid (DAA) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3

[3] The Transmit Power Control (TPC) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3

[4] The exterior limit (e.l.) ≤ -53.3 dBm/MHz is required. The exterior limit is defined in ETSI Standard EN 302 065-3

4 - UWB ONBOARD AIRCRAFT

The values for maximum mean power spectral density (e.i.r.p) and maximum peak power (e.i.r.p) for Short Range Devices (SRD) using Ultra Wide Band technology (UWB), with or without use of mitigation techniques are listed in the table below.

Technical requirements			
Frequency range	**Maximum mean power spectral density (e.i.r.p)**	**Maximum peak power (e.i.r.p) (defined in 50 MHz)**	**Requirements for mitigation techniques**
f ≤ 1.6 GHz	-90 dBm/MHz	-50 dBm	
1.6 < f ≤ 2.7 GHz	-85 dBm/MHz	-45 dBm	
2.7 < f ≤ 3.4 GHz	-70 dBm/MHz	-36 dBm	
3.4 < f ≤ 3.8 GHz	-80 dBm/MHz	-40 dBm	
3.8 < f ≤ 6.0 GHz	-70 dBm/MHz	-30 dBm	
6.0 < f ≤ 6.650 GHz	-41.3 dBm/MHz	0 dBm	
6.650 < f ≤ 6.6752 GHz	-62.3 dBm/MHz	-21 dBm	notch of 21 dB should be implemented to meet a level -62.3 dBm/MHz[1]
6.6752 < f ≤ 8.5 GHz	-41.3 dBm/MHz	0 dBm	7.25 to7.75 GHz (FSS and MetSat (7.45 to 7.55 GHz) protection)[1, 2] 7.75 to 7.9 GHz (MetSat protection)[1,3]

Technical requirements			
Frequency range	**Maximum mean power spectral density (e.i.r.p)**	**Maximum peak power (e.i.r.p) (defined in 50 MHz)**	**Requirements for mitigation techniques**
8.5 < f ≤ 10.6 GHz	-65 dBm/MHz	-25 dBm	
f > 10.6 GHz	-85 dBm/MHz	-45 dBm	

[1] Alternative mitigation techniques offering equivalent protection such as the use of shielded portholes could be a solution.

[2] 7.25 to 7.75 GHz (Fixed Satellite Service) and 7.45 to 7.55 GHz (Meteorological Satellite) protection: -51.3 - $20*\log_{10}(10[km]/x[km])$(dBm/MHz) for heights above ground above 1000 m, where x is the aircraft height above ground in kilometres, -71.3 dBm/MHz for heights above ground of 1000m and below.

[3] 7.75 to 7.9 GHz (Meteorological satellite) protection:

-44.3 - $20*\log_{10}(10$ [km] / x [km]) (dBm/MHz) for heights above ground above 1000 m, where x is the aircraft height above ground in kilometres, and -64.3 dBm/MHz for heights above ground of 1000 m and below.

5 - MATERIAL SENSING DEVICES USING UWB TECHNOLOGY

5.1- Material sensing devices

Material sensing devices permitted under this Decision shall fulfil the following requirements:

- **Fixed installation (application A)**
  - The transmitter has to switch off if the machine is not running, "running sensor";
  - The transmitter shall implement a TPC with a dynamic range of 10 dB, as described in the harmonised standard EN 302 065-4~~498-2~~ for material sensing devices~~ODC (*Object Discrimination and Characterisation*) applications~~;
  - The transmitter shall be attached to a fixed installation.
- **Non-fixed installation (application B)**
  1. Transmitter-on only if manually operated with a non-locking switch (e.g. it may be a sensor for the presence of the operators hand) plus being in contact or close proximity to the investigated material and the emissions being directed into the direction of the object (e.g. measured by a proximity sensor or imposed by the mechanical design);
  2. The transmitter has to switch off if the machine is not running, "running sensor"

Emissions radiating from material sensing devices permitted under this decision shall be kept to a minimum and in any case not exceed the e.i.r.p. density limits within the following Table. The compliance with the limits of the following Table for non-fixed installations (application B) has to be ensured with the device on a representative structure of the investigated material (e.g. representative wall as defined in ETSI EN 302 065-4~~435-1 or ETSI EN 302 498-1)~~.

Frequency range	Fixed installations (Application A)		Non-fixed installations (Application B) Maximum mean power spectral density (e.i.r.p)
	Maximum mean power spectral density (e.i.r.p)	Maximum mean power spectral density (e.i.r.p) in the horizontal plane (-20° to 30° elevation)	
Below 1.73 GHz	-85 dBm/MHz		-85 dBm/MHz
1.73 to 2.2 GHz	-65 dBm/MHz	-70 dBm /MHz	-70 dBm/MHz
2.2 to 2.5 GHz	-50 dBm/MHz		-50 dBm/MHz
2.5 to 2.69 GHz	-65 dBm/MHz[1]	-70dBm/MHz	-65 dBm/MHz[1 and 2]
2.69 to 2.7 GHz	-55 dBm/MHz	-75 dBm/MHz	-70 dBm/MHz[3]
2.7 to 2.9 GHz	-50 dBm/MHz	-70 dBm/MHz	-70 dBm/MHz
2.9 to 3.4 GHz	-50 dBm/MHz	-70 dBm/MHz	-70 dBm/MHz[1]
3.4 to 3.8 GHz	-50 dBm/MHz	-70 dBm/MHz	-50 dBm/MHz[2 and 3]
3.8 to 4.8 GHz	-50 dBm/MHz		-50 dBm/MHz
4.8 to 5 GHz	-55 dBm/MHz	- 75 dBm/MHz	-55 dBm/MHz[2 and 3]
5 to 5.25 GHz	-50 dBm/MHz		-50 dBm/MHz
5.25 to 5.35 GHz	-50 dBm/MHz	- 60 dBm/MHz	-60 dBm/MHz
5.35 to 5.6 GHz	-50 dBm/MHz		-50 dBm/MHz
5.6 to 5.65 GHz	-50 dBm/MHz	-65 dBm/MHz	-65 dBm/MHz
5.65 to 5.725 GHz	-50 dBm/MHz	-60 dBm/MHz	-60 dBm/MHz
5.725 to 8.5 GHz	-50 dBm/MHz		-50 dBm/MHz
8.5 to 10.6 GHz	-65 dBm/MHz		-65 dBm/MHz
Above 10.6 GHz	-85 dBm/MHz		-85 dBm/MHz

The peak power (in dBm) measured in a bandwidth of 50 MHz shall be less than a limit that is obtained by adding a conversion factor (25 dB) to the 'maximum mean power spectral density' (in dBm/MHz) limit.

[1] devices using a Listen Before Talk (LBT) mechanism, as described in the harmonised standard EN 302 065-~~4~~198 2, are permitted to operate in frequency ranges 2.5 to 2.69 and 2.9 to 3.4 GHz with a maximum mean power spectral density of -50 dBm/MHz.

[2] to protect the radio services, non-fixed installations (application B) must fulfil the following requirement for total radiated power spectral density:

a) In the frequency ranges 2.5 to 2.69 GHz and 4.8 to 5 GHz, the total radiated power spectral density has to be 10 dB below the maximum mean power spectral density;

b) In the frequency ranges 3.4 to 3.8 GHz, the total radiated power spectral density has to be 5dB below the maximum mean power spectral density.

[3] Limitation of the Duty Cycle to 10% per second.

5.2- Building material analysis devices (BMA)

1) BMA Devices permitted under this Decision shall fulfil the following requirements:

a) Transmitter-On only if manually operated with a non-locking switch plus being in contact or close proximity to the investigated material and the emissions being directed into the direction of the object;

b) The BMA transmitter has to switch-off after max 10s without movement;

c) The total radiated power spectral density has to be 5 dB below the maximum mean power spectral density limits in the table below;

2) Emissions radiating from BMA devices shall be kept to a minimum and in any case not exceed the maximum power limits within the table below with the BMA device on a representative wall as defined within ETSI ~~Standards~~ EN 302 065-4~~435-1 and EN 302 498-2~~.

Technical requirements		
Frequency range	**Maximum mean power spectral density (e.i.r.p)**	**Maximum peak power (e.i.r.p) (defined in 50 MHz)**
Below 1.73 GHz	-85 dBm/MHz[1]	-45 dBm
1.73 to 2.2 GHz	-65 dBm/MHz	-25 dBm
2.2 to 2.5 GHz	-50 dBm/MHz	-10 dBm
2.5 to 2.69 GHz	-65 dBm/MHz[1]	-25 dBm
2.69 to 2.7 GHz	-55 dBm/MHz[2]	-15 dBm
2.7 to 3.4 GHz	-70 dBm/MHz[1]	-30 dBm
3.4 to 4.8 GHz	-50 dBm/MHz	-10 dBm
4.8 to 5 GHz	-55 dBm/MHz[2]	-15 dBm
5 to 8.5 GHz	-50 dBm/MHz	-10 dBm
Above 8.5 GHz	-85 dBm/MHz	-45 dBm

[1] Devices using a Listen Before Talk (LBT) mechanism described in the harmonised standard EN 302 065-4~~435-1~~ are permitted to operate in frequency range 1.215 to 1.73 GHz with a maximum mean power spectral density of –70 dBm/MHz and in the frequency ranges 2.5 to 2.69 and 2.7 to 3.4 GHz with a maximum mean power spectral density of –50 dBm/MHz.

[2] To protect the Radio Astronomy Service (RAS) bands 2.69 to 2.7 GHz and 4.8 to 5 GHz, the total radiated power spectral density has to be below -65 dBm/MHz.

