



# CEPT Report 44

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 8 March 2013 by the ECC**

## 0 EXECUTIVE SUMMARY

This Report describes the proposed fifth update of the technical annex of the EC Decision on the technical harmonisation of radio spectrum for use by Short Range Devices (SRD) and has been developed in the 2011-2012 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:

- CEPT proposes to add the existing regulations for meter reading, asset tracking and tracing and social alarms from EC Decision 2005/928/EC [4] as amended by Commission Decision 2008/673/EC [3]. In addition, the existing regulation for hearing aids should be included as Assistive Listening Devices (ALD) and the existing regulation for asset tracking and tracing and social alarms as non-specific SRD with the respective duty cycle limits. The EC Decision 2005/928/EC [4] can be withdrawn as already outlined in CEPT Report 43 [18]. CEPT proposes to add in the band 169.4-169.8125 MHz a new regulation for non-specific SRD with Low Duty Cycle (LDC) parameters. Exclusion of equipment that concentrates/multiplexes SRD LDC individual equipment data is also considered necessary as a regulatory requirement in the band 169.4875-169.5875 MHz. Sharing in the band 169.4875-169.5875 MHz is only possible with an extremely low duty cycle or day/night sharing;
- CEPT proposes to include the frequency range 57-64 GHz for non-specific SRD with a power of 20 dBm e.i.r.p., a maximum transmit power of 10 dBm and a maximum e.i.r.p. power spectral density of 13dBm/MHz;
- CEPT proposes the following definition of TTT (Transport and Traffic Telematics). “TTT’ means systems in which information and communication technologies are applied in the field of transport (depending on technical restrictions for road rail, water and air), traffic management, navigation and mobility management, as well as for interfaces with other modes of transport including communication in vehicles between vehicles (e.g. car-to-car), and between vehicles and fixed locations (e.g. car-to-infrastructure) as well as communication from and to users”;
- CEPT proposes to include the Eurobalise and Euroloop transmit spectra. These are connected to the telepowering link at 27 MHz which is already included in the annex of the EC Decision;
- The power limit in relation to the antenna for Euroloop should be included in the regulation;
- CEPT proposes the 5795-5805 MHz spectrum for TTT road tolling purposes with a maximum of 2 watts e.i.r.p. for inclusion in the EC Decision for SRD;
- CEPT also proposes for inclusion in 24.250-24.500 GHz a complementary automotive radar mode to the existing entries in 24.050-24.250 GHz;
- A minor modification is proposed by CEPT to replace the term “terrestrial” by “ground-based” for the 76-77 GHz entry in the EC Decision;
- CEPT proposes for inclusion entries for Level Probing Radar (LPR) with description of the essential regulatory parameters such as TPC and antenna pattern and allowing exclusion zones to protect the radio astronomy service under radio determination applications;
- CEPT proposes to widen the scope of application of the 26 and 27 MHz frequency entries for model control to encompass all kinds of wireless controls: a new entry with a maximum transmit power of 100 mW is proposed to be added for non-specific SRD applications whereby all applications should implement a Duty Cycle of 0.1 % except for model controls which still can use a higher duty cycle. The entry for model control for this frequency range is no longer needed;
- CEPT proposes to include the band 2483.5-2500 MHz for active medical implant SRDs;
- CEPT proposes to change the application category name from “Wireless Audio Applications” to “Wireless Audio and Multimedia Streaming Devices”;
- CEPT proposes to change the application category “detection of avalanche victims” in a more generic description “emergency detection of buried victims and valuable items” and include it in a new section in the annex of the EC Decision;
- CEPT proposes to define the category “RFID”. CEPT proposes to keep the RFID terminology which is also used in other documentation since the early 1990’s and add a new and broad RFID definition which includes all kind of tag/interrogator based systems;
- CEPT does not propose generic low power limits since the usefulness is considered doubtful and even may impose a risk for the current used applications and services;

- Pursuant to recommends 5.10 and 5.21 of the RSPG opinion on streamlining the regulatory environment for the use of spectrum [54], CEPT proposes to add a footnote in the EC Decision which states that “ERC Decision (01)17 defines that protection of active medical implant communication systems from short range device applications shall be ensured in the 401-406 MHz frequency band. Additionally, protection of the primary service shall be ensured;
- CEPT proposes to remove the usage restriction to exclude video applications for the frequency band 26.957 to 27.283 MHz.

**The following items for further work were identified:**

- Identifying designations for SRDs above 40 GHz is an on-going task for future updates;
- There is a need to amend the EC Decision on UWB (2007/131/EC) [5] as amended by Commission Decision 2009/343/EC [2] since there are additional regulations in the ECC/DEC/(06)04 [21] amended in 2011. This is covered in a separate CEPT Report in response to the Fifth Mandate on UWB;
- At this moment new spectrum in the UHF range is investigated in a number of ECC and ETSI groups. The results of these studies may be considered in future updates of the EC decisions for SRD. At the same time a study is going on in ECC WGSE about optimising the use of the 863-870 MHz band, the results may also be incorporated in future revisions of the EC Decision for SRD. The possibility of sharing and the associated conditions in the 863-870 MHz band based on present available (monitoring) reports and other reports to be expected in the near future should be a continuous process;
- CEPT proposes to study a comparison of the various solutions for the provision of time signals addressing items such as coverage and reliability, economic feasibility and possible bundling with other services for such solutions and if considered appropriate, to provide a plan for phasing out or relaxing the protection of such time signals in the spectrum over a medium to long-term time-plan (e.g. over 10 years). This will allow for the provision of contiguous spectrum without “notches” for inductive non-application specific SRD. It is also proposed to monitor the actual need for the protection of time services in the inductive applications range;
- At this moment SRD applications using LDC and VLDC as a mitigation technique are investigated. It is likely that more frequency bands outside the traditional SRD bands may become available. It is advisable to follow these developments and reflect this in the EC Decision for SRD in the future;
- The growing requirement for safety-related devices, which are often politically mandated, increases the need for additional radio spectrum. To provide the increased reliability required for such applications, they should operate in a predictable sharing environment. This could be achieved by designating frequency space with defined usage scenarios to a number of specified SRD services, applications or technologies. Further work is needed, based on suitable scenarios, within the compatibility studies;
- CEPT proposes to investigate the possibility to include the band c in annex 8 of ERC/REC 70-03 [15] in the EC Decision for SRD, possibly also for non-model applications, should interest be expressed in this;
- CEPT investigates the need to change the necessary operating parameters of SRDs in 122-122.25 GHz range in order to ensure protection of EESS (passive) service. Studies in CEPT are on-going at the present time;
- CEPT investigates additional frequency opportunities for Assistive Listening Devices (ALD) in the frequency range 174-216 MHz;
- Similar to the integration of Commission Decision 2005/928/EC [4], the Commission Decision 2006/804/EC [7] for UHF RFID should also be integrated in the next update of the EC Decision for SRD. This will facilitate a common and transparent update processing the future as well as more efficient implementation work for the administrations;
- The TTT usage category may still be reconsidered in the future with regard to the question of widening the scope of the application field subject to intra-SRD compatibility issues. This could allow other use and therefore more efficient use of these frequencies and hence, an increased economy-of-scale for such equipment. Especially, radio determination and industrial applications could be considered as interesting fields where the same technology could be used;
- Certain types of SRDs rely on low latency, low duty cycle and/or high reliability spectrum access mechanisms. Examples under investigations are alarms (incl. social alarms), wireless audio, ALDs, asset tracking and tracing, and also some TTT applications, which could potentially be pooled in a limited number of more general categories. The considerations on this subject are at an early stage and activities in ECC on-going, following initial considerations in ECC Report 181 [9];
- A study was performed to look at sharing with ALDs in the band 169.4-169.8125 MHz on the basis of duty cycle. The conclusion is that as ALDs are 100% Duty Cycle, this was possible only with extremely low duty cycle. Future work on sharing in this band should concentrate on means of sharing on a basis
-

- other than duty cycle or day/night sharing such as frequency re-use on a geographic basis by means of a database;
- There is a need to investigate the situation with different types of radar applications (fixed infrastructure and vehicular radars) in the 76-77 GHz range. No restriction is proposed by CEPT until evidence is provided that fixed installed outdoor radar applications could cause harmful interference to the road-safety related vehicular radar applications;
- CEPT cooperates with ETSI in the area of receiver performance to ensure coherence between the regulatory framework and relevant Harmonised European Standards. CEPT invites ETSI to continue to develop improved SRD receiver specifications and/or alternative mitigation techniques, where needed, in collaboration between ETSI and the CEPT, to improve spectrum sharing and spectrum efficiency through standardisation in the case where various SRD applications need to share the same band. E.g. ETSI EG 201 399 [51] and ETSI TR 102 914 [50] procedures for choosing receiver minimum performance, where justified, for Harmonised European Standards and associated regulatory guidance (e.g. an ECC Recommendation similar to ERC/REC 74-01 on unwanted emissions in the spurious domain [23]). The receiver specifications are a prerequisite for CEPT to perform compatibility studies and investigate spectrum access methods.

## TABLE OF CONTENTS

<b>0 EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>1 INTRODUCTION.....</b>	<b>8</b>
<b>2 BACKGROUND.....</b>	<b>8</b>
<b>3 DISCUSSION.....</b>	<b>9</b>
<b>4 GENERAL PRINCIPLES.....</b>	<b>10</b>
4.1 Neutrality Principles.....	11
4.1.1 Application neutrality .....	11
4.1.2 Technology neutrality .....	13
4.1.3 Neutrality principles applied.....	14
<b>5 A STRUCTURED EXAMINATION APPROACH FOR THE TECHNICAL ANNEX OF THE SRD DECISION .....</b>	<b>15</b>
5.1 EXAMINATION of the "type of short-range device" and the "other usage restrictions" categories in the technical annex of the EC Decision .....	16
5.2 Review of ERC Recommendation 70-03 .....	29
5.2.1 Non-specific Short Range Devices.....	29
5.2.2 Tracking, Tracing and Data Acquisition.....	31
5.2.3 Wideband Communication Systems .....	32
5.2.4 Railway applications .....	34
5.2.5 Road Transport and Traffic Telematics (RTTT) .....	35
5.2.6 Radiodetermination applications .....	40
5.2.7 Alarms.....	42
5.2.8 Model Control .....	43
5.2.9 Inductive applications .....	44
5.2.10 Radio microphones applications including aids for the hearing impaired .....	45
5.2.11 Radio frequency identification applications .....	49
5.2.12 Active Medical Implants and their associated peripherals.....	50
5.2.13 Wireless Audio Applications .....	53
5.3 Specific issues.....	54
5.3.1 Generic power limits for SRDs above 30 MHz.....	54
5.3.2 Use of SRD allocations in the 863-870 MHz range.....	55
5.3.3 Investigate how to address receiver capabilities and identify areas where improved receivers could improve spectrum access for SRDs .....	56
5.3.4 Issues on the 169 MHz mandate and SRD roadmap investigation.....	58
5.3.5 Non-specific industrial applications in the 2446-2454 MHz range .....	59
<b>6 OVERVIEW OF CEPT PROPOSAL.....</b>	<b>60</b>
<b>7 WORK ITEMS FOR FURTHER INVESTIGATIONS .....</b>	<b>61</b>
<b>ANNEX 1: GUIDE TO CEPT REGARDING THE ANNUAL UPDATE OF THE TECHNICAL ANNEX OF THE SRD COMMISSION DECISION 2011/829/EU [1] .....</b>	<b>63</b>
<b>ANNEX 2: EC MANDATE TO CEPT .....</b>	<b>65</b>
<b>ANNEX 3: PROPOSED AMENDMENTS TO THE TECHNICAL ANNEX OF THE EC DECISION FOR SRDS 69</b>	
<b>ANNEX 4: LIST OF REFERENCES .....</b>	<b>82</b>