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ANNEX 5: CALL FOR INFORMATION FROM POTENTIAL STAKEHOLDERS ON COGNITIVE RADIO ENABLED SHORT RANGE DEVICES

The call for information from potential stakeholders collected the following information whereby it should be noted that the number of responses (13) has been very limited compared to other activities on SRDs in CEPT in general:

Questions

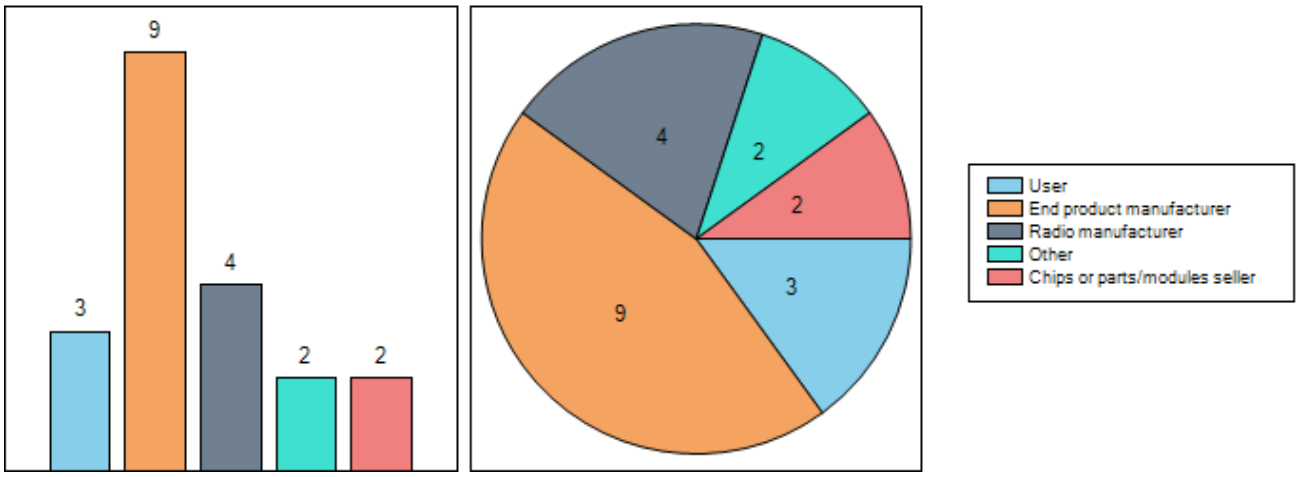
Question 1: Date of response (13 responses)

Dutchview (NED)	27 February 2015
Krohne (D)	23 March 2015
Volkswagen (D)	1 April 2015
Silver Spring Networks (G)	7 April 2015
Sennheiser (D)	7 April 2015
Deutsche Telekom (D)	8 April 2015
Aidon (SE)	8 April 2015
Siemens (D)	10 April 2015
Pilz (D)	10 April 2015
Sony Europe (G)	10 April 2015
Bosch (D)	28 April 2015
CEA-LETI (F)	29 April 2015
Kamstrup (DNK)	1 May 2015

Question 2: What is your activity in wireless domain?

Dutchview	User
Krohne	End product manufacturer
Volkswagen	End product manufacturer
Silver Spring Networks	Radio manufacturer End product manufacturer
Sennheiser	Radio manufacturer
Deutsche Telekom	User Other
Aidon	End product manufacturer
Siemens	Radio manufacturer End product manufacturer

	Chips or parts/modules seller User
Pilz	Radio manufacturer End product manufacturer
Sony Europe	End product manufacturer
Bosch (D)	End product manufacturer Chips or parts/modules seller
CEA-LETI (F)	Other
Kamstrup (DNK)	End product manufacturer



Question 2.1: What kind of user?

	Please specify
Dutchview	broadcast industry
Deutsche Telekom	Network operator (e.g. 2G/3G/4G, WiFi hot spot operator)
Siemens	Manufacturing lines of the products

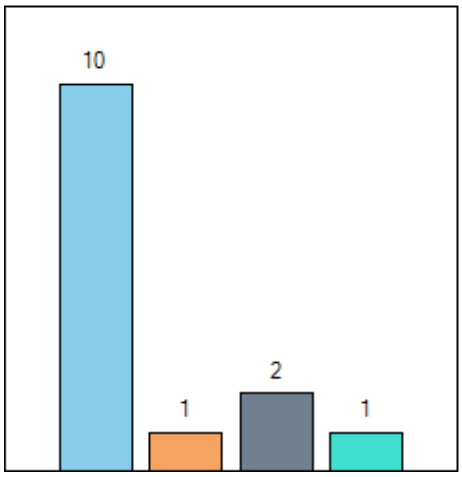
Question 2.2: Other activity

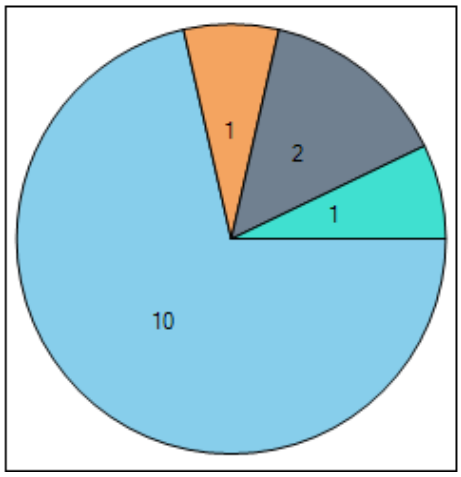
	Please specify
Deutsche Telekom	Distributer
CEA-LETI	Research and development (RTO)

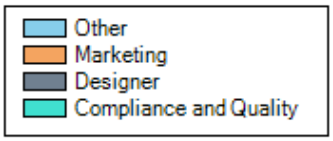
Question 3: What is your function in your company?

Dutchview	Other
Krohne	Marketing

Volkswagen	Other
Silver Spring Networks	Other
Sennheiser	Other
Deutsche Telekom	Other
Aidon	Other
Siemens	Designer
Pilz	Designer Other
Sony Europe	Other
Bosch	Compliance and Quality
CEA-LETI	Other
Kamstrup	Other







Question 3.1: Please specify

Dutchview	Engineer
Volkswagen	Frequency Management (ACEA)
Silver Spring Networks	European Regulatory Director
Sennheiser	Spectrum Management
Deutsche Telekom	Spectrum Manager
Aidon	Sales
Pilz	Developer
Sony Europe	Regulatory/Technology Standards
CEA-LETI	Head of Communication and Security Dpt Also answering as member of the FP7 ICT CRS-i project.

Kamstrup	Engineer

Question 4: Applications/Devices with wireless interfaces

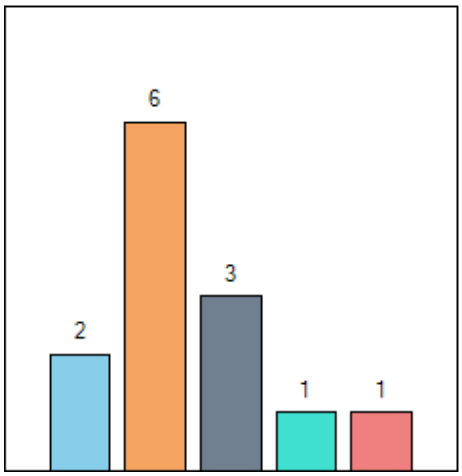
	Applications	**Devices**
Dutchview	PMSE use	wireless microphones in ear monitoring wireless intercom wireless camera
Krohne	Process applications in various industries	Process instrumentation (flow, level, temperature, pressure, analytics sensors)
Volkswagen	Ca. 5 per vehicle	
Silver Spring Networks	Smart Metering/Grid, street lights and IoT	>20M
Sennheiser	Audio PMSE	
Deutsche Telekom	Hot Spots WiFi, DECT, NFC, Home Automation	WLAN (2.4 and 5 GHz), SRD e.g 868 MHz)
Aidon	Data acquisition networks for utilities, smart metering	Energy Meters
Siemens	Wireless Industrial Automation	IEEE802.11, .15, ISO18000-3/6 etc. based SRDs
Pilz	WIA	InduraNET p (EN300328 based SRDs)
Sony Europe		Consumer Electronics (https://www.sony-europe.com/)
Bosch	Building Material Analysis…….	Wallscanner……..
CEA-LETI	Body Area Networks, Personal Networks, M2M, IoT, Indoor Localization, millimeter wave indoor/outdoor systems, TVWS.	Baseband technology, Coding technology, Modems, Antennas (steerable, flexible, miniature), SDR
Kamstrup	Radio mesh networking and Wireless M-Bus for data acquisition	Energy meters (Electricity, heating, cooling and water)

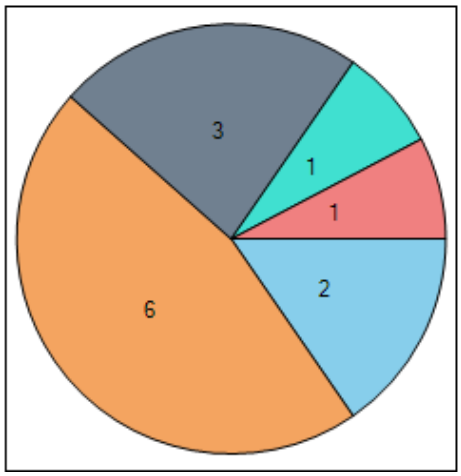
Assessment
The responders are mainly involved in manufacture; only two of the 13 are actual end users. The group can be considered as a balanced group in terms of applications but the number of responding end-users is too low to make final conclusions.