## LIST OF ABBREVIATIONS

<b>Abbreviation</b>	<b>Explanation</b>
<b>ALD</b>	Assistive Listening Device
<b>APPS</b>	Active braking for Pedestrian Protection System
<b>BC</b>	BroadCasting
<b>CEPT</b>	European Conference of Postal and Telecommunications Administrations
<b>CILIR</b>	Calculation of Inductive Loop Interference Range
<b>DAA</b>	Detect And Avoid
<b>DC</b>	Duty Cycle
<b>DFS</b>	Dynamic Frequency Selection
<b>DSRC</b>	Dedicated Short Range Communications
<b>EAS</b>	Electronic Article surveillance
<b>EC</b>	European Commission
<b>ECC</b>	Electronic Communications Committee
<b>EESS</b>	Earth Exploration Satellite Service
<b>ERC</b>	European Radiocommunications Committee
<b>e.i.r.p</b>	Equivalent isotropically radiated power
<b>e.r.p.</b>	Effective Radiated Power
<b>ETSI</b>	European Telecommunications Standards Institute
<b>FCC</b>	Federal Communications Commission
<b>GBSAR</b>	Ground Based Synthetic Aperture Radar
<b>GNSS</b>	Global Navigation Satellite System
<b>GPRS</b>	General Packet Radio Service
<b>GSE</b>	Group Spectrum Efficiency
<b>GSM</b>	Global System for Mobile Communications
<b>ISM</b>	Industrial, Scientific and Medical frequency band
<b>ITS</b>	Intelligent Transport Systems
<b>ITU</b>	International Telecommunication Union
<b>LBT</b>	Listen Before Talk
<b>LDC</b>	Low Duty cycle
<b>LLHR</b>	Low Latency/ High Reliability
<b>LPR</b>	Level Probing Radar
<b>LTA</b>	Location Tracking and sensor applications for Automotive and transportation environments
<b>MGWS</b>	Multiple Gigabit Wireless Systems
<b>PMSE</b>	Programme Making and Special Events
<b>QOS</b>	Quality Of Service
<b>RAKE</b>	Radio Activated Key Entry
<b>RIS</b>	Radio Interface Specification
<b>RFID</b>	Radio Frequency Identification
<b>R&amp;TTE</b>	Directive 1999/5/EC [29] 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
<b>RTTT</b>	Road Transport and Traffic Telematics
<b>SAR</b>	Synthetic Aperture Radar
<b>SRD</b>	ShortRange Devices
<b>SRR</b>	ShortRange Radars
<b>TCAM</b>	Telecommunication Conformity Assessment and Market Surveillance Committee
<b>TLPR</b>	Tank Level Probing Radar
<b>TPS</b>	Telephone Preference Service
<b>TTT</b>	Transport and Traffic Telematics
<b>TVWS</b>	TeleVision White Space
<b>UWB</b>	Ultra-wideband
<b>ULP-AMI</b>	Ultra low power medical implant systems
<b>VLDC</b>	Very Low Duty Cycle
<b>WG FM</b>	Working Group Frequency Management
<b>WG SE</b>	Working Group Spectrum Engineering
<b>WRC-12</b>	World Radio Conference 2012

## 1 INTRODUCTION

This Report has been developed in 2011/2012 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 **fifth update** of the technical annex of the SRD Commission Decision 2006/771/EC [6] 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 Commission Decision 2006/771/EC [6] issued 8 July 2011 (Doc. RSCOM11-28) which is given in Annex 1 to this Report.

## 2 BACKGROUND

In July 2006, ECC adopted CEPT Report 014 [16] 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 Recommendations contained in CEPT Report 014 [16] 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 014 [16]”. 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) refers to Commission Decision of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices (Commission Decision 2006/771/EC [6]). The technical annex of Commission Decision 2006/771/EC [6] 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 life 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.

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

The Guidance from the Commission to CEPT on the fifth update of the SRD Decision again requests CEPT when preparing its response to the permanent mandate to take into account a number of principles which are generally consistent with the approach developed by CEPT for the implementation of the “SRD strategy”. It emphasises in particular that “technical parameters in the technical annex of the SRD Decision set the requirements which all short range devices to be used in these bands must at least comply with. At the same time practical implementations of these requirements defined via Harmonised European Standards may apply in order to meet the essential requirements defined pursuant article 3 of the R&TTE Directive”. Due to the general authorisation regime under which the SRD will operate, results of CEPT sharing studies implemented in spectrum regulation shall also be included in Harmonised European Standards according the ETSI CEPT MoU before entering into force of spectrum regulation.

CEPT has been requested to pay attention to a number of specific issues during the present update, in particular to perform an examination of the “type of short-range device” and the “other usage restrictions” categories in the technical annex in order to widen the scope of the Decision with the least constraining usage conditions, to allow for as much flexibility as possible for manufacturers and users and to remove as many restrictions as possible.

SRD applications operate in general under the general authorisation regime without individual rights and with some obligations (also often called license-exemption or license-free conditions). They are not a recognised and defined radio service according to the ITU-R Radio Regulations [10]. Under article 4.4 of the RR, spectrum for SRD can be implemented by an administration in their frequency utilisation plans under the rule of “no harmful interference and no protection. Furthermore, pursuant to Directive 1999/5/EC [29] (the R&TTE Directive), manufacturers should ensure, that all radio equipment under the Directive effectively uses the radio frequency spectrum so as to avoid harmful interference.

The essential requirement in Art. 3.2 states “In addition, radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communication and orbital resources so as to avoid harmful interference”. The Directive also defines “harmful interference” as “interference which endangers the functioning of a radionavigation service or of other safety services or which otherwise seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with the applicable Community or national regulations”.

It is the role of the regulators to ensure that SRDs do have equal access to frequency bands and would therefore have to protect each other to a reasonable and defined extent. This is a principle which is proposed by CEPT in the context of the examination of application categories in the technical annex of the EC Decision. In order to ensure this goal, CEPT performs studies based on ETSI Technical Reports (named System Reference Documents (SRDoc)) providing visibility on expecting deployment scenario, technical characteristics and economic background on new radio applications under standardisation in ETSI. The results of these studies are transferred to minimum technical requirements to be included in ETSI Harmonised European Standards for SRD applications according to the MoU between ETSI and ECC. In addition, CEPT can also start spectrum engineering studies when proposed and agreed by the administrations in the CEPT.

The outcome of CEPT investigations in view of improving the existing regulatory framework for SRDs and identifying additional frequency ranges to be harmonised through the SRD Decision is presented in the following sections.

These investigations have resulted in a CEPT proposal for amendment of the technical annex of the EC Decision for SRD (see section 4 and annex 3) and clarification of current CEPT work items for further investigations (see section 5). CEPT has informed ETSI accordingly to ensure that the relevant Harmonised European Standard will be updated or developed accordingly.

Pursuant to Directive 1999/5/EC [29] (the R&TTE Directive) manufacturers should ensure, that short-range devices effectively use the radio frequency spectrum. This was usually interpreted as to avoid harmful interference to radio services and short-range devices or share the spectrum equally between the SRD but the new ECC Report 181 [9] offers a more comprehensive methodology to accomplish this.

## 4 GENERAL PRINCIPLES

One of the main goals of the EC SRD decision is to create regulatory certainty and flexibility for users and industry at the same time by harmonising the frequency bands and the related technical parameters for the availability and efficient use of radio spectrum for short-range devices so that such devices may benefit from "Class 1" classification under Commission Decision 2000/299/EC [8]. The following points are in assistance to that principle.

Some general principles for updating the annex of the EC Decision for SRD can be found in CEPT Report 035 [17] in response to the permanent EC mandate on SRDs and the plan on the implementation of the SRD strategy. In addition to this the implementation of the RIS-II template is considered in this update.

During the drafting of the 2009 revision of the annex it was concluded that the annex is already RIS compatible so a modification would only be a cosmetic change and not necessary. During the drafting process of this fifth update, RIS-II compatibility is again observed as a continuous process.

In 2009 SRD/MG and ECC/WGFM concluded that it was desired to include SRDs based on UWB technology by reference in the ERC/REC 70-03 [15]. This increased the transparency for industry to find the relevant UWB regulation in one place. UWB-technology based SRD applications operating mainly in the frequency ranges 3.1-4.8 GHz and 6-9 GHz are covered by a different EC Decision [5], although the technology itself is used for short range wireless applications in support of broadband communication applications or the provision of location information with accurate resolution based on the usage of ultra-wideband(s). SRD applications at higher frequencies in the EHF such as 60 GHz or 120 GHz also use air interfaces which can be considered as ultra-wideband but these applications are not considered as ultra-wideband and are actually covered by the EC Decision for SRD and the present Report.

It could be argued that to merge all kinds of SRD related EC Decisions into one (e.g. RFID, UWB) to the EC Decision for SRD would further provide additional transparency, so the interested public can find the relevant SRD regulations in one place.

For this update the European Commission explicitly requested to take general principles into account: "The update should focus on widening the scope of the Decision with least constraining usage conditions and allow for as much flexibility as possible for manufacturers and users. The removal of as many restrictions as possible from existing and proposed allocations in the technical annex should be pursued. More constraining usage conditions for already existing entries should be avoided (they can only be introduced in duly justified cases)".

In addition, CEPT is requested to "perform an examination of the "type of short-range device" and the "other usage restrictions" categories in the technical annex in order to widen the scope of the Decision with the least constraining usage conditions, to allow for as much flexibility as possible for manufacturers. In its preparatory meetings SRD/MG decided therefore to respond to this request to use a flow chart based decision scheme to assist in this task. Adopting this method can be seen as a first step for future improvements of the technical annex of the EC SRD decision.

Based on stipulated market demand, and forecasts such as contained in ETSI System Reference Documents, it may also assist to investigate the possibility to create generic overlay bands or bands with common spectrum access parameters beyond the current frequency segments. Spectrum access can also be seen as a key prerequisite for market demand and that transparent regulations in which all restrictions are clearly defined, resulting from CEPT sharing studies based on assumed deployment scenarios, hence facilitating the usability of the bands by new applications. Therefore, the EC has asked the CEPT to examine the applications categories and to identify the usage restrictions that they represent (e.g. the assumed usage density, i.e. number of devices that have been considered in the respective compatibility studies, etc.).

## 4.1 NEUTRALITY PRINCIPLES

The EC framework for electronic communications services refers to the principles to be technology and service neutral supporting the continuous process of development and innovation going on.

The principle of technology and service neutrality may be translated in technology and application neutrality for the specific environment of SRDs (low power / general authorisation).