Question 5: Approximate number of wireless devices sold / bought annually in Europe

Dutchview	<1000
Krohne	<1000
Volkswagen	>1M

Silver Spring Networks	<1M
Sennheiser	<1M
Deutsche Telekom	>1M
Aidon	>1M
Siemens	>1M
Pilz	<1M
Sony Europe	>1M
Bosch	<100 000
CEA-LETI	<100
Kamstrup	>1M





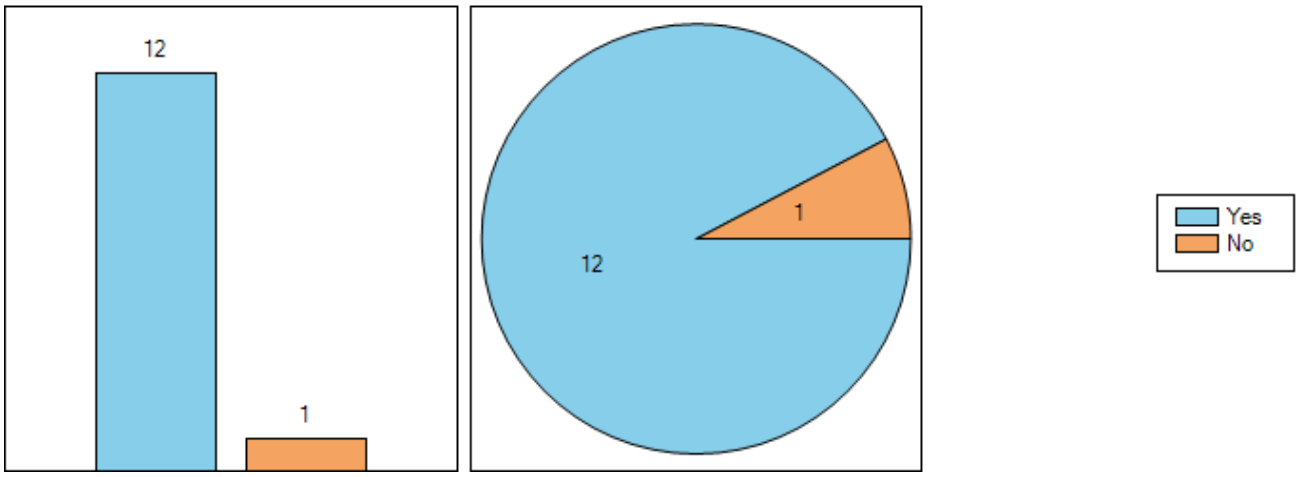
Assessment

Answers cover a wide range of applications

Question 6: Is there a person responsible for the compliance of wireless products to the relevant framework in the company?

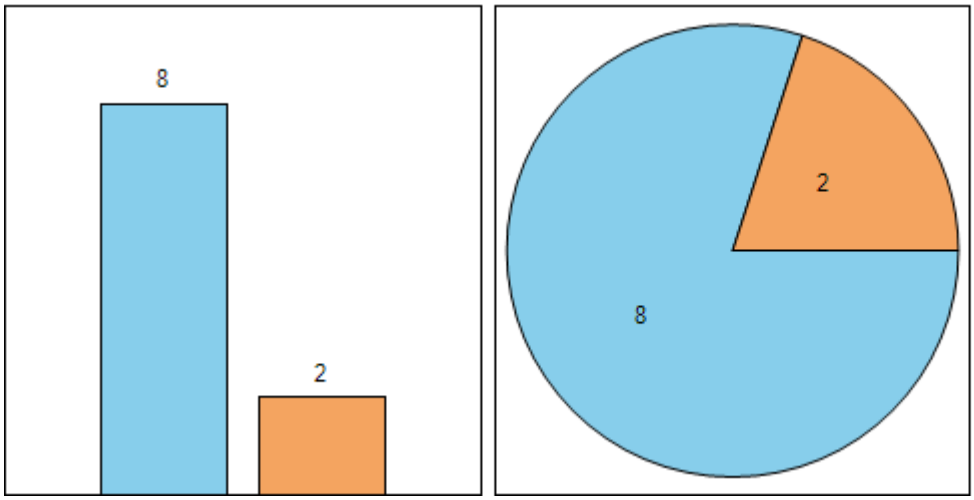
Dutchview	Yes
Krohne	Yes
Volkswagen	Yes
Silver Spring Networks	Yes
Sennheiser	Yes
Deutsche Telekom	Yes
Aidon	Yes
Siemens	Yes
Pilz	Yes

Sony Europe	Yes
Bosch	Yes
CEA-LETI	No
Kamstrup	Yes



Question 7: After reading the introduction, do you understand the aim of the questionnaire?

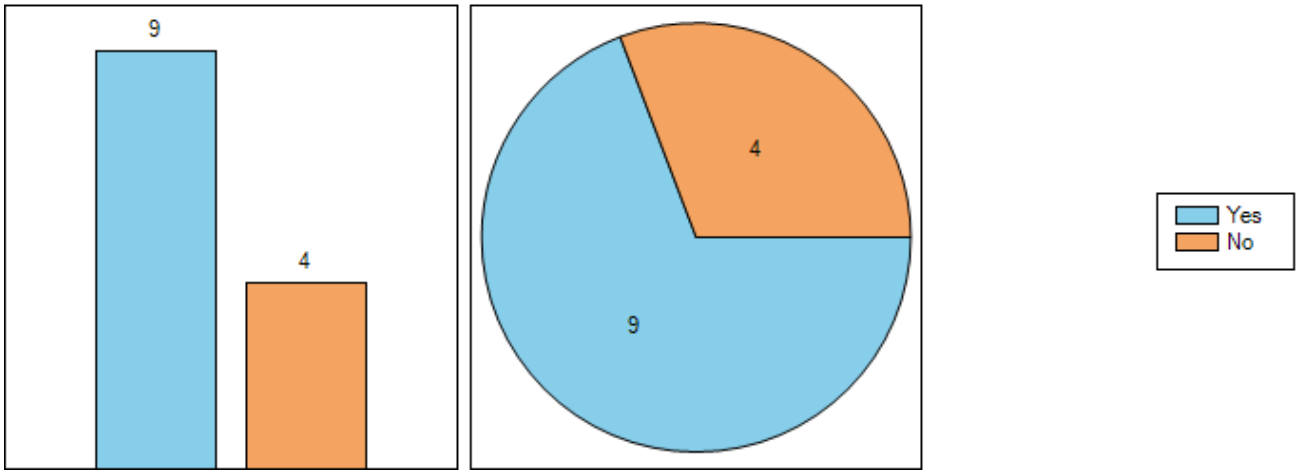
Dutchview	Yes
Krohne	Yes
Volkswagen	Yes
Silver Spring Networks	Yes
Sennheiser	No
Deutsche Telekom	Yes
Aidon	Yes
Siemens	No
Pilz	Yes
Sony Europe	Yes
Bosch	Yes
CEA-LETI	Yes
Kamstrup	Yes



Assessment
The aim of the questionnaire was to start investigations to assess requirements for future cognitive radio enabled SRDs. The investigations include this call for information from potential stakeholder and interested parties in the SRD community. **The majority of responders understood the aim of the questionnaire.**

Question 8: Have you already designed or integrated cognitive radio enabled SRD devices into modules or end products?

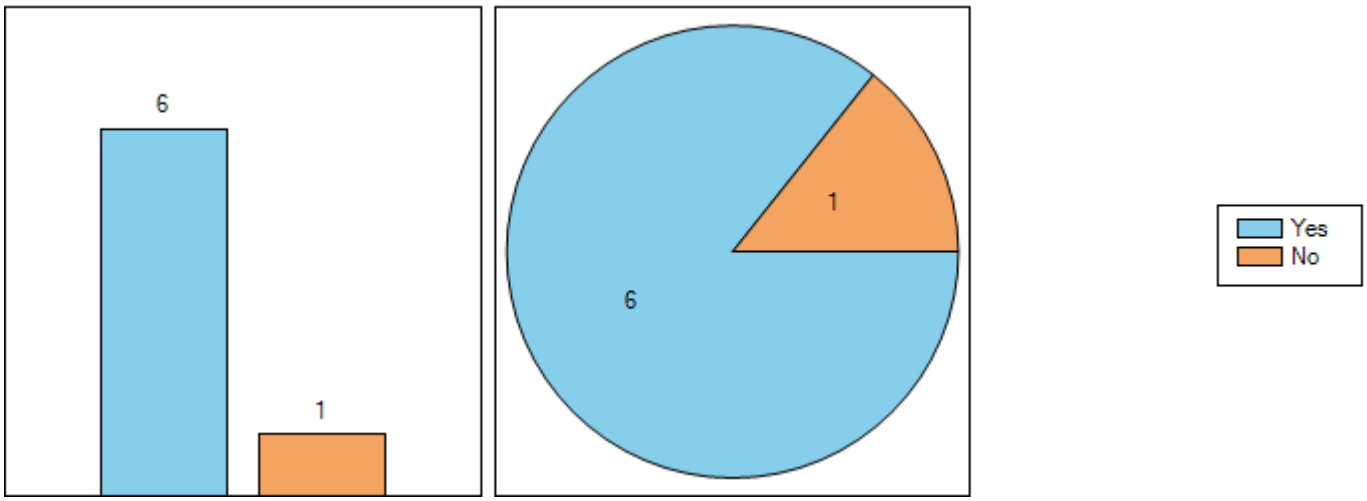
Dutchview	Yes
Krohne	No
Volkswagen	Yes
Silver Spring Networks	Yes
Sennheiser	No
Deutsche Telekom	No
Aidon	Yes
Siemens	Yes
Pilz	Yes
Sony Europe	No



Assessment
Only one manufacturer does not use and is also not planning to use cognitive SRDs in the future.

Question 9: If no (Q8), are you planning to use cognitive radio enabled SRDs in the future?

Dutchview	Yes
Krohne	Yes
Volkswagen	Yes
Sennheiser	Yes
Siemens	Yes
Pilz	Yes
Sony Europe	No



Question 9.1: Explanation

	Why?	**For which application? (If possible fill out question 9)**

Dutchview	PMSE solutions for sharing purposes	PMSE solutions for sharing purposes
Krohne	Use of radio bandwidth in less crowded segments of the RF spectrum. Increase of transmit power for improving signal quality.	Process industry, e.g. WirelessHART, Bluetooth or similar SRD protocols
Volkswagen	maybe	Not defined till now
Sennheiser	According to C-PMSE study but only after fully implementation into relevant standards (e.g. ETSI). Because the PMSE interfaces to a number of different manufacturers products will have to be coordinated.	Secure production quality, will finally only work if all manufactures are using similar standards.
Siemens	a) For the use of battery powered devices in the 5,725 GHz … 5,875 GHz spectrum a centralised RRS concept is needed. b) For increasing the spectrum efficiency; a RRS concept is the right way forward. c) To add additional capabilities	
Pilz	regulatory requirement	

Question 9.2: Explanation

	Why?	**For which application? (If possible fill out question 9)**
Sony Europe	However, we are carrying out R&D for the geo-location database approach to protect incumbent systems such as Earth Exploration Satellite Service for additional 5GHz spectrum for RLANs.	

Assessment
Responders consider the main reasons for the use of cognitivity and reconfigurability to have better sharing possibilities. They also see the need for one or more common spectrum access methods. The solution can be both a regulatory (centralised) approach or a standardised technical method.

Question 10: Which applications do you consider as particularly suited to use a cognitive approach?

	Application(s)	**Why?**
Dutchview	wireless microphones in ear monitoring wireless intercom wireless camera	for being a secondary user in the spectrum and to keep our core business
Krohne	Any industrial applications where transmit power could be increased either due to the absence of other SRDs or strict geographical borders, such as e.g. large petrochemical plants.	
Silver Spring Networks	All	Cognitive approaches are a responsible way in which to share a precious scare resource. There is a vast amount of evidence suggesting that channel sensing is a useful mechanism to avoid interference. Note, specifically, using repeated

		channel transmissions as a communications assurance mechanism is wasteful of spectral resources.
Sennheiser	Audio PMSE that are operated by frequency coordinator(s)	Cognitive application may maintain production quality at current level in a RF spectrum of higher user density but it will not save RF spectrum.
Aidon	Metropolitan area networks, including Smart Grid	Facilitates coexistence with other metropolitan area networks and other applications and increases the flexibility and capacity of the networks.
Siemens	Wireless Industrial Applications (WIA)	a) For the use of battery powered devices in the 5,725 GHz … 5,875 GHz spectrum a centralised RRS concept is needed. b) For increasing the spectrum efficiency; a RRS concept is the right way forward. c) To add additional capabilities
Pilz	WIA	Low requirements to roundtrip times/cycles
Sony Europe	Devices operating with incumbent systems under general authorisation.	There can be no extra hardware costs for accessing a geo-location database.
Bosch	Communication devices	Applications which have a pool of channels available to change if necessary
CEA-LETI	Broadband access, Super Wifi, Home networking, Public safety.	Broadband access: mosty expected in developping countries Super Wifi: extend broadband access range of current campus WiFi Home networking: exploitation of UHF indoor propagation properties (superior to WiFi for the same Tx power => lower EMF) Public safety: first responders require reliable indoor to outdoor wireless connexion which can be provided by TVWS devices in the UHF band
Kamstrup	IoT and Smart Grid	

Assessment
Manufacturers consider their own application as particularly suited to use a cognitive approach. The range is broad so we can consider most applications suitable. **The reason given however are very diverse.**

Question 11: Which of the before mentioned (or other) cognitive techniques do you consider as mature enough?

	Mature enough?	**Not mature enough?**	**Why?**
Dutchview	industry is waiting for RSPG ECC decision and WRC2015. For this moment no solutions	yes	no standards
Krohne	CSMA, LBT	geolocation	How will the geolocation

			database get into the device, especially for low complexity device such as e.g. temperature transmitters? Particularly relevant if the devices or applications are really 'nomadic'.
Silver Spring Networks	All mentioned		These is a substantial installed base of systems indicating mature access mechanisms. All of these techniques are known.
Sennheiser		To our knowledge there is no mature technology available on the market today	Test have proven that current cognitive devices cannot protect audio PMSE
Deutsche Telekom	only CR Geolocation systems relying on geolocation data bases are able to protect incumbent services	the Cognitive Radio (CR) approach based on autonomous sensing or beacons is inadequate to protect incumbent radio services	
Aidon	Beacon, sensing with limitations	Geolocation database	Beacon based solution is in use, sensing requires suitable receiver sensitivity and signal levels and possible knowledge of the signal to be sensed. Use of geolocation database may require regulation, collaboration between the various players and particular technical solutions.
Siemens		Cognitive approaches are mostly not suitable for WIA as they are not deterministic; it just increases the probability of less interference. Central coordination point in the sense of a Reconfigurable radio system (RRS) is today a concept; it is not mature today. Central coordination point in the sense of a Reconfigurable radio systems is today a concept, not mature.	
Pilz		Cognitive approaches are mostly not suitable for WIA as they are not deterministic; it just increases the probability of less interference.	

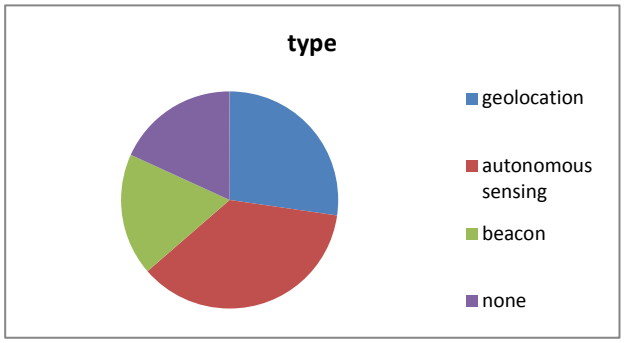
Sony Europe			General Comment; LBT is difficult to provide “fair spectrum access” between different radio access technologies and DFS is difficult to protect new military radar systems.
Bosch	LBT, DAA,CSMA		
CEA-LETI	TVWS using GDB (and sensing)		
Kamstrup	Autonomous sensing, beacon	Geolocation database	Geolocation database might introduce overhead and complexity which is not suited for battery powered devices.

Question 12: Do the cognitive spectrum access techniques, listed below, suit your application(s)? Use remarks field to explain why.

	Geolocation database	Autonomous sensing	beacon
Dutchview	Yes	Yes	
Krohne	No	Yes	Yes
Silver Spring Networks	No	Yes	No
Sennheiser	Yes	No	Yes
Deutsche Telekom	Yes	No	No
Aidon	Yes	No	Yes
Siemens	No	Yes	No
Pilz	No	Yes	No
Sony Europe	Yes	No	No
Bosch	No	Yes	No
CEA-LETI	Yes	Yes	No
Kamstrup	No	Yes	Yes

Assessment

The percentage for sensing and geolocation database use is slightly higher but the main conclusion is that there is no real preference for a particular type of cognitivity.

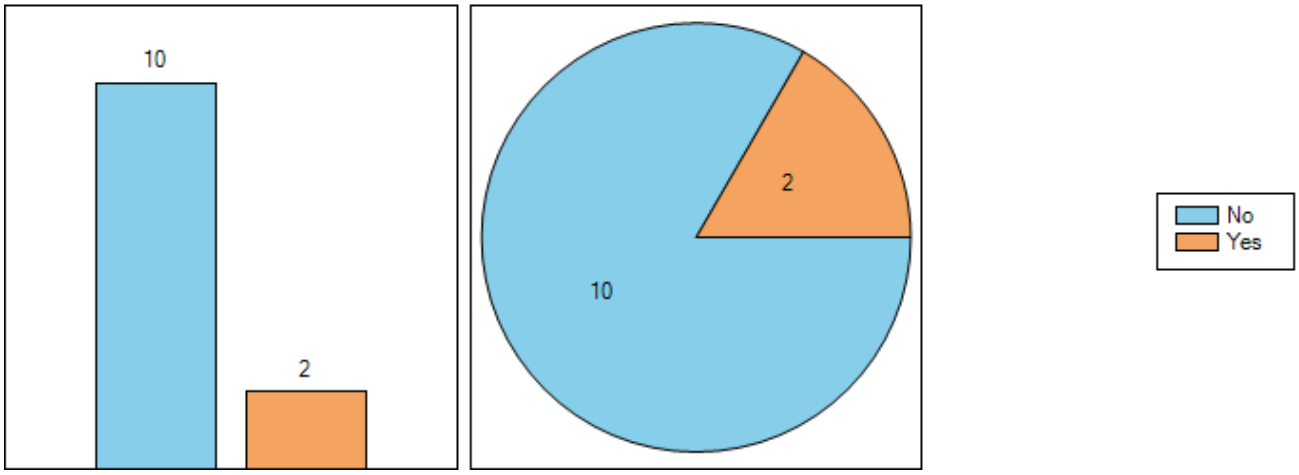


Note that the National Association of Broadcasters (NAB) filed an emergency petition to the FCC in the USA arguing that the databases that are supposed to map out the devices operating in TV white spaces are in fact full of errors and inaccuracies. Note that WSD do not require accurate GPS positioning information in the USA. The petition claims that some users also enter false contact information, so the FCC and licensees do not even know whom to contact to resolve any problems. The issue is critical since a wide range of companies are hoping that the FCC implements database-powered spectrum-sharing technologies more broadly, including potentially in the upcoming incentive auction of 600 MHz spectrum and in the 3.5 GHz band. NAB claims in the petition that one-third of the fixed TVWSDs in the databases contain inaccurate location information, including multiple devices registered in the middle of empty fields or to a single family home, and some even registered in foreign countries. Note that the overall number of TVWSD in the USA is still considered very small.

National administrations, when using a geolocation database approach, should be carefully consider to add a geolocation requirement to white space devices that these would automatically provide accurate location information to white space databases in order to avoid inaccurate location information

Question 13: Do you see other polite spectrum access techniques than mentioned before? Use remarks field to explain why.