The technical layout of complete radio systems can be chosen with maximum freedom. The choice of modulation systems, error correction protocols and link establishment choices for robustness and latency and the application are all the choice of the manufacturer.

It is likely that for the same reason of technology neutrality there will be a trend towards grouping users not by application but more by the type of signal transmitted. This also supports the principle of “commons” segments of spectrum not specifically designed for one application but available for those users obeying common access rules: E.g., access to a frequency sub-band will depend on a combination of parameters such as power, duty cycle, length of transmission, spectrum access method. This section is a discussion of some of the issues arising from this preferred neutrality principle. Most of the work on this topic was performed in ECC WGSE Project Team SE-24 and published in ECC Report 181 [9].

### 4.1.1 Application neutrality

Two immediate points to make are:

- that the expectation and requirement of the user varies widely;
- that various ranges of applications are needed to answer to the market demand.

In this report, applications refer to categories or types of devices performing a specific task with a particular installed base described by one or more system reference documents (including the usage scenario of these types of devices) and/or application specific harmonised standards.

As such it is defined as a field or scope of application in terms of usage application such as non-specific applications (i.e. all usage fields) or specific applications, i.e. specific usage fields for which specific usage scenarios and usage densities were assumed in the respective spectrum compatibility studies. The term application should not be misunderstood as a specific field of technology.

Consider as example the following applications, each of which generates a short data burst. In each case the application data content is only one or two bits, but the message or packet is built up to some 50 to 100 raw data bits consisting of overhead and security needs. The actual transmissions are very similar, and possibly indistinguishable without a priori knowledge.

1. Remote control, lighting control: the user expects the message to be delivered and acted upon within a very short time, of the order of 100 ms. A noticeable delay, or a manual retry is unacceptable to the user;
2. RAKE (Radio Activated Key Entry) car systems. Garage door opener: the user has the same expectation of almost instant response, but is conditioned to make a retry in the event of failure;
3. Building security systems; intruder detection, social alarms: a delay of the order of 5 seconds may be acceptable. While some intruder systems may have 90 second delays for verification, social alarm and fire alarms would expect a response in a few seconds;
4. Heating, ventilation, air-conditioning control; building management: the acceptable delay could be of the order of minutes.

Although the data bursts belonging to the applications above may be almost identical in form to an external observer, the applications they belong to have very different criteria for success, and therefore different needs in terms of spectrum access. Or to express it more formally:

**The relationship between spectrum access and perceived functionality is different for different applications, even though the signal parameters are identical.**

The key issue that differentiates the examples chosen is Latency – the time within which the message must be transferred and acted upon. Latency is also an issue for moderate sized data bursts. For instance point-of-sale equipment or GPS location data may require latency of no more than a few seconds, but certain telemetry or status reporting could accept much more. Even with large or continuous data, the same variation occurs. Voice, for instance, requires very low latency, but audio streaming can withstand a few seconds delay and some applications, such as file transfer, can withstand longer. Latency is just one requirement, reliability or bandwidth could also be a requirement.

**Application neutrality therefore can only be achieved if the proper technology, in terms of latency, reliability or data bandwidth is described for all application types in the same environment.**

The principle of application neutrality means the end of segregation by application – whereby sub-bands were designated exclusively to a particular application, primarily within the European SRDs generic frequency ranges. In order to preserve technical efficiency, a suitable replacement could be partitioning of the bands based on technical objectives – e.g., sub-bands for high reliability, for low latency, for high throughput. However, this may lead to more detailed definition being needed in describing the technical requirements and this may lead to a reduction in technology neutrality if not performed properly.

A way to achieve those conflicting objectives is by creating licence exempt spectrum access rules with minimum and appropriate technological restrictions, in such a way that the QoS for all existing and predicted future applications can be achieved. Application neutrality is therefore a desirable overall aim.

This is obviously not always possible in shared spectrum. A segment of shared spectrum does therefore not always support all applications. This means that in some cases (for instance very demanding applications)

full application neutrality may not be an achievable objective if those applications are allowed to impose these requirements in the respective shared spectrum.

At the same time it is worth noting that sometimes an SRD application may have very clear specific technical characteristics that may employ opportunistic sharing techniques to enable it to politely operate within spectrum allocated to radiocommunication services that otherwise would be interfered by generic SRDs. This may represent an improved spectrum use efficiency, beneficial to both uses.

**In this case the application neutrality principle should be used with caution.**

On the basis of common technical access spectrum, this principle leads to a combination of different applications and so, multiple equipment/applications in a same frequency band should be able to coexist. The aggregation effect due to the increasing concentration of devices could create unanticipated interference cases. For an identified application, the aggregation effect could be assessed but the basic approach addressed by neutrality application is that the type of the implemented application is unknown.

**Full application neutrality may not be an achievable objective and should be used with caution.**

This is a key aspect in regard to first level compatibility (i.e. SRD vs. primary services sharing). If a specific application category is defined and important to limit the number of SRDs that can use the band, then the avoidance of harmful interference is a suitable justification for keeping the application restriction. In other words, a review of the relevant compatibility studies is necessary before opening the band to other applications. The present Report also indicates where such restrictions based on assumptions for very specific scenarios and usage densities exist.

Finally, it needs to be emphasised that it is ultimately the responsibility of manufacturers to build short-range devices in a way to protect such devices against harmful interference to the extent possible and to minimise the risk of interference from radiocommunication services as well as from other short-range devices sharing the same medium. This should be noted in particular for such SRD devices where the users claim to have high requirements in terms of e.g. latency, throughput, predictability or reliability of the wireless

communications link. In such cases, the implementation of adaptive techniques to “escape” interference or the definition of special frequency bands conditions as discussed further in the following may be solutions.

#### 4.1.2 Technology neutrality

Technology neutrality has different definitions in different areas of technology and is in electronic communication usually described as “the rules should neither require nor assume a particular technology” As you can see for SRD technology this reads in two parts “require” as in regulation and “assume” as in (harmonized) standards.

The principle of technology neutrality is more difficult to realise and therefore may not always be realised by regulation without sacrificing spectrum use efficiency. It should be still possible to frame regulations so that, for instance, either analogue or digital modulation is allowed or a range of bandwidths is possible. In most cases, however, it is necessary to set specific technical conditions to allow successful sharing, so technology neutrality is at odds with spectrum efficiency. There may be a case for a “sandpit” area, akin to the concept of bands identified for ISM, where technology neutrality is applied as far as possible, to assist the emergence of new technologies.

Technology neutrality is a desirable aim, but similarly, is only truly achievable when applications have equal access and equal requirements.

This addresses a second-level compatibility (i.e. intra-SRD sharing) which needs to be established to ensure that SRDs do have equal access to bands and therefore have to protect each other (instead of being protected by regulators). The sharing rules mandated in spectrum regulation then become the level playing field on which SRDs would have to operate. As such, there could therefore be the case for having different playing fields for different categories of SRDs. Appropriate spectrum access rules facilitate predictable sharing arrangements. Proposal for predictable sharing definition:

**Predictable Sharing Environment: Common behaviour for communication equipment and systems, common rules with common well defined technical parameters and mitigation techniques to provide better defined sharing conditions within a specified frequency band.**

From the spectrum requirements presented by industry, it is clear that some new services and functions, such as safety related applications, may require a more predictable sharing environment than that provided by traditional mitigation techniques. Different scenarios for combining services requiring a predictable sharing environment should be considered during compatibility studies in order to determine an acceptable solution.

Alternatively, by careful specification of the technical parameters and mitigation techniques, it may be possible to create a predictable sharing environment for the whole band that could apply to all SRDs.

From studies in Project Team SE24 the SRD/MG can conclude that a maximum Group Spectrum Efficiency (GSE) is achieved when the used technology is of the highest achievable mitigation level for that particular application. Mitigation level in this context means the effectiveness with which the spectrum may be equally divided between a fixed number of users/applications/devices allowing at the same time all users/applications/devices to fulfil their operational requirements. Only the addition of systems with equal mitigation levels relative to the original systems may be added to keep the same GSE level. This is something that at the moment is usually reflected in an application category. Systems with better mitigation levels may be added as long as their mitigation levels are equally polite to the existing systems as to systems of their own kind. This may be explained with two different examples, the first example adds a more sophisticated system to a group of relatively spectrum inefficient devices, the other example describes the opposite and adds a less spectrum efficient and less polite device to a group.

It is important to distinguish between spectrum occupancy and spectrum efficiency. The value of using a particular part of spectrum comes from the utility it provides to users, which is not necessarily the same as the data traffic. A distinction should be made between the concepts of Single system Absolute spectrum Efficiency (SAE), which is based on the raw data transmitted, and Group Spectrum Efficiency (GSE), which is closer to the broader utility or service provided.

One conclusion is that some SRDs operating in “exclusive to one SRD category” bands might indeed benefit if in those bands the maximum medium utilisation is limited so that devices relying on low occupancy to realise a reliable operation can achieve their wanted QoS in terms of latency and reliability.

At the same time, it would be wasteful and inefficient to operate the entire spectrum identified for SRDs in this way. In other sub-bands, whenever there is demand, occupancy and throughput levels will have to rise. Regulators and industry will have to devise means of achieving this. Since basic DC is only effective as a sharing mechanism up to relatively low levels of occupancy and throughput, this may require the introduction of more advanced sharing mechanisms.

**From the above we can conclude that spectrum efficiency and technology neutrality are in direct conflict with each other if no mandatory technical border conditions for all devices in a certain environment are defined.**

These border conditions are the technical boundaries between which the value of a technical parameter may vary.

#### 4.1.3 Neutrality principles applied

In October 2010 a questionnaire was developed in SRD/MG in cooperation with ETSI Task Group TG28 in ETSI Technical Committee ERM to investigate the industries experience with the regulatory parameters and framework of the frequency band 863-870 MHz. Although this is just one of the frequency ranges in ERC/REC 70-03 [15] and the EC SRD decision the results give some insight in the industries requirements to place products on the market. The survey was answered by both established and new manufacturers, large and small from different sectors of industry. A few conclusions are that 2/3 of the respondents do not see benefit in decreasing the number of application categories, about the same number of respondents thinks special treatment such as protection is justified. On the other hand half of the respondents support application and technology neutrality. From the answers we may conclude that application neutrality is more accepted than technology neutrality therefore application neutrality may be a key point for changing regulation in the future. This means that spectrum sharing is found important and applications with similar spectrum requirements should share spectrum to maximize the spectrum usage. A number of detailed ideas were given and are taken into account in this revision or will be discussed at a later stage.

From both the theoretical approach and the results of the survey we can conclude that predictability of spectrum availability is needed for some applications having specific requirements such as low latency, high reliability/availability or wideband data throughput. This requires a medium access definition for adaptive equipment. The current situation is that dynamic spectrum access regulations are underdeveloped but under the attention of the relevant ECC and ETSI groups. Existing techniques also need to be better evaluated, such as DAA (more sophisticated LBT + AFA), LDC, robust spread spectrum modulations or signal parameter requirements. The application of a MUF (Medium Utilisation Factor) may be used to make spectrum more application neutral. This is not a new concept it is mentioned in Recommendation ITU-R SM.1046-2 [26] and in ETSI ERM Task Group TG11 used the concept to devise the mitigation methods in standard ETSI EN 300 328 [31] On-going studies in ECC and ETSI show that the principle cannot be applied without caution and setting boundary conditions for each frequency range as explained in the previous sections. This is a task to be performed within ETSI

The application categories in the current and proposed revised annex are not in all cases what they seem to be. Part of the application contains deployment figures and the technical border conditions for proper operation and mitigation often referring to specific ETSI Harmonised European Standards. Removing those categories may create the need for referencing to the applicable compatibility results in ECC study reports to the harmonised standards. This reference needs to have regulatory value. It is also advisable to keep an informative section on typical applications in the annex.