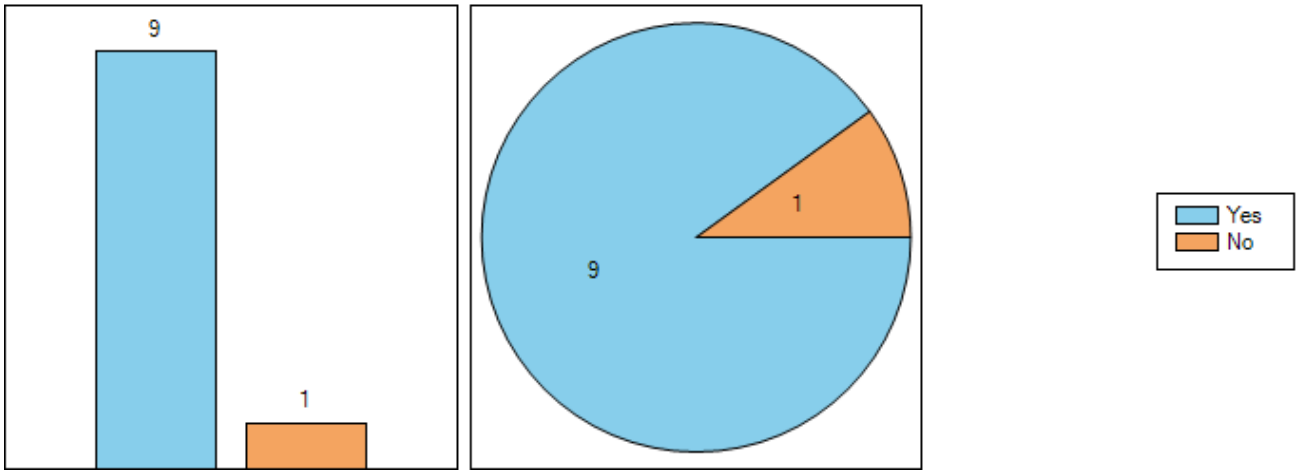
Dutchview	No
Krohne	No
Silver Spring Networks	Yes
Sennheiser	No
Deutsche Telekom	No
Aidon	No
Siemens	Yes
Pilz	No
Sony Europe	No
Bosch	No
CEA-LETI	No
Kamstrup	No



Assessment
The majority of responders do not see possibilities for additional polite spectrum sharing techniques. The ones which do see possibilities are those involved in new applications or new spectrum use and do not have the relatively safe position of those having "their" frequency band and standards already available. **The conclusion is that decisions about innovative use of the spectrum cannot be completely left to industry.**

Question 14: Intra-SRD spectrum sharing studies can be seen as a pre-requisite for the successful implementation of a regulatory approach based on cognitive techniques. Do you agree YES/NO?

Dutchview	Yes
Krohne	Yes
Volkswagen	Yes
Silver Spring Networks	Yes
Sennheiser	No
Aidon	Yes
Siemens	Yes
Pilz	
Sony Europe	Yes
Bosch	Yes
Kamstrup	Yes



Question 14.1: Additional explanations

	Description of the situation	Explain your answer	Suggestion for CEPT to study
Dutchview	see report 204 FM51	see report 204 FM51	see report 204 FM51 RSPG rapport 36
Krohne		predictable spectrum access needed	
Volkswagen		possible interference situations	Coexistence studies before usage!
Silver Spring Networks	Spectrum being shared by devices using mixed mechanisms including simple SRDSs up to complex cognitive systems.	CEPT studies need to be extended to model systems in the time-domain (as well as the frequency domain) in order for the benefits of cognitive systems to be recognised.	CEPT needs to consider introducing tools that model the time-domain in addition to frequency analysis in SEAMCAT eg NS3 or Omnet
Aidon	It seems obvious that in the 870 MHz band there will be HDC SRD's that are required to use specific mitigation techniques, other SRD's not required to use mitigation techniques and incumbents. The sharing between those has been studied rather widely, but the impact of and opportunities opened through the use of cognitive capabilities has not been thoroughly addressed. In many countries incumbent use, such as military use, continues in the 870 MHz band. The SRD's could employ specific techniques facilitating coexistence with incumbents. Furthermore, in	In general, the impact of the utilization of cognitive capabilities by the SRD's on sharing should be further investigated. For example coexistence with the military applications may be significantly enhanced by utilization of cognitive techniques by the SRD's. Secondly, the same may apply in case the ER-GSM is deployed in the upper part of the band.	Study the feasibility of sharing and coexistence in the 870 MHz band in case cognitive radio enabled SRD's are to be deployed. Address sharing and coexistence with military, ER-GSM, etc., duty cycles not limited to 0.1 %,

	some countries the ER-GSM to be based on LTE is expected to operate in the upper portion of the 870 MHz band, in 873-875.6 MHz, whereas SRD's would seem to be limited to the lower portion of the band.		
Siemens	Most of the used technologies are using COTS chip sets based on a IEEE 802 standard. These codings are well known and with that identifiable.	SRD spectrum sharing studies could be helpful to identify the intended neighbours so that outside of a controlled area for example the intended coding can be used to identify neighbours.	Such an approach is only worth to be considered if a completely different legal approach will be established. Today it will not be legal.
Sony Europe	We believe the use of Intra-SRD spectrum sharing studies are required to ensure the most efficient use of spectrum.		
Bosch	General frequency allocation for all kinds of SRD (1% DC to 100% DC) in one band will lead to unbalanced performance		Types of SRD with similar techn. parameter should be grouped
Kamstrup	Soft harmonised bands such as 870-876MHz is a candidate for cognitive techniques where the band is not harmonised to ensure market similarity across country borders.	Coexistence issues needs to be investigated	Further studies must be imitated on impact from SRDs in e.g. military bands as well as other primary users. Also if cognitive radio is enabled in SRD bands under existing regulations, the operation of existing SRDs must be ensured

Question 14.2: Additional explanations

	Description of the situation	**Explain your answer**	**Suggestion for CEPT to study**
Sennheiser		All cognitive SRDs must have a compatible sharing method which is currently not the case. An increasing number of SRDs in a given amount of RF spectrum	How long can the secondary status of audio PMSE remain tenable? Programme distribution via whatever platform is protected but content production is not.

		will not be able to be controlled by a compatible cognitive technology as it can be foreseen that additional spectrum is required. In our view, cognitive SRD does not save RF spectrum. Cognitive audio PMSE is focused on reliability and audio quality. Any interference experienced at the front end of the production chain destroys not just the performance but also any downstream revenue generation.	This is a contradiction that has to be studied.

Assessment
It is common practice that sharing studies are employed to develop spectrum management practices for SRDs. The majority of responders agrees that a similar approach should also be used for cognitive devices. **The conclusion is that intra-SRD spectrum sharing studies including time and location can be seen as a pre-requisite for the successful implementation of a regulatory approach based on cognitive techniques. Hence, a specific cognitive solution cannot be pushed forward in regulation without the availability of sharing studies.**

Question 15: Concerning technical complexity: Do you think that cognitive radio enabled SRDs can compete in the market with less complex technical spectrum access solutions (e.g. duty cycle spectrum access could be understood as being less complex). Please explain your statement.

	Can compete (explain why)	**Cannot compete (explain why)**
Dutchview	sharing like DECT and wifi systems. (Some microphone/intercom techniques)	Long distance use with High tower high power (helicopter links)
Krohne	If cost adder is sufficiently low even if complexity of CR technique is large	if cost adder is too large
Volkswagen		cannot compete - too complex
Silver Spring Networks	None of the techniques listed are expensive to manufacture, but they do require careful design.. These design practices lead to systems that are extremely spectrum efficient, but also act as good neighbours in mixed system environments. However, in the absence of a regulatory reward mechanism for polite behaviour, system designers will tend towards the lowest common denominator design.	
Sennheiser		More complex technology leads to higher costs for end users. Therefore it will be more difficult for cognitive SRDs to compete in the market.
Deutsche Telekom		there is no “low cost approach tCR Geolocation systems are

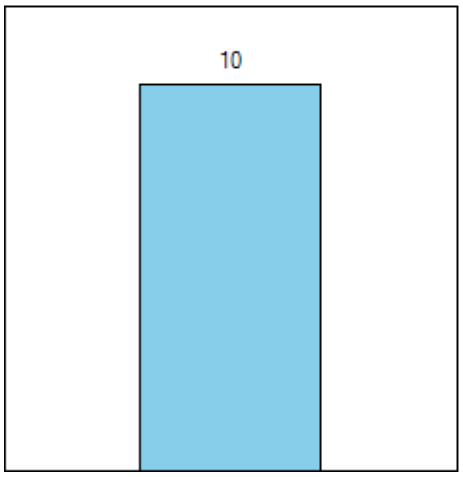
		expensive and need proper attendance by software specialists and regulatorso CR" - due to the fact that SRDs are in general "low cost" CR and SRDs do not fit together.
Aidon	Use of cognitive capabilities facilitates optimization of the network, it becomes more predictable and easier to estimate the performance of the network when amount of devices or data increase.	
Siemens	As the efficiency can be tremendously increased, it has to be excepted otherwise no or only limited digital communication can be used.	
Pilz	If deterministic and fast.	
Bosch	Can compete, if there are significant advantages e.g. the possibility to transmit more often compared to low duty cycle.	Otherwise the costs are high, battery lifetime low (if used)
CEA-LETI	Depends on applications. E.g. professional markets allow for higher cost if superior performance is provided. Also depends on business models (e.g. subscription rate in rural broadband).	
Kamstrup	Yes, as long as there is a reward in e.g. duty cycle for being polite	

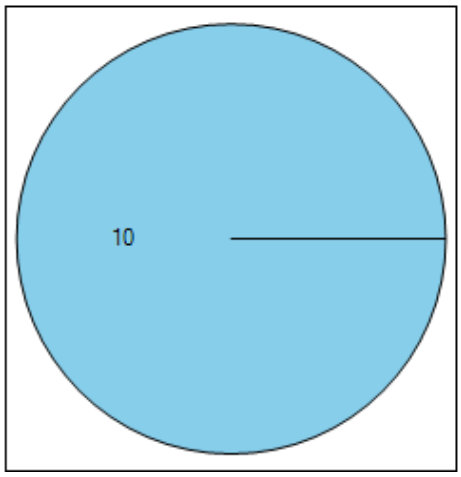
Assessment
Complexity, technical limitations and cost are given as reason why cognitive SRDs cannot easily compete with traditional spectrum access methods. **On the other hand cognitive techniques may increase the effective spectrum use.** **Industry however is not interested in investing in these techniques when there is no clear award for them.** **Such an award could be higher allowed duty cycle or more radiated power but also the use of frequency bands closed for traditional SRDs.**

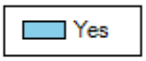
Question 16: Cognitive techniques must also fit to the SRD application itself and the intentions in terms of quality and availability of the service. Do you agree? Please explain your statement. Where do you see the challenges?

Dutchview	Yes
Krohne	Yes
Volkswagen	Yes
Silver Spring Networks	Yes
Sennheiser	Yes
Aidon	Yes
Siemens	Yes
Bosch	Yes

CEA-LETI	Yes
Kamstrup	Yes







Question 16.1: Please explain

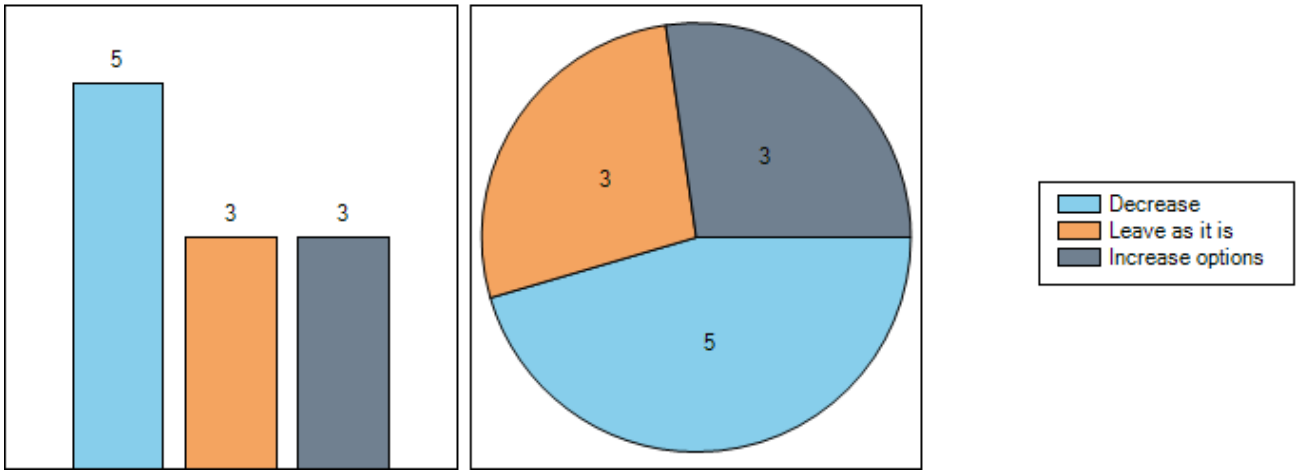
	Explanations	Where are the challenges?
Dutchview	Availability: 100% duty cycle Latency less than 3ms Quality: very high professional use	standard and protocol
Krohne	see next question	Complexity must be in good relation with the sales price that can be achieved per unit. Availability of standardised access techniques will certainly help maintaining the cost.
Volkswagen		New standards need to be discussed with all users
Silver Spring Networks	Apart from the very simplest devices, cognitive techniques are beneficial to most SRD applications. Extremely low activity devices, eg alarms, can be considered a special case, but for most SRD applications, active sharing mechanisms will be beneficial both for the system itself and the wider mixed sharing environment.	The main challenge is the ability to reliably detect unlike systems in the same frequency, location and time.
Sennheiser	For audio PMSE reliability and audio quality are absolutely critical. Any implementation of new cognitive SRD techniques must ensure that no interference is experienced by audio PMSE.	Reliability, audio quality and latency and very low man-made noise.
Aidon	Utilization of cognitive techniques helps achieving and maintaining predictable capacity and QoS.	Challenges are e.g. in the availability of information about other networks and applications in the same geographical area operating in the same band.
Siemens	RRS combined with SRDs makes sense, see CCP concept in TR 103 329.	Computing power of SRD battery powered devices.

Bosch	If the application is not flexible concerning the usage of different frequencies, the frequency cannot be changed.	Some spectrum access depending intelligence has to be implemented
CEA-LETI	Reliability of service is an important factor of success.	Enable QoS in various channel occupation situations. Need for flexible radio able to address potentially fragmented spectrum.
Kamstrup		Battery powered devices might have a disadvantage vs. mains powered devices and politeness towards these devices should be ensured

Assessment
Cognitive solutions must fit to the application needs, different technical reasons are given, such as battery life and computing power needed for complex cognitive algorithms. As an example, it is extremely unlikely that a passive disposable RFID tag can be made cognitive for a reasonable price. In addition, the required cognitive mechanism should be adapted to the required QoS and reliability in terms of a minimum of available spectrum at any point in time. **It is also mentioned that standards are not specifically tailored for cognitive applications, the one size fits all approach is limiting when traditional and cognitive device manufacturers have to agree on a common standard.** **In the end these challenges may be overcome but at a cost that has to be recovered at a certain moment.**

Question 17: Would you prefer an increase or a decrease in the number of spectrum access techniques (e.g. Duty Cycle, LBT, FHSS, DSSS, AFA, other cognitive techniques) in the regulations? Use remarks field to explain your suggestion.

Dutchview	Decrease
Krohne	Leave as it is
Volkswagen	Leave as it is
Silver Spring Networks	Decrease
Sennheiser	Decrease
Aidon	Leave as it is
Siemens	Increase options
Pilz	Decrease
Sony Europe	Increase options
Bosch	Increase options
Kamstrup	Decrease



Assessment
The opinion on the number of spectrum access techniques to be increased, decreased or kept the same is mixed and looking at the background and other answers of the responders. The reason(s) for giving a particular answer is also not the same. **For example, a limited number of spectrum access methods has the potential to increase spectrum efficiency but also protects certain existing applications using these particular methods.** **Manufacturers able to produce such a product for a reasonable price like the number of options to be the same or decreased.** **Manufacturers preferring a method which is not in the list of allowed methods, like the number of methods increased but the focus is only on their own method.**

Question 18: In SRD deployment it is not possible to give each application its own reserved frequency slot. What do you think is important to achieve a good balance and operational reliance for the cognitive enabled SRDs?

	Comment
Dutchview	create sharing possibilities like geo-location databases
Volkswagen	Some frequencies must be reserved for safety functions in the very near future!
Silver Spring Networks	In general, small spectrum bands reserved for special case systems (eg very low duty-cycle devices) cannot be avoided, however, in general the approach for SRD spectrum should be based on polite spectrum shared access.
Sennheiser	Audio PMSE requires a 100% duty cycle. This needs to be fully acknowledged.
Aidon	Utilization of advanced technical solutions, such as cognitive capabilities should be taken into account in the regulation in a manner that would incentivise their use, and thus increase in the efficiency of the overall spectrum use. Furthermore, sufficient bandwidths should be made available to avoid blocking.
Siemens	I disagree that only the frequency assignment is the only mitigation technique. The time is also a valid separator for different SRDs using the same channel, see “Time Synchronized Channel Hopping TSCH) in IEEE 802.15.4e and IEC 62591.
Bosch	General frequency allocation for all kinds of SRD (1% DC to 100% DC) in one band will lead to unbalanced performance Types of SRD with similar techn. parameter should be grouped

CEA-LETI	SDR should be flexible enough to exploit opportunities wherever possible. This required frequency agility, possibility of exploiting fragmented spectrum, temporal agility.
Kamstrup	Comments It must be assured that the cognitive techniques are testable via standards to ensure fair distribution within band

Assessment
It is pointed out that frequency assignment is not the only mitigation method, time is also important. The flexibility to adjust these parameters is seen as a key element to be effective. **Small frequency segments for particular safety considerations aiming at more predictable spectrum access as well as 100% duty cycle applications cannot be completely avoided for now and should be separately assigned.** **Devices with similar spectrum requirements should be grouped and there should also be some control over the behavior and deployment, a standard is seen as one of the tools for this.**

Question 19: What are the most important operational/technical parameters for cognitive radio enabled SRDs (may depend on the SRD application)? Please explain