It is valuable to have a look at some technologies to come.

One of these is cognitive radio. Cognitive Radio can enable a better utilisation of the available spectrum resulting in a higher QoS, doing so through the sensing of its surrounding spectral environment, and “choosing” appropriate unused frequencies over which data can be transmitted without the risk of interference. In case of a dynamic change of the spectrum access conditions, a broadcasted data base, sensing system or any other system for updating the conditions of spectrum access is needed.

Another technology is Low Duty Cycle (LDC) where DC is described in terms of activity patterns instead of just an activity figure. The LDC figures in parts of the technical annex could be better described and as a result be defined in combination with higher emission values in some cases. ETSI Special Task Force 411 [45] is currently working on this issue. Project Team SE-24 needs to verify whether the results may be included in the regulation.

## 5 A STRUCTURED EXAMINATION APPROACH FOR THE TECHNICAL ANNEX OF THE SRD DECISION

The objective of the examination of the technical annex as requested in the EC mandate by the European Commission is to ensure transparent and predictable sharing arrangements with least constraining usage conditions and as much flexibility as possible for manufacturers and users that foster coexistence between: primary users vs. SRD and SRD vs. SRD. The examination itself uses the principles from the previous section and factual information from ECC reports and ETSI reports and standards.

### Background

Sharing arrangements for SRDs can be considered to encompass the operating condition(s) and the sharing rule(s) that govern the shared use of spectrum between independent users in a particular range of frequencies:

Type of short-range device	Frequency band <sup>(1)</sup>	Transmit power limit/ field strength limit/power density limit <sup>(2)</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>(3)</sup>	Other usage restrictions <sup>(4)</sup>	Implementation deadline
(...)					

Operating conditions
Sharing rules

Figure 1: Operating conditions and sharing rule are results of compatibility studies.

Two step examination:

Animal implantable devices <sup>(14)</sup>	315-600 kHz	- 5 dBµA/m at 10 m	Duty cycle limit <sup>(7)</sup> : 10 %	B	1 November 2010
	12,5-20,0 MHz	- 7 dBµA/m at 10 m in a bandwidth of 10 kHz	Duty cycle limit <sup>(7)</sup> : 10 %	This set of usage conditions applies to indoor applications only	1 November 2010

A
B

Figure 2: 2-step approach examination approach

### Step 1 "type of short-range device"

If the type of short-range device is not a non-specific short-range device we have to examine the technical characteristics of the application (category).

This step is performed by checking the relevant ECC study reports and ETSI System Reference Documents to identify if a specific technical or usage scenario is assumed. For example Duty Cycle as given in the technical characteristics is usually constructed of a Duty Cycle and an activity factor which is not always visible. Also a very specific antenna system may be a key part of the application.

## **Step 2 "other usage restrictions"**

If the application category is removed, does the existing usage restriction/condition properly describe what is removed or is it possible to construct such a usage restriction/condition?

If this is not the case the application category has to be maintained and a justification has to be provided. It may however be possible to make the category more general by adding as much as possible usage restriction/condition

"Other usage restrictions" are justifiable if:

- They are necessary to enable coexistence between different SRDs i.e. through ensuring a specific level of reliability or latency;
- They are necessary to protect services;
- necessary to enable a predictable sharing arrangements for SRDs, i.e. by ensuring a specific interference limiting behaviour;
- necessary to ensure a minimum level shared spectrum access for different SRDs;
- etc.....

If "other usage restriction" is justifiable:

**Provide unambiguous parameter  
and  
least restrictive definitions**

The practical approach therefore includes inter-alia checking the existing compatibility studies with regard to compatibility issues with radio services and intra-SRD compatibility. In addition, SRDs having similar requirements need to be identified.

The objective of this examination is not to "decrease the number of categories", it is rather to: (1) assess to what extent the application descriptions in the "type of short-range device" category qualify as justified "other usage restrictions" (or are merely informative descriptions of typical usage) and then (2) to provide documented justifications for applications-specific designations and for "other usage restrictions". On the basis of this examination and the principles developed in section 4, CEPT can for example propose to introduce generic SRD categories and to include other usage restriction where necessary to ensure backward compatibility for existing users in a band or to safeguard first-level compatibility with radio services.

## **5.1 EXAMINATION OF THE "TYPE OF SHORT-RANGE DEVICE" AND THE "OTHER USAGE RESTRICTIONS" CATEGORIES IN THE TECHNICAL ANNEX OF THE EC DECISION**

For the review the latest version of the annex and the approach in section 3.2 is used. Table 1 contains all entries in the current annex with the application name, the relevant footnotes, frequency band and technical parameters. An application category could theoretically be removed and replaced with a set of technical parameters to fulfil the minimum technical requirements for compatibility with the radio services requirements and intra SRD compatibility to allow other users. This means the original technical specifications remain in place but some usage conditions are added to allow those other users.

This approach however would risk going one step too far and too fast. As said before the objective of examination is not just to "decrease the number of categories"

Table 1 contains a column with the application category and two columns to describe this application category with parameters in addition to the already existing technical parameters and usage requirements.



Signal parameters not expressed in transmitter signal parameters

Some of these parameters are given in other usage restrictions but also an assumed usage pattern may be of importance.

Additional parameters describing the application category.

These parameters may not be a direct technical requirement but a necessity such as battery operated, weight restricted implying an indirect maximum achievable technical limit opposite to the minimum requirement.

Both columns contain basically what is required to describe the application category, a third column "Removal of application category required / possible" indicates if it is possible to include these parameters and under which conditions, it is basically the result of the analysis.

Table 2: contains a simplified summary of the results of the analysis performed in Table 1:.

**Table 1: Analysis of application categories**

Application Category	Frequency band	Additional parameters needed to describe application category	Requirements not expressed in transmitter signal parameters	Removal of application category required / possible	Relevant CEPT, ECC or ETSI documentation
<b>Non-specific</b>	6765-6795 kHz	None		Not applicable	ECC Report 001 ECC Report 011 ECC Report 013 ECC Report 037 ECC Report 040 ERC Report 098 ECC Report 011 ERC Report 109 ECC Report 002 ECC Report 068 ECC Report 002 CEPT Report 38 CEPT Report 35 CEPT Report 5 CEPT Report 14 ETSI TR 102 649-1 ETSI TR 102 649-2 ETSI TR 102 134
	13.553-13.567 MHz				
	26.957-27.283 MHz				
	40.660-40.700 MHz				
	433.050-434.040 MHz				
	434.040-434.790 MHz				
	863.000-865.000 MHz				
	865.000-868.000 MHz				
	868.000-868.600 MHz				
	868.700-869.200 MHz				
	869.400-869.650 MHz				
	869.700-870.000 MHz				
	2400-2483.5 MHz				
	5725-5875 MHz				
	24.150-24.250 GHz				
61.0-61.5 GHz					
122-123 GHz					
244-246 GHz					
<b>Wideband data transmission systems</b>	2400-2483.5 MHz	Power reduction to 10mW	May have certain level of adaptability and error correction. Some modulation types such as narrowband analogue are excluded.	Already in list of non-specific applications with wideband entry maintained. No action proposed.	ECC Report 011 ERC Report 001 ERC Report 109 CEPT Report 26
	57.0-66.0 GHz			To be included in list of non-specific applications with. TX Power reduction to 10mW with an addition of a max e.i.r.p limit of 20 dBm. Wideband entry maintained. No action proposed.	ECC Report 113 ECC Report 114 CEPT Report 35 CEPT Report 26
<b>Alarm systems</b>	868.600-868.700 MHz	Description of DC		Yes with technical description in	ECC Report 011

Application Category	Frequency band	Additional parameters needed to describe application category	Requirements not expressed in transmitter signal parameters	Removal of application category required / possible	Relevant CEPT, ECC or ETSI documentation
		pattern Description of typical deployment figure.	Low latency, high reliability May be battery operated with battery lifetime requirements.	frequency space were suitable sharing conditions with applications of the same kind is guaranteed. Currently this is arranged in reserved sub bands. No change advised at the moment, wait for ECC WGSE/SE-24 WI-42 to be finalised. It should be noted that ETSI has created a new work item for a Harmonised European Standard for alarms (including social alarms) operating in UHF frequencies in November 2012.	ECC Report 013 ECC Report 037 ECC Report 040 ERC Report 098
	869.250-869.300 MHz	Description of DC pattern. Description of typical deployment figure.			
	869.300-869.400 MHz	Description of DC pattern. Description of typical deployment figure.			
	869.650-869.700 MHz	Description of DC pattern. Description of typical deployment figure.			
<b>Social alarms</b> (Social alarm devices are used to assist elderly or disabled people when they are in distress)	869.200-869.250 MHz	Description of DC pattern. Description of typical deployment figure. Description of receiver specifications			ECC Report 011 ECC Report 013 ECC Report 037 ECC Report 040 ERC Report 098 ETSI TR 103 056
<b>Inductive applications</b> This category covers, for example, 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	9.000-59.750 kHz	Antenna aperture or field strength distribution at different distances		Not required, inductive already describes an application independent technical condition. The entries that have a similar entry in the non-specific section have emission levels expressed both in e.i.r.p. power level and field strength thus expressing a specific antenna configuration without giving the construction details of that antenna. For the band 400-600 KHz: and 13553-13567 MHz, an unlimited number of devices could cause	ECC Report 135 ERC Report 044 ERC Report 069 ECC Report 001 ECC Report 007 ECC Report 001 ERC Report 074 ERC Report 092 ERC Report 095 ECC Report 067 ERC Report 096 CEPT Report 38
	59.750-60.250 kHz				
	60.250 74.750 kHz				
	74.750-75.250 kHz				
	75.250-77.250 kHz				
	77.250-77.750 kHz				
	77.750-90 kHz				
	90-119 kHz				
	119-128.6 kHz				
	128.6-129.6 kHz				
	129.6-135 kHz				
135-140 kHz					
140-148.5 kHz					