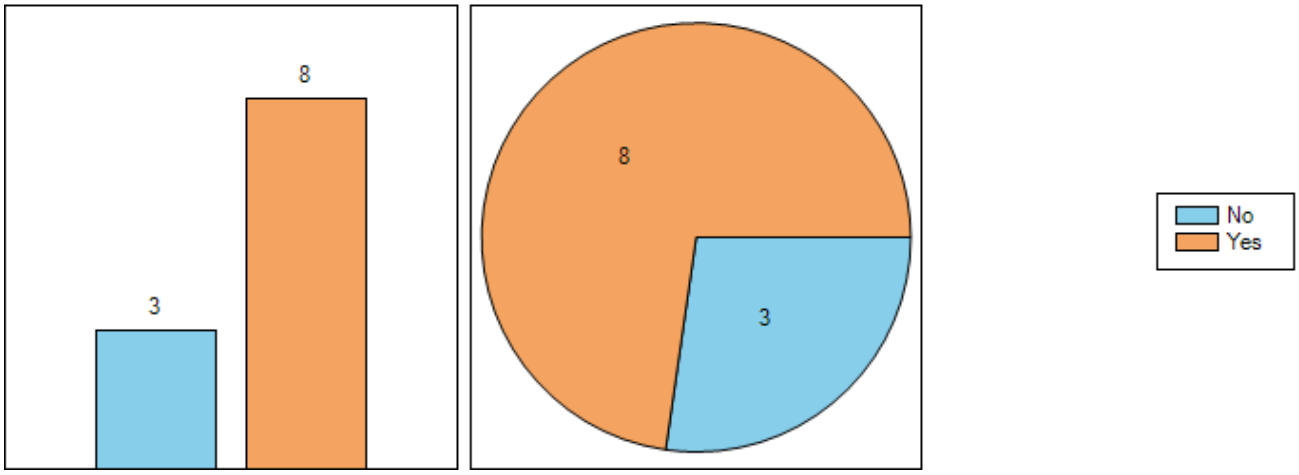
	Important operational parameters	**Please explain**
Dutchview	Availability: 100% duty cycle Latency less than 3ms Quality: very high professional use	for covering live events you need the above mentioned criteria
Krohne	Transmit power, interference control = QoS	
Silver Spring Networks	A polite device should minimise its interference range and maximise the success rate of transmission. To achieve this transmitted power should be adapted to that which is required, and supported by acknowledged transmissions and good receiver performance.	
Sennheiser	Reliability, audio quality, very low latency and very low man-made noise in order to operate a high number of audio PMSE links in parallel.	These are the fundamental working principles for audio PMSE
Aidon	The most important operational/technical parameters depend on the applications, to be studied.	
Siemens	All WIA important operational/technical parameters of an RRS are specified in IEC 62657-2, Ed 2.0	The specified parameters in the various templates could be used to establish an automated coexistent management.
Pilz	Recognition time, reaction time, sync time	Fast recognition, reaction and sync, if possible with seamless data transfer are most important for wireless factory automation and wireless safety.
Sony Europe	Geo-location, output power and antenna parameters	
Bosch	Always “on air” with a related power consumption (battery)	Receiver parameter, hidden node situations which cannot

		be avoided
CEA-LETI	Frequency range; frequency min/max bandwidth ; use of fragmented spectrum ; low radio time response ; good ACLR performance	To garantee service, SDR based cognitive radio must be flexible enough to face various spectrum occupation situations.
Kamstrup	APC should be used to limit interference to the level needed for the application. AFA could be used for detection and avoidance of other systems. SRDs with cognitive capabilities should be rewarded with e.g. bandwidth in foreign band or higher duty cycle.	

Assessment
The operational requirements for cognitive SRDs are very diverse but most of them are a balance of functionality and interference control within the specific application. **It seems that also here a "one size fits all" method is not possible**

Question 20: Do you feel it is possible to enhance the existing SRD regulations to gain new frequency opportunities for cognitive radio enabled SRDs? Use remarks field to specify your suggestion

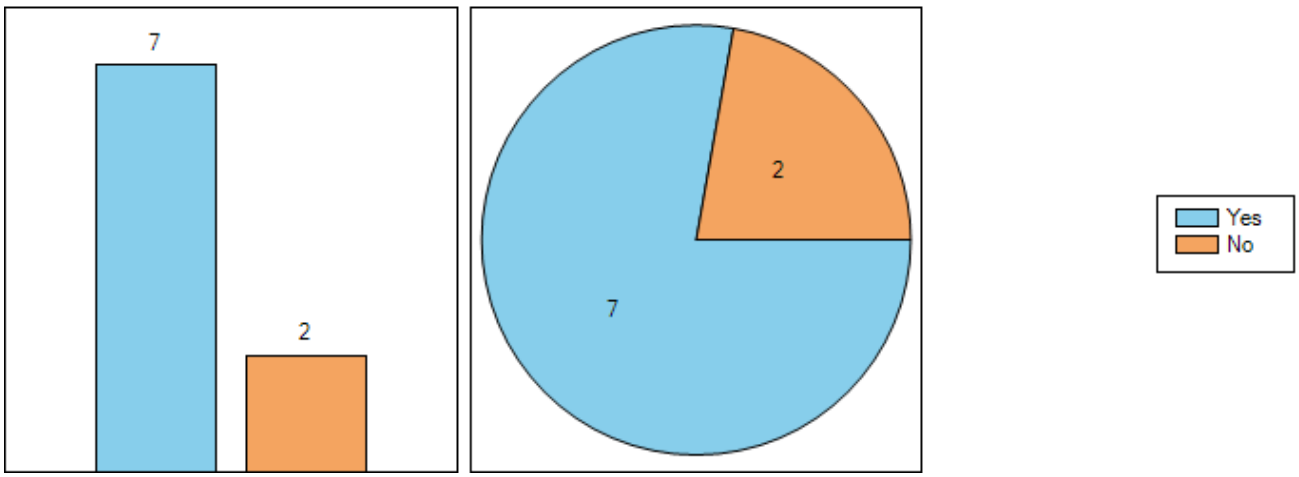
Dutchview	No
Krohne	Yes
Volkswagen	Yes
Silver Spring Networks	Yes
Sennheiser	No
Aidon	Yes
Siemens	Yes
Pilz	No
Sony Europe	Yes
Bosch	Yes
Kamstrup	Yes



Assessment
The manufacturers involved in safety related applications and high duty cycle applications do not see possibilities for enhancement of SRD regulations to gain new frequency opportunities for cognitive radio enabled SRDs. However, the majority not dealing with such aforementioned applications does see possibilities.

Question 21: Are there emerging market needs where cognitive radio enabled SRDs are in your opinion a viable alternative to satisfy the demand/ emerging market needs?

Dutchview	Yes
Volkswagen	Yes
Silver Spring Networks	Yes
Sennheiser	Yes
Deutsche Telekom	No
Aidon	Yes
Siemens	Yes
Bosch	No
Kamstrup	Yes



Question 21.1: Explanations

	Please explain	Should these be treated as generic (non-specific) SRDs or as a specific type?
Dutchview	emerging market for audio video distribution is waiting for a standard protocol. Sharing of PMSE use depends on how much frequencies are still white space.	specific PMSE
Volkswagen	It seems necessary	specific types
Silver Spring Networks	The predicted enormous demand for IoT-connected devices will require much more sophisticated use of the limited spectrum resource. These are generic requirements.	The regulatory community should move away from the concept of application-specific regulation as much as possible to improve the efficiency with which Europe's radio spectrum is utilised.
Sennheiser	Cognitive enabled SRDs could complement existing manually configurable audio PMSE devices but they should not be considered as a viable alternative. At present 100% of all audio PMSE devices are manually configurable and this situation will take many years to change if indeed it ever will.	Specific type of SRD with compatible RF spectrum access methodology.
Aidon	For particular SRD applications there is a need for higher bandwidths and network capacity, which can be fulfilled by access to new bands. Such access may be facilitated by employment of cognitive radio enable SRD's. One such application is smart metering.	Specific type, as the applications have their specific characteristics and requirements.
Siemens	WIA	See requirements of Industrie 4.0, Smart Manufacturing initiatives, IoT, etc. - Generic, non-specific.
Kamstrup	Cognitive radio for SRDs could facilitate IoT and Smart Grid/Metering which will require spectrum in order to meet the demands	Specific categories of SRDs such as Smart Grids/Metering might show potential for global environment and economy and should awarded vs. non-specific SRDs

Question 21.2: Explanations

	Please explain	Should these be treated as generic (non-specific) SRDs or as a specific type?
Deutsche Telekom	SRDs shall continue to be restricted to SRD bands and shall use already proven economic mitigation technologies such as LBT	-
Bosch	Cognitive radio enabled SRDs may relax the problem of congestion of frequency bands for a certain time. The overall increase of SRD will lead to a congestion anyway due to	Specific in case of more relaxed working conditions allowed

	physical reasons: more than one device at the same place, same frequency, same time (independant of the spectrum access mechanism)	

Assessment

Most responders see cognitive SRDs as a method to fulfill emerging market needs but generally only for specific SRD applications.
One responder suggests that SRDs should only be restricted to the SRD bands using proven technologies such as LBT.

From a regulatory point of view there are no SRD bands, there are only ISM bands and shared bands that may be used for SRD on a non-protected non-interference basis.
The remark may be read as use only the established techniques in the current bands used by SRDs and allow cognitive techniques in new shared bands.

This also could solve part of the congestion expected in some bands, if alternatives exist for devices using cognitivity, they are likely to move to the bands were only cognitive devices are allowed.

Question 22: Do you have proposals and descriptions of modifications to technical parameters keeping in mind that the use of spectrum has to be as much as possible technology neutral meanwhile ensuring that other SRDs applications (including existing ones) have to share the same spectrum on equal basis and work properly so as to achieve new spectrum utilisation opportunities for cognitive enabled SRDs?

	Proposal
Dutchview	specific PMSE networks and frequencies
Volkswagen	Spectrum sharing has the big problem of possible interferences between the users. That can be very critical by safety applications!
Silver Spring Networks	All of the above are generally applicable, and technology and application neutral.
Sennheiser	To be considered in suggested studies. See question 9.
Aidon	The regulation should allow access to bands based on utilization of advanced technical approaches, if their utilization can facilitate sharing, coexistence and proper operation of the concerned applications. Furthermore, utilization of certain technical approaches may also have an impact on the regulatory requirements, for example utilization of geolocation database could allow deployment of HDC NRP's based on general authorization. In general, the use of advanced technical solutions could be required, but still the technology neutrality should be maintained. Some examples: - use of an effective interference mitigation method would be required, but a specific method would not be required - if the method is based on an ETSI standard, compliance with a specific HS is needed, but if another method is used, the performance would have to be shown by the manufacturer It is also preferred that the regulatory approaches would be light. Some examples: - coordination between the licensees may be left to be done between the licensees - network deployment information would need to be presented to the regulator only on request
Siemens	The sharing should be based on the parameter: - Frequency - Time - Coding

	- Location - Polarization The use of those parameters to achieve coexistence could be organised by a coexistence manager or a RRS system like CCP concept.
Bosch	What means equal basis? Technical parameter can be fine-tuned if the RF-environment can be approximately predicted (families of devices with similar characteristics)

Assessment
It is again stressed that there are more parameters to be used besides frequency. **Spectrum access should also be based on predicted/presumed utilisation in order to have a predictable environment for more critical applications.** **Regulation should be light on one hand but also specifying the basic rules to avoid collisions between cognitive systems.**

Question 23: Any other suggestion?