Application Category	Frequency band	Additional parameters needed to describe application category	Requirements not expressed in transmitter signal parameters	Removal of application category required / possible	Relevant CEPT, ECC or ETSI documentation
systems, data transfer to handheld devices, automatic article identification, wireless control systems and automatic road tolling.	148.5-5000 kHz. In the specific bands mentioned below, higher field strengths and additional usage restrictions apply:			interference to the services in this band	CEPT Report 35 ETSI TR 102 756 ETSI TR 101 981 ETSI TR 102 378 ECC Report 001 CEPT Report 35 CEPT Report 35 ETSI TR 102 309
	400-600 kHz	Compatibility studies with the BC service assume a low typical density of devices.	This category covers inductive applications used for Radio Frequency Identification (RFID).		
	3155-3400 kHz				
	5000-30000 kHz. In the specific bands mentioned below, higher field strengths and additional usage restrictions apply:				
	6765-6795 kHz				
	7400-8800 kHz				
	10200-11000 kHz				
	13553-13567 kHz	Compatibility studies with the broadcast and radio amateur service assume a low typical density of devices	This set of usage conditions applies to RFID and EAS only		
26957-27283 kHz					
<b>Active medical implants</b>  This category covers the radio part of active implantable medical devices, as defined in Council Directive 90/385/EEC of 20 June 1990 on the approximation of the laws of the	9-315 kHz	Compatibility studies assume a typical density of devices and a duty cycle and duty cycle pattern. Studies also assume Indoor use in hospital or medical premises but not exclude outdoor use and use at home.	High level of integration. Battery power considerations resulting in limited choices of technology.	No. 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	ECC Report 012 CEPT Report 35 CEPT Report 26 ETSI TR 102 434
	30.0-37.5 MHz				ECC Report 092 CEPT Report 35 ETSI TR 102 343
	402-405 MHz				ECC Report 092 CEPT Report 35 ETSI TR 102 343

Application Category	Frequency band	Additional parameters needed to describe application category	Requirements not expressed in transmitter signal parameters	Removal of application category required / possible	Relevant CEPT, ECC or ETSI documentation
	401-402 MHz			should prove coexistence for new applications.	CEPT Report 35 ETSI TR 102 316
Member States relating to active implantable medical devices and their peripherals (OJ L 189, 20.7.1990, p. 17).	405-406 MHz	Deviating from the assumed pattern of density and duty cycle could interfere with band scanning devices taking the receiver out of “sleep mode” at more regular intervals and therefore depleting the battery faster than calculated.		ERC/DEC/(01)17 has been amended in 2011 and includes a new Decides 4 : “Decides 4 of this ERC Decision define that protection of ULP-AMI communication systems from short range device applications shall be ensured in the 401-406 MHz frequency band. A true non-specific status is not recommended.	ECC Report 081 CEPT Report 35
<b>Animal implantable devices</b> This category covers transmitting devices which are placed inside the body of an animal for the purpose of performing diagnostic functions and/or delivery of therapeutic treatment.	315-600 kHz	Although a high number of devices are installed/ implanted the number of readers is low.	These are inductive applications, mainly handheld and mobile.	No, an unlimited number of devices could cause interference to the services in this band.	
	12.5-20.0 MHz	Only used indoors in test laboratories with a low installed base.		No, an unlimited number of devices could cause interference to the services in this band.	ECC Report 011 ECC Report 013 ECC Report 037 ECC Report 040 ECC Report 081
<b>Low power FM transmitters</b> This category includes applications which connect personal audio devices, including mobile phones, and the automotive or home entertainment system.	87.5-108.0 MHz	Analogue modulation according to Recommendation ITU-R BS.450 [53] Very low power devices. Channel spacing.	Uninterrupted reception required according to Recommendation ITU-R BS.412 [53], but only at very short range.	No, the restriction to the modulation is required since otherwise the whole application scenario would change.	ECC Report 073

Application Category	Frequency band	Additional parameters needed to describe application category	Requirements not expressed in transmitter signal parameters	Removal of application category required / possible	Relevant CEPT, ECC or ETSI documentation
<p><b>Wireless audio applications</b></p> <p>Applications for wireless audio systems, including: wireless microphones, cordless loudspeakers; cordless headphones; cordless headphones for portable use, e.g. portable CD, cassette or radio devices carried on a person; cordless headphones for use in a vehicle, for example for use with a radio or mobile telephone, etc.; in-ear monitoring and wireless microphones for use at concerts or other stage productions.</p>	863-865 MHz	100% DC, low power,	Uninterrupted reception required.	It is proposed to widen the application category from Wireless Audio Applications to Wireless Audio and Multimedia Streaming Devices.	ECC Report 011 ERC Report 109 ECC Report 111 CEPT Report 26
<p><b>Radio determination applications</b></p> <p>This category covers applications used for determining the position, velocity and/or other characteristics of an object, or for obtaining information relating to these parameters.</p>	2400-2483.5 MHz	Not needed - the band has been identified with the current parameters since the 1990's.	Movement detectors have limited DC characteristics compared with non-specific SRD which justifies the increased emission level of 25 mW versus 10mW.	No change proposed	ECC Report 11 CEPT Report 26
	17.1-17.3 GHz	Detailed description of antenna pattern. Detailed description of LBT mechanism.	Low density static deployment.	Not advisable see the dedicated chapter in this report.	T/R 20-04 CEPT Report 26
<p><b>Tank level probing radar</b></p> <p>Tank Level Probing Radars (TLPR) are a specific type of radiodetermination application, which are used for tank level</p>	4.5-7.0 GHz	Detailed description of emission levels outside the tank and associated test procedure.	Very low density static deployment.	TLPR and LPR are actually not a usage category in itself (they fall into category radio determination applications) but there are other usage restrictions related to their installation and associated limits, also covered by the applicable harmonised standards.	ERC Report 109 CEPT Report 38
	8.5-10.6 GHz				
	24.05-27.0 GHz	Detailed description of application, in tank only.			
	57.0-64.0 GHz				
	75.0-85.0 GHz				

Application Category	Frequency band	Additional parameters needed to describe application category	Requirements not expressed in transmitter signal parameters	Removal of application category required / possible	Relevant CEPT, ECC or ETSI documentation
measurements and are 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.					
<b>Model control</b>	26990-27000 kHz		This application has a Typical location dependency and Duty Cycle figure and pattern.	Yes, make available for all SRD applications. An entry for all kinds of controls and telemetry was once defined in T/R 20-04 in 27.3-32.3 MHz. Add a suitable DC limit to ensure protection of the others usages in these channels.	CEPT Report 38
	27040-27050 kHz				
	27090-27100 kHz				
	27140-27150 kHz				
	27190-27200 kHz				
<b>RFID</b>	2446-2454 MHz	RFID needs to be defined as a system consisting of an interrogator including one or more passive or active tags that in the light of the R&TTE directive need to be seen as a single device.		No need, RFID with the proper description is already an application neutral technology. It is suggested to define the RFID category.	ECC Report 109 CEPT Report 38
<b>Road transport and traffic telematics</b>	24.050-24.075 GHz	Specific antenna, DC and dwell time figures apply depending on the respective sub-band.	Specific deployment figures	No	CEPT Report 35 CEPT Report 38 ECC Report 134 ECC Report 164
	24.075-24.150 GHz				
	24.150-24.250 GHz				
	24.250-24.500 GHz				
	63-64 GHz			Accomplished and described in this report with specific power and power density requirements	ECC Report 113 ECC Report 114 ERC Report 003 CEPT Report 38

Application Category	Frequency band	Additional parameters needed to describe application category	Requirements not expressed in transmitter signal parameters	Removal of application category required / possible	Relevant CEPT, ECC or ETSI documentation
	76.0-77.0 GHz	<p>Predominantly used for ground based vehicle radars which are road safety related applications. Fixed installations are possibly interfering with vehicle radars hence defeating the intended road-safety purpose. An exception is the railway level crossing application which is seen to be compatible with the ground based vehicle radars.</p>		<p>No, CEPT proposes to use the acronym TTT and proposes a definition for TTT.</p>	<p>Identified in 1992 in CEPT, no supporting study report ETSI TR 102 704</p>



**Table 2: Summary of the analysis of the application terminology**

Name of category / terminology	Description
Non-specific short-range devices	<p>This category is available for any type of application which fulfills the technical conditions (typical uses are telemetry, telecommand, alarms, data in general and other similar applications).</p>
Alarm systems	<p>Not clearly defined but alarms applications need a predictable sharing arrangement including latency limits and high reliability requirements). This can be achieved by using low duty cycles or equivalent techniques. Some administrations do not have a specific alarm usage category in their national regulations which is possible since national regulations can be more relaxed than the EC Decision.</p> <p>One possibility which perhaps allows greater flexibility was seen to provide improved sharing rules in Harmonised European Standards. So far, no specific Harmonised European Standard exists for wireless alarms covering the art. 3.2 RTTE requirements and these systems often comply with the alarm specific part of the generic Harmonised European Standard ETSI EN 300 220-2.</p> <p>No change advised at the moment. The subject is still subject to studies in ECC WGSE PT SE24 and it is recommended to wait until these studies will be finalised. The considerations on this subject are at an early stage and activities in ECC on-going.</p> <p>See also LLHR application category.</p> <p>It should be noted that ETSI has created a new work item for a Harmonised European Standard for alarms (including social alarms) operating in UHF frequencies in November 2012.</p>
Inductive SRD's	<p>Inductive loop systems are communication systems based on magnetic fields generally at low RF frequencies commonly used for inductive short-range radio communication applications below 30 MHz. The regulations for inductive systems are different in various countries. In some countries outside of Europe, inductive loop systems are not considered as radio equipment. This category is application-neutral (application non-specific). Inductive applications are different from the non-specific SRD category as they are used for near field communications and not for far field communications which is limiting the operating range and hence the interference potential. This category therefore enables many interesting applications which were otherwise not possible with the existing limits due to interference scenario considerations based on far field communications having longer operating range towards primary services at these low frequencies with only limited propagation losses. Therefore, this category should be kept.</p> <p>Inductive SRD's cover, for example, 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 handheld devices, automatic article identification, wireless control systems and automatic road tolling. No specific applications are excluded.</p>
Active medical implants and associated peripherals	<p>This category covers systems specifically designed for the purpose of providing non-voice digital communications between active medical implants, as defined in the active medical implants category, and/or body-worn devices and</p>

Name of category / terminology	Description
	<p>other devices external to the human body used for transferring non-time critical individual patient-related physiological information.</p>
<p>Wireless audio applications</p>	<p>Applications for wireless audio systems, including: wireless microphones; cordless loudspeakers; cordless headphones; cordless headphones for portable use, e.g. portable CD, cassette or radio devices carried on a person; cordless headphones for use in a vehicle, for example for use with a radio or mobile telephone, etc.; in-ear monitoring and wireless microphones for use at concerts or other stage productions.</p> <p>This category initially started for analogue application's using a 100% duty cycle. As technology has progressed both analogue and digital systems are now in use. Digital systems simply transmit data and do not distinguish between audio or video therefore the category is proposed to be renamed "Wireless Audio and Multimedia streaming" however these systems still require a 100% duty cycle.</p> <p>The difference between "Wireless Audio and Multimedia Streaming" and "data streaming" is that the "Wireless Audio and Multimedia Streaming" requires a different minimum QOS, particularly in ensuring the latency of any streamed content is such that the coherence of the received data is preserved.</p>
<p>Tank Level Probing Radar/Level Probing Radars</p>	<p>Tank Level Probing Radars (TLPR) are a specific type of radio determination application, which are used for tank level measurements and are 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.</p> <p>Level Probing Radars (LPR) is also radio determination application targeting mainly a wide range of industrial applications.</p> <p>TLPR and LPR are using UWB technology. This category covers Level Probing Radars (LPR) and mainly targets a wide range of industrial applications.</p> <p>TLPR and LPR are actually not a usage category in itself (they fall into category radio determination applications) but there are other usage restrictions related to their installation and also covered by the applicable Harmonised European standards.</p>
<p>Radio Frequency Identification (RFID)</p>	<p>No definition exists yet in the EC Decision for SRD.</p> <p>The crucial point is that due to interaction between an interrogator and the corresponding tag. These two parts of a system cannot readily be independently assessed for compliance with article 3.2. of the RTTE Directive.</p> <p>Therefore, a link to Harmonised European Standards which contain the precise interaction requirements should be made.</p> <p>RTTT DSRC systems for example may also be seen as RFID-technology based system.</p> <p>It is suggested to define the RFID category to make the current situation clearer.</p> <p>The RFID technology enables all kinds of networked application fields and scenarios, often also described as the "internet of things" or "machine-to-machine communications" and is application neutral.</p> <p>RFID systems are typically used to track, identify and collect/carry data relating to animate or inanimate objects to which tags are attached. The tags may be either battery-</p>

Name of category / terminology	Description
	<p>less, or battery assisted or battery powered. The responses from the tags are validated by its interrogator and passed to its host system.</p> <p>CEPT proposes to keep the RFID terminology which is also used in other documentation (e.g. ITU-R, ISO) since the early 1990's and add a new and broad RFID definition which includes all kind of tag/interrogator based systems. The introduction of a new term to be used instead of RFID should only be done after agreement at the ITU-R level.</p>
Wideband data transmission systems	<p>No definition in EC Decision for SRD.</p> <p>This application category is subject to mainly two specific Harmonised European Standards (EN 300 328, EN 302 567). In parallel, there are non-specific, generic standards (EN 300 440, EN 305 550).</p> <p>EN 300328 and EN 302 567 unlike the EN 300440 and EN 305 550 however are not entirely technology neutral. The latter is the price for a higher allowed radiated power. Having both options in the EC decision gives industry a wider choice. Based on this the regulation as in the current technical annex of the SRD decision can be considered application neutral. This differentiation is also supported by the clear statement provided in the scope of the generic SRD harmonised European standard that &lt;&lt;The present document does not apply to radio equipment for which a specific Harmonized EN applies as such specific Harmonized EN may specify additional EN requirements relevant to the presumption of conformity under article 3.2 of the R&amp;TTE Directive. The usage of a specific HEN falls actually in the category "other usage restrictions".</p>
Social alarms	<p>Social alarm devices are used to assist elderly or disabled people when they are in distress. It is suggested to change the category in non-specific maintaining all the technical requirements and references to the standard to guarantee backward compatibility with existing applications. A proposal to develop a specific standard for high reliable communications including alarms and social alarms is also included in the list of proposals.</p> <p>See also LLHR application category.</p> <p>The considerations on this subject are at an early stage and activities in ECC on-going</p> <p>It should be noted that ETSI has created a new work item for a Harmonised European Standard for alarms (including social alarms) operating in UHF frequencies in November 2012.</p>
Active medical implants	<p>This category covers the radio part of 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).</p> <p>Implantable radio devices that are intended to be totally or partially introduced, surgically or medically, into the human body or that of an animal.</p>
Low power FM transmitters	<p>This category includes applications which connect personal audio devices, including mobile phones, and the automotive or home entertainment system.</p> <p>This category covers radio devices that rely on low latency, very low power Frequency Modulated (FM) and high duty cycle transmissions.</p> <p>The restriction to low power FM is needed to ensure</p>

Name of category / terminology	Description
	protection of the primary terrestrial broadcast service. In this case, the modulation type (FM) is needed.
Radio determination applications	This category covers applications used for determining the position, velocity and/or other characteristics of an object, or for obtaining information relating to these parameters.
Model Control	This category covers applications used to control the movement of models (principally miniature representations of vehicles) in the air, on land or over or under the water surface. CEPT proposes to widen the scope of band 8a to ALL types of non-specific SRD, e.g. for the transmissions of telecommand and telemetry equipment (and not only model control). A duty cycle limitation for anything but model controls of 0.1% is proposed
Road Transport and Traffic Telematics	<p>No definition exists yet in the EC Decision for SRD.</p> <p>All existing compatibility studies for the frequency ranges at 5.8 GHz, 24 GHz, 64-64 GHz as well as 76-77 GHz included very specific interference considerations and it is therefore not proposed to withdraw this category.</p> <p>Technically, an RTTT DSRC system for example may also be seen as RFID-technology based system. RTTT DSRC is used in Europe in many countries for national road tolling purposes.</p> <p>63-64 GHz technology has still a very long way until real implementations will be seen on the market.</p> <p>76-77 GHz is currently for vehicle and specific fixed radar applications used.</p> <p>24 GHz (existing and new entries) should be linked to harmonised standards reference considerations.</p> <p>The usage of the bands included under RTTT should therefore be linked to the applicable Harmonised European Standards. New applications in the RTTT category need first compatibility considerations to ensure compatibility with the existing major applications such as road tolling (high economic value when used on national motorways) or automotive radars (road safety related).</p> <p>CEPT proposes to use the acronym TTT and proposes a definition for TTT.</p>
Meter Reading	<p>A term used for a system which allows remote status monitoring, measuring and service commands using radio communication devices.</p> <p>Typical transmitter duty cycles for such systems are in the range up to 10%, e.g. for multiplexers and concentrators of data while individual readers have normally much lower transmitter duty cycles (sub-metering).</p> <p>Recent investigations have indicated that wireless metering devices may appear in very high deployment numbers in the market in the future. Estimates go up to about 25 000 devices per square kilometer in urban environments. It is therefore proposed to keep this category in the 169 MHz range for the existing regulation for meter reading in the 169 MHz range where limited propagation attenuation exists compared with higher frequency ranges, and where non-specific SRD applications with the same parameters (500 mW, 10% duty cycle, no further spectrum access requirement) could lead to severe interference problems. In addition, the band is also shared with some applications such as asset tracking and tracing which need a predictable sharing environment.</p>

Name of category / terminology	Description
Assistive Listening Devices (ALD)	<p>A term used for radio communication systems which usually includes one or more radio transmitters and one or more radio receivers allowing persons suffering from hearing disability to increase their listening capability.</p> <p>Such systems use analogue technology with 100% duty cycle or digital technology with high duty cycle, typically in the range between 25% and 100%.</p>
Asset tracking and tracing	<p>A term used for systems which are used for tracing and tracking of goods, leading to their recovery, consisting in general of a radio transmitter placed on the item to be protected and a receiver and may also include an alarm. Typical transmitter duty cycles for such systems are in the range up to 1%. Such systems need a predictable sharing environment.</p> <p>One possibility which allows greater flexibility is seen to provide improved sharing rules in Harmonised European Standards. So far, no specific Harmonised European Standard exists for asset tracking and tracing systems covering the art. 3.2 RTTE requirements and these systems often comply with the generic Harmonised European standard ETSI EN 300 220-2. I.e. this entry from 2005/928/EC is proposed to be included in the EC Decision for SRD as non-specific SRD entry.</p>
Animal implant devices	<p>A term that covers transmitting devices which are placed inside the body of an animal for the purpose of performing diagnostic functions and/or delivery of therapeutic treatment. This is seen as a special case of active implant devices and based on the specific compatibility studies conducted; it can be regarded as under other usage restrictions.</p>
Low latency/high reliability SRDs (LLHR)	<p>Certain types of SRDs rely on low latency, low duty cycle and/or high reliability spectrum access mechanisms. Examples under investigation are alarms (incl. social alarms), wireless audio, ALDs, asset tracking and tracing and also some TTT applications. They could potentially be pooled in a limited number of more general categories.</p> <p>The considerations on this subject are at an early stage and activities in ECC on-going..</p> <p>It should be noted that ETSI has created a new work item for a Harmonised European Standard for alarms (including social alarms) operating at UHF in November 2012.</p>

## 5.2 REVIEW OF ERC RECOMMENDATION 70-03

For the review of ERC/REC 70-03 [15] the version of 9 February 2011 is used.

A number of frequency bands are stated as “*Not identified as a priority for inclusion in the EC Decision on SRDs. Lack of demand expressed for EU harmonisation*”. A new evaluation for these bands has taken place and information for justification has been added.

### 5.2.1 Non-specific Short Range Devices

The table below presents the frequency bands included in Annex 1 of ERC/REC 70-03 [15] and their status with respect to the EC Decision on SRDs. In 2009 it was decided to include UWB applications in ERC/REC 70-03 [15] and the table reflects these additions. The EC SRD decision itself does not cover UWB applications.

**Table 3: Non-specific Short Range Devices**

Annex 1	Non-specific Short Range Devices	Comments / Status
1a	6.765 - 6.795 MHz	Already covered by the EC Decision on SRDs.
1b	13.553 - 13.567 MHz	Already covered by the EC Decision on SRDs.
1c	26.957 - 27.283 MHz	Already covered by the EC Decision on SRDs.
1d	40.660 - 40.700 MHz	Already covered by the EC Decision on SRDs.
1e	138.200 - 138.450 MHz	Not planned for inclusion in the EC Decision on SRDs. Not implemented by several administrations in Europe due to the operation of defence systems.
1f	433.050 - 434.790 MHz	Already covered by the EC Decision on SRDs.
1g	863 - 870 MHz	Already covered by the EC Decision on SRDs.
1h	2400 - 2483.5 MHz	Already covered by the EC Decision on SRDs.
1i	5725 - 5875 MHz	Already covered by the EC Decision on SRDs.
1j	24.00 - 24.25 GHz	Band 24.15 - 24.25 GHz covered by the EC Decision on SRDs.
1k	61.0 - 61.5 GHz	Already covered by the EC Decision on SRDs.
1k1	57 - 64 GHz	New entry in ERC/REC 70-03 introduced in Annex 1 in 2012. Proposed for inclusion in the EC Decision for SRDs.
1l	122 - 123 GHz	Already covered by the EC Decision on SRDs. Investigations are on-going in CEPT regarding the compatibility with the EESS. A challenge is that it is currently not possible to provide meaningful deployment density figures since the real deployment of devices may occur first in some years from now.
1m	244 – 246 GHz	Already covered by the EC Decision on SRDs.
1n	3.1 - 4.8 GHz 6.0 - 9.0 GHz	Generic UWB regulation See Decision. ECC/DEC/(06)04 (amended in 2011 whereby mitigation techniques described in ECC/DEC/(06)12 were merged into ECC/DEC/(06)04 as well as new regulations for LTA added). A new ECC Decision for airborne UWB applications is also in preparation in the ECC. There is a need to amend the Commission Decision on UWB (2007/131/EC) as amended by Commission Decision 2009/343/EC.

- **Frequency band 57 - 64 GHz**

CEPT proposes to include the band 57-64 GHz in the annex of the EC SRD decision with a power of 20 dBm e.i.r.p a maximum transmit power of 10dBm and a max e.i.r.p. power spectral density of 13dBm/MHz. These conditions are necessary to ensure compatibility with the Fixed Service in the frequency range 57-64 GHz. ECC Report 176 [48] shows a strong relation between the impact of non-specific SRDs with 20 dBm e.i.r.p. and the FS antenna pattern. ETSI ATT M4 assumes the majority of FS installations to have lower performance antennas. There is no reliable information about the planning practice of FS links in the 60 GHz

band and it is hence assumed that the FS is working at its minimum signal level. It is therefore needed to enforce a minimum antenna gain of 10 dBi as part of the regulation or to exclude fixed outdoor installations. A choice of both options is the most flexible solution but in order to ease enforcement the indoor / outdoor restriction is not advised.