	Proposal
Volkswagen	Safety applications (flight, road traffic) must have own safe frequencies bands!
Sennheiser	Stop implementing new SRDs (e.g. TVWSD) before suggested studies leading to a common standard with a compatible RF spectrum access methodology for all SRDs have been finalised. The existing RF landscape is already extremely congested, particularly in the UHF TV band, and great care needs to be exercised before allowing new devices to operate in parallel to audio PMSE.
Deutsche Telekom	a general discussion in CEPT is necessary to decide for which applications CR technologies are suitable.
Aidon	In general, the regulatory requirements should facilitate technology neutral approaches and deployments under general authorization.
Bosch	Incorperate a parameter qualifying the socio-economic benefit for the society (device depending). If and how this could be done needs sensitive studies. The fact that this will become difficult should not avoid profound discussions.

Assessment
In addition to the previous question it is clear that studies are needed before rushing to the implementation of cognitive radio for SRDs.

ANNEX 6: LIST OF REFERENCES

[1] Commission Decision 2006/804/EC of 23 November 2006 on the harmonisation of the radio spectrum for radio frequency identification (RFID) devices operating in the ultra high frequency (UHF) band

[2] Commission Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community

[3] Commission Decision 2009/343/EC of 21 April 2009 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community

[4] ECC Decision (15)05 on the harmonised frequency range 446.0-446.2 MHz, technical characteristics, exemption from individual licensing and free carriage and use of analogue and digital PMR 446 applications

[5] ETSI Harmonised European standard EN 305 550 Radio equipment to be used in the 40 GHz to 246 GHz frequency range

[6] ERC Recommendation 70-03 on Relating to the use of Short Range Devices (SRD)

[7] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity

[8] 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

[9] Commission Decision 2014/702/EU of 7 October 2014 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community

[10] ETSI Harmonised European standard EN 302 498-2 Object Discrimination and Characterization Applications for power tool devices operating in the frequency band from 2.2 GHz to 8 GHz

[11] ETSI Harmonised European standard EN 302 435-1 Building Material Analysis and Classification equipment applications operating in the frequency band from 2.2 GHz to 8.5 GHz

[12] CEPT Report 14 to Develop a strategy to improve the effectiveness and flexibility of spectrum availability for Short Range Devices (SRDs)

[13] CEPT Report 44: Annual update of the technical annex of the Commission Decision on the technical harmonisation of radio spectrum for use by SRD

[14] Commission Decision 2011/829/EU amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices

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[16] ECC Report 181 on improving spectrum efficiency in the SRD bands

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[18] ERC Report 25 The European table of frequency allocations and applications in the frequency range 9 kHz to 3000 GHz (ECA)

[19] CEPT Report 45 the Fifth Mandate to CEPT on ultra-wideband technology to clarify the technical parameters in view of a potential update of Commission Decision 2007/131/EC

[20] CEPT Report 43 “To undertake technical studies on the efficient use of the harmonised 169.4-169.8125 MHz frequency band (169 MHz – Review Mandate)”

[21] ETSI Harmonised European standard EN 300 220 on Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW

[22] ETSI Harmonised European standard EN 300 422 on Wireless microphones in the 25 MHz to 3 GHz frequency range

[23] CEPT Report 26: Annual update of the technical annex of the Commission Decision on the technical harmonisation of radio spectrum for use by SRDs

[24] ETSI TR 101 557 Medical Body Area Network Systems (MBANSs) in the 1 785 MHz to 2 500 MHz range

[25] ECC Report 201 Compatibility study between MBANS operating in the 2400-2483.5 MHz and 2483.5-2500 MHz and other systems in the same bands or in adjacent bands

[26] ECC Report 230 Harmonisation Possibilities for Assistive Listening Devices in the Band 174-216 MHz

[27] ETSI Harmonised European standard EN 303 203 Medical Body Area Network Systems (MBANSs) operating in the 2 483,5 MHz to 2 500 MHz range

[28] ETSI Harmonised European standard EN 303 204 Radio equipment to be used in the 870 MHz to 876 MHz frequency range with power levels ranging up to 500 mW

[29] ETSI Harmonised European standard EN 300 330 Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz
[30] ECC Report 189 Future Spectrum Demand for Short Range Devices in the UHF frequency bands
[31] ETSI TR 103 059 Short-Range Devices (SRD) for operation in the 13,56 MHz band; System Reference Document for Radio Frequency Identification (RFID) equipment
[32] ECC Report 208 Impact of RFID devices on radio services in the band 13.56 MHz
[33] ERC Report 69 Formats for submission of information from administrations to the Office on conditions for operation of Earth stations aboard vessels within the separation distances identified in ITU RR Resolution 902
[34] ECC Report 200 on Co-existence studies for proposed SRD and RFID applications in the frequency 870-876 MHz/915-921 MHz
[35] SRDMG(14)050 - Existing and near future work in CEPT on cognitive radio solutions
[36] The activities in ITU-R WP1B on Dynamic Spectrum Access Devices (DSAD)
[37] ECC Report 182 Survey about the use of the frequency band 863-870 MHz
[38] ECC Decision (09)01 on the harmonised use of the 63-64 GHz frequency band for Intelligent Transport Systems (ITS)
[39] CEPT Report 52 on the harmonised technical conditions for the 1900-1920 MHz and 2010-2025 MHz frequency bands (“Unpaired terrestrial 2 GHz bands”) in the EU”
[40] ECC Report 190 Compatibility between Short-Range Devices (SRD) and EESS (passive) in the 122 to 122.25 GHz band
[41] ETSI TR 103 137 V1.1.1 (2014-01) on ”surveillance radar equipment for helicopter application operating in the 76 GHz to 79 GHz frequency range”
[42] ECC Decision (16)01 on “The harmonised frequency range 76-77 GHz, technical characteristics, exemption from individual licensing and free carriage and use of obstacle detection radars for rotorcraft use”
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[44] ECC Report 222 on the impact of Surveillance Radar equipment operating in the 76 to 79 GHz range for helicopter application on radio systems
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[46] ECC Report 206 on compatibility studies in the band 5725-5875 MHz between SRD equipment for wireless industrial applications and other systems
[47] ETSI Harmonised European standard EN 303 258 Wireless industrial automation; Radio equipment to be used in the 5,725 GHz to 5,875 GHz frequency range with power levels ranging up to 400 mW
[48] ETSI Harmonised European standard EN 301 893 on 5 GHz high performance RLAN
[49] ETSI Harmonised European standard EN 301 559 on Low Power Active Medical Implants (LP-AMI) operating in the frequency range 2 483,5 MHz to 2 500 MHz
[50] DECISION No 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 (Radio Spectrum Decision)
[51] ETSI Harmonised European standard EN 303 360: Obstacle Detection Radar equipment operating in the 76 GHz to 79 GHz range
[52] ETSI Harmonised European standard EN 303 348: Inductive loop for hearing impaired persons in 0- 20 kHz
[53] ETSI Harmonised European standard EN 302 208: Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W and in the band 915 MHz to 921 MHz with power levels up to 4 W
[54] ETSI TR 102 649-1 RFID equipment operating in the range from 865 MHz to 868 MHz
[55] ERC Decision (98)22 on exemption from individual licensing of DECT equipment
[56] ECC Decision (06)01 on harmonised of utilisation of 1920-1980 MHz and 2110-2170 MHz for MFCN including IMT
[57] ECC Recommendation (11)09 on UWB location tracking systems TYPE 2 (LT2)
[58] ECC Recommendation (11)10 on location tracking application for emergency and disaster situations
[59] FM(13)116 - Annex 17: liaison statement from ECC WGFM to ETSI ERM on wireless industrial applications
[60] ETSI Harmonised European standard EN 301 406: Digital Enhanced Cordless Telecommunications (DECT); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
[61] ERC Decision (98)25 on free circulation and use of PMR 446 equipment in CEPT member countries enlarging the field of application of ERC/DEC/(95)01 (withdrawn)

[62] ECC Decision (05)12 on Digital PMR 446 applications operating in 446.1-446.2 MHz (withdrawn)
[63] SRDMG(16)023rev1: ASECAP - Key Figures Road Tolling
[64] ETSI Harmonised European standard EN 300 674: : Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band
[65] ECC Report 250 on compatibility studies between TTT/DSRC and other systems in the band 5805–5815 MHz
[66] Electromagnetic compatibility and Radio spectrum Matters (ERM); System Reference document (SRdoc); Technical characteristics for radio applications below 9kHz
[67] ETSI Harmonised European standard EN 301 598: Wireless Access Systems operating in the 470 MHz to 790 MHz TV broadcast band
[68] ETSI Harmonised European standard EN 303 144: Enabling the operation of Cognitive Radio System (CRS) dependent for their use of radio spectrum on information obtained from Geo-location Databases (GLDBs)
[69] ETSI TR 103 355 on inductive loop systems intended to assist the hearing impaired in the frequency range 0 Hz to 20 kHz (under development)
[70] ETSI TR 103 359 to evaluate the current situation and possible future use of radio applications in the frequency range below 9kHz (under development)
[71] ETSI Harmonised European Standard EN 300 440: Radio equipment to be used in the 1 GHz to 40 GHz frequency range
[72] EASA Decision 2003/11/RM of the executive director of the agency of 5 November 2003 on definitions and abbreviations used in certification specifications for products, parts and appliances (« CS-Definitions ») and amended by an Annex to the Decision (2010/014/R) on 23 December 2010
[73] ETSI TR 102 889-2 Technical characteristics for SRD equipment for wireless industrial applications using technologies different from UWB
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