- **Frequency band 13.553 - 13.567 MHz**

This band is also listed under inductive applications with the same parameters, for the sake of completeness there is a cross-reference made in ERC/REC 70-03 [15]. Therefore no change or deletion is suggested.

- **Frequency band 26.957 - 27.283 MHz**

This band is also listed under inductive applications, although seemingly the same band as for inductive applications there is an antenna restriction on inductive applications. No justification for the restriction to exclude video applications was identified.

- **Frequency band 169.600 - 169.6125 MHz**

This frequency segment was originally a guard band. CEPT proposed to include this band in the non-specific section of the EC Decision's annex with the same parameters as the social alarm frequencies in the 169 MHz range.

**CEPT proposes to include the band 57-64 GHz in the annex of the Commission Decision for SRD with a power of 20 dBm e.i.r.p. A maximum transmitter output power of 10 dBm, and a maximum e.i.r.p. power spectral density of 13dBm e.i.r.p. applies.**

**CEPT proposed to include the band 169.6-169.6125 MHz in the non-specific section of the EC Decision's annex with a channel spacing of 12.5 kHz, a power of 10mW and a Duty Cycle of 0.1%. This proposal is inherently included in the new proposed entry for the wider frequency range 169.5875-169.8125 MHz under the same conditions.**

**CEPT proposes to remove the usage restriction to exclude video applications for the frequency band 26.957 to 27.283 MHz.**

## 5.2.2 Tracking, Tracing and Data Acquisition

The table below presents the frequency bands included in Annex 2 of ERC/REC 70-03 [15] and their status with respect to the EC Decision on SRDs.

**Table 4: Tracking, Tracing and Data Acquisition**

Annex 2	Tracking, Tracing and Data Acquisition	Comments / Status
2a	456.9 - 457.1 kHz	For Detection of avalanche victims. Already "class 1" (see sub-class 49). Scope proposed to be widened to "detection of buried victims and valuable items" and for inclusion in the EC Decision on SRD.
2b	169.4 - 169.475 MHz	For Meter Reading. Already covered by the EC Decision on the harmonisation of the 169.4-169.8125 MHz frequency band (2005/928/EC). In line with the recommendations in CEPT Report 43, CEPT proposes to move this regulation into the annex of the EC SRD decision.

Annex 2	Tracking, Tracing and Data Acquisition	Comments / Status
2c	169.4 - 169.475 MHz	<p>For Asset Tracking and Tracing.</p> <p>Already covered by the EC Decision on the harmonisation of the 169.4-169.8125 MHz frequency band (2005/928/EC).</p> <p>In line with the recommendations in CEPT Report 43, CEPT proposes to move this regulation into the annex of the EC Decision for SRD.</p> <p>One possibility which allows greater flexibility is to provide improved sharing rules in Harmonised European Standards. So far, no specific harmonised standard exists for asset tracking and tracing systems covering the art. 3.2 RTTE requirements and these systems often comply with the generic harmonised standard ETSI EN 300 220-2. Therefore, this entry from 2005/928/EC is proposed to be included in the EC Decision for SRD as non-specific SRD entry.</p>

▪ **Frequency 456.9 – 457.1 kHz**

A number of member states have implemented this frequency without the need for actual detection of avalanche victims. The frequency is in those cases used for the tracking of valuable trained animals like dogs in tunnels. An application as cave radio for specific emergency situation is also proposed.

CEPT proposes to change the application category slightly to accommodate these applications without sacrificing the safety nature of the original application category and include it in a new section in the EC decision’s annex.

The application category itself is maintained to provide the predictable sharing environment needed for emergency use.

NOTE: *The Harmonised European Standards ETSI EN 300 718-2 [34] (RTTE directive article 3.2 requirements) and ETSI EN 300 718-3 [34] (art. 3.3e requirements) have been created by ETSI for avalanche beacon transmitter and receiver systems. Such equipment may however also be used in other rescue situations/scenarios than just avalanches and the application of the equipment does actually not exclude these other situations where there could also be the need for direct rescue where a victim is covered. It is proposed to inform ETSI about these intentions.*

**CEPT proposes to include the frequency 457 kHz in the annex of the EC Decision for SRD with the application description “emergency detection of buried victims and valuable items”**

**5.2.3 Wideband Communication Systems**

The table below presents the frequency bands included in Annex 3 of ERC/REC 70-03 [15] and their status with respect to the EC Decision on SRDs.

**Table 5: Wide Band Data Transmission Systems**

Annex 3	Wide Band Data Transmission Systems	Comments / Status
3a	2400 - 2483.5 MHz	Already covered by the EC Decision on SRDs.
3b	17.1 - 17.3 GHz	<p>This band has a high level of harmonisation in Europe.</p> <p>However, this entry has been deleted from ERC/ REC 70-03 in 2012, therefore no proposal for inclusion in the EC Decision for SRD. See</p>



Annex 3	Wide Band Data Transmission Systems	Comments / Status
		explanation below.
3e	57 - 66 GHz	Already covered by the EC Decision on SRDs. CEPT proposes to include the band 57-64 GHz for non-specific SRD in the EC Decision for SRD.

- **Frequency band 2400 – 2483.5 MHz**

The applications in this frequency range are subject to mainly two harmonised standards. The ETSI EN 300 440-2 [42] for non-specific SRDs and the ETSI EN 300 328 [31] for wideband data transmission systems. Both the ETSI EN 300 328 [31] and the ETSI EN 300 440-2 [42] may also be considered as application neutral standards. The ETSI EN 300 328 [31], unlike the ETSI EN 300 440 [42], is not entirely technology neutral. The latter is the price for a higher allowed radiated power. Having both options in the EC Decision gives industry a wider choice. Based on this the regulation as in the current technical annex of the SRD decision can be considered application neutral. This differentiation is also supported by the clear statement provided in the scope of the generic SRD harmonised European standard that:

<<The present document does not apply to radio equipment for which a specific Harmonized EN applies as such specific Harmonized EN may specify additional EN requirements relevant to the presumption of conformity under article 3.2 of the R&TTE Directive. No change is proposed>>.

- **Frequency band 17.1 – 17.3 GHz**

This entry has been deleted from ERC/REC 70-03 [15] in 2012.

#### REGULATORY CONTEXT

The frequency band 17.1 to 17.3 GHz is a piece of a larger frequency band from 15.7 to 17.3 GHz which is globally harmonised for Radiolocation Services.

Since the end of WRC-12 (the subject was under Agenda Item 1.21 of WRC-12) this frequency band has been extended from 15.4 to 17.3 GHz and this whole band should be used by new radar applications (Recommendation ITU-R M.1730) [46] which operate with a greater resolution than existing ones.

Furthermore, some radiolocation applications which are included in the frequency band 17.3-17.7 GHz should be moved to 15.4-17.3 GHz (In US, a priority was done to Broadcasting-Satellite services in this band, this implies this modification).

It should be mentioned that the frequency band 17.1-17.3 GHz is included in annex 6 of recommendation ERC/REC 70-03 [15] for GBSAR applications. This type of application is very specific (in particular, specific antenna pattern) and clearly identified as a niche market with a very low capacity of market penetration (see ECC Report 111 [41]). To our understanding, there is today GBSAR use, for which specific technical conditions have been established in order to share the spectrum with sensitive radiocommunication services, i.e., EESS, Fixed Links and military radar (see ECC Report 111 [41]) on a careful opportunistic basis.

#### CURRENT SITUATION ON HYPERLANS

It has been pointed out that the lack of a standard for HYPERLAN has led to include this frequency band in annex 3 of recommendation ERC/REC 70-03 [15] without relevant compatibility studies with existing services.

Furthermore, CEPT sought for Industry opinion on including non-specific SRD in this frequency band. The response from ETSI was that there is no particular interest for such frequency band as there is neither chipset on the shelf nor any work item in ETSI. ETSI also expressed that an important reason for this situation is that there is no harmonisation measure for this band for wideband data transmission equipment outside of Europe. Other sources confirmed a limited licence-exempt usage of this band. One entity reported

during the consultation of this report to have placed 4 000 units on the market within the last two years for usage such as in industry and mining.

**CONCLUSIONS**

Taking into account that

- There is no demand to harmonise this band;
- There are many radiolocation applications in this band and new radars are in development;
- There is no harmonisation measure for this band for wideband data transmission equipment outside Europe;
- There is no standard for wideband data transmission applications for this frequency band;
- Individual countries may still use the band for licence-exempt applications.

Therefore, CEPT does not propose the band for inclusion in the Commission Decision for SRD.

▪ **Frequency band 57 – 64 GHz**

The existing specific harmonised European standard ETSI EN 302 567 [43] for wideband communication systems is under revision and includes the requirement for a medium access protocol mechanism designed to facilitate spectrum sharing with other devices in the wireless network. This medium access protocol shall be implemented by the equipment and shall be active under all circumstances. However, the precise technical requirements of a more sophisticated medium access are not defined yet in this standard, i.e. there are no pass/fail criteria and providers can simply declare to fulfil this requirement without any test against a technical requirement. This is a major difference compared with the approach in the 2.4 GHz band and seen as an area where an amendment of the standard to establish clear criteria should be undertaken in the future to achieve a similar situation as in the 2.4 GHz band.

**5.2.4 Railway applications**

The table below presents the frequency bands included in Annex 4 of ERC/REC 70-03 [15] and their status with respect to the EC Decision on SRDs.

**Table 6: Railway applications**

Annex 4	Railway applications	Comments / Status
4a	2446 - 2454 MHz	<p>The automatic Vehicle Identification for Railways was introduced in 1997 in the first version of ERC/REC 70-03. The system specifies 5 channels, each 1.5 MHz wide, within the band 2446-2454 MHz, i.e. 2447.0 MHz, 2448.5 MHz, 2450.0 MHz, 2451.5 MHz and 2453 MHz. The product standard is ETSI EN 300 671. The system has failed to be implemented in the market. There is currently no equipment for the railway AVI application for asset tracking application placed on the market.</p> <p>Not identified as a priority for inclusion in the EC Decision on SRDs. Lack of demand expressed for EU harmonisation.</p> <p>The UIC (International Railway Union) could not confirm any implementations in early 2012. Therefore, this entry has been deleted in 2012 from ERC/REC 70-03 Annex 4. The harmonised standard EN 300 671 has been added in ERC/REC 70-03 Annex 11 related to band entry 11a which is for 500mW e.i.r.p. already covered by the EC Decision for SRD.</p>

Annex 4	Railway applications	Comments / Status
4b	27.090 – 27.100 MHz	This entry is in line with band 1c (non-specific SRD) which is already covered by the EC Decision on SRDs. The frequency is used to tele-power the Eurobalise and Euroloop applications and also covered by the Commission Decision of 28 July 1999 on the basic parameters for the trans-European high-speed rail system [2]. COMMISSION DECISION of 19 October 2009 amending Decisions 2006/679/EC and 2006/860/EC as regards technical specifications for interoperability relating to subsystems of the trans-European conventional and high-speed rail systems also applies (entries 4b to 4d).
4c	984 - 7484 kHz	Eurobalise transmit spectrum which is connected to the tele-power frequency in 4b. This should be included in the EC Decision for EU harmonisation. Specific requirements are identified in ETSI EN 302 608. The entry Band 4c may also be consistent with the tighter level given for bands 9d, 9e and 9 and seems logical for a wide band system.  The UIC supports the inclusion of this band in the EC Decision for harmonisation.
4d	7.3 - 23.0 MHz	Euroloop transmit spectrum which is connected to the telepower frequency in 4b. This should be included in the EC Decision for EU harmonisation. Specific requirements are identified in ETSI EN 302 609. Based on ECC Report 098 and the compatibility studies were specific to railway applications.  The UIC supports the inclusion of this band in the EC Decision for harmonisation.
4e	76 - 77 GHz	Obstruction/vehicle detection via radar sensors at railway level crossings. This application will also be included in the harmonised standard EN 301 091 [12].

▪ **Frequency bands 984 – 7484 kHz and 7.3 – 23 MHz**

The entries in bands 4c and 4d are part of the Eurobalise and Euroloop systems which belong to the tele-powering link in band 4b. These backscatter frequency ranges should be understood as being part of systems and therefore the inclusion in the EC Decision for SRD is proposed since band 4b is already implemented in the EC Decision for SRD. **The frequency bands have very specific usage conditions** as described in ECC Report 098 [44]. Key components for compatibility with the amateur radio service, broadcasting and military communication are, deployment, usage in the presence of trains and antenna installation.

**CEPT proposes to include the bands 984-7484 kHz and 7.3-23 MHz currently included in annex 4 of ERC/REC 70-03 [15] of the annex of the EC SRD decision. It is suggested to include them under the TTT section.**

### 5.2.5 Road Transport and Traffic Telematics (RTTT)

The table below presents the frequency bands included in Annex 5 of ERC/REC 70-03 [15] and their status with respect to the EC Decision on SRDs.

**Table 7: Road Transport & Traffic Telematics (RTTT)**

Annex 5	Road Transport & Traffic Telematics (RTTT)	Comments / Status
5a	5795 - 5805 MHz	<p>Candidate for inclusion in the annex of the EC Decision.</p> <p>Individual license required in many countries for higher power of 8 W systems. Proposal for inclusion limited to road tolling systems only. Identified as pan-European service frequencies for road tolling applications.</p>
5b	5805 - 5815 MHz	<p>Not a candidate for inclusion in the annex of the EC Decision.</p> <p>Individual license required in many countries for higher power of 8 W systems. France indicated possible coexistence problems between RTTT DSRC and tactical radars as well as the radiolocation service. Compatibility studies are required in order to propose this frequency band for inclusion in EC Decision.</p>
5c	63 - 64 GHz	<p>Already covered by the EC Decision on SRDs.</p> <p>ITS applications operating in the 63-64 GHz range which are under ECC/DEC/(09)01 as well as the EC Decision for SRD (under TTT) with identical usage parameters. The ECC/DEC/(09)01 recognises this application as under the mobile service and the EC Decision is implemented by 37 administrations. The 63-64 GHz entry was recently been removed during the revision of annex 5 of ERC/REC 70-03 ECC/DEC/(09)01, similar to the removal of ULP-AMI in 401-406 MHz from annex 12.</p>
5d	76 - 77 GHz	<p>For vehicle and defined fixed installed radar systems. It is proposed to better define the fixed installed radar applications.</p> <p>Concerning the 76-77 GHz utilisation for “obstruction/vehicle detection via radar sensors, the railway community expressed demand for fixed installations at railway level crossings.</p> <p>CEPT has also been made aware of fixed scanning surveillance radars. These are for safety and security purposes both at road sites and sites away from roads such as airports, container ports, dockyards.</p> <p>A study [3] shows the possibility of interference between automotive and fixed installed radars. No restriction proposed at the moment. Already covered by the EC Decision on SRDs. CEPT proposes a modification.</p>
5e1	21.65 - 26.65 GHz	<p>For automotive Short Range Radars (SRR).</p> <p>See decision ECC/DEC/(04)10.</p> <p>Already covered by the EC Decision on 24 GHz UWB SRR systems (2005/50/EC) as amended by 2011/485/EU.</p>
5e2	24.25 - 26.65 GHz	<p>For automotive Short Range Radars (SRR).</p> <p>See amended decision ECC/DEC/(04)10 .</p> <p>Already covered by the EC Decision on 24 GHz UWB SRR systems (2005/50/EC) as amended by 2011/485/EU.</p>

Annex 5	Road Transport & Traffic Telematics (RTTT)	Comments / Status
5f	77 - 81 GHz	For automotive Short Range Radars (SRR) ECC/DEC/(04)03. Already covered by the Commission Decision on 79 GHz SRR systems (2004/545/EC)
5g1	24.050 - 24.075 GHz	Already covered by the Commission Decision on SRDs
5g2	24.075 - 24.150 GHz	
5g3	24.150 - 24.250 GHz	
5g4	24.25 - 24.50 GHz	Candidate for inclusion. For automotive vehicle radars. Complementary to 5g1, 5g2 and 5g3 and only activated as described in ECC Report 164.

- **Frequency band 5795 – 5805 MHz and 5805 – 5815 MHz (bands 5a and 5b)**

Directive 2004/52/EC [28] lays down the conditions for the interoperability of electronic road toll systems in the European Union. The Directive requires that all new electronic toll systems brought into service shall use one or more of the following technologies: satellite positioning (GNSS); mobile communications (GSM-GPRS); microwave technology (DSRC). This equipment on-board of lorries shall therefore at least be interoperable and capable of communicating with all the systems operating in the Member States using one or more of the technologies named in this Directive. The on-board units installed in lorries have therefore bands 5a and 5b included.

It should be noted that the frequency usage for RTTT DSRC was identified in the early 1990's and that no compatibility studies exist for this frequency identification.

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 [36] and use all four 5 MHz wide channels up to 2 watts e.i.r.p. per channel for the road site units. Some implementations only use the 5795-5805 MHz range such as the French national road tolling system. The use of 8 W road side unit systems is seldom and is an almost historic implementation option but maybe still in use at individual systems. State-of-the-art technology does not use higher power for multiple lane management. The Harmonised European Standard ETSI EN 300 674 only identifies the frequency range 5795-5805 MHz as pan-European service frequencies.

It should be noted that the RTTT DSRC Harmonised European Standard EN 300 674 [36] only includes RTTT DSRC and no other RTTT applications at the present time. In addition, a generic Harmonised European Standard for SRD cannot be used for RTTT applications in presence of EN 300 674. A widening of the scope of EN 300 674 would require first an ETSI SRDoc and compatibility studies in CEPT.

However, 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.

CEPT proposes to include the band 5795-5805 MHz in the technical annex. The proposal for this new entry is limited to road tolling systems only. Some countries allow a wider use of the RTTT DSRC technique as is reported above. However, a spectrum compatibility study covering a wider application than just road tolling systems would first need to be initiated. In addition, compatibility studies for the frequency range 5805-5815 MHz with regard to TRR (Tactical Radio Relay) and the radiolocation service would be needed first before full European harmonisation can be suggested for this band.

- **New entry Frequency band 5g4**

Together with this new frequency band the following modes of operation are allowed:

1. 5g1 to 5g3: Narrowband radar Mode (sometimes referred to as ISM mode) will operate in the 24.050-24.25 GHz band;
2. Forward facing Radars; WLAM Calibration mode (Front-permanent mode), which consists in a few low-power CW emissions with -11 dBm in 24.25-24.495 GHz and -8 dBm in 24.495-24.5GHz;
3. Forward facing Radars: APPS (Active braking for Pedestrian Protection System) mode (Front Emergency mode) which is a frequency modulated emission in 24.05-24.5 GHz with +20 dBm e.i.r.p., activated for emergency braking support in case of a crash event monitored by a camera, for a vehicle speed above 20km/h;
4. Rear facing Radars: Rear-parking mode, which is a frequency modulated emission in 24.05 - 24.5 GHz with +16 dBm e.i.r.p., activated only when the vehicle moves back to better discriminate pedestrians.

- **Frequency band 76-77 GHz**

The present 76 GHz to 77 GHz automotive radar technology is also the basis for some fixed installed infrastructure and surveillance applications. The development of the automotive radar systems in the industry predates 1995, and the corresponding ETSI standard ETSI EN 301 091 (V1.1.1) [11] was published in 1998 and the latest amendment was published in November 2006 as version ETSI EN 301 091 (V1.3.3) [12]. This Harmonised European Standard only includes automotive radars in its scope of application but is currently under revision to also include fixed installations used at railway level crossings. It is worth to note that the 76 - 77 GHz regulations of the FCC are currently restricted to automotive radars only and that a consultation in 2011-2012 did not materialise so far in a widening of the scope of the ruling to also include all types of fixed installed applications except for installations at airports [ref to FCC 12-72].

The published ETSI system reference document TR 102 704 [13] did finally not include any fixed installed surveillance radar applications operating in the 76 GHz to 77 GHz band and the ECC received only a dedicated request for fixed installed radar applications at railway level crossings which led finally to an inclusion of this application in the annex 4 of ERC/REC 70-03 [15] for SRD applications used by the railways. Therefore, it should be recognised that no request from ETSI has come forward to support fixed radar applications beyond level crossing radars in this band until now. In the absence of such a clear request, it has not been possible for CEPT to investigate the subject of spectrum compatibility between ground-based vehicular radars and fixed radar applications and to ensure that road-safety related applications (e.g. LRR application used for cruise control application in lorries) can operate under acceptable usage conditions without harmful interference from fixed installations near to public roads.

New recent application requests presented in CEPT include the use of 76-77 radar technology on aircraft, either on the ground (e.g. when the plane is taxiing) or even in the air (e.g. as safety-related application during the landing approach at low altitude above the ground to avoid obstructions, to be used by helicopters). One company has approached CEPT providing information on existing and planned fixed radar installations and related applications. All ground-based vehicle usage, including usage on-ground at e.g. an aircraft during taxiing, seems in this context as covered by the existing regulations whereas usage in the air at heights above the ground requires first spectrum compatibility investigations. A minor modification is proposed by CEPT to replace the term “terrestrial” by “ground-based” for the 76-77 GHz entry in the EC Decision as shown in Annex 3.

CEPT does not suggest restricting the usage to vehicular radars only, but sees a need to investigate the situation with different types of radar applications (fixed infrastructure, surveillance and vehicular radars) in the 76-77 GHz range. No restriction is proposed by CEPT until the evidence is provided that fixed installed outdoor radar applications could harmfully interfere with road-safety related vehicular radar applications.

ETSI is in a process of creating two new ETSI SRdoc describing the technical characteristics for the above mentioned helicopter usage as well as for fixed road infrastructure usage of the 76-77 GHz technology and other frequency options as per a request to provide information from the CEPT.

In addition, future SRR systems in the adjacent band 77 GHz to 81 GHz have to be protected. The most critical potential interference aspect for general surveillance radar applications is that this kind of application may overlap in the direction of automotive SRRs on public roads. In such scenarios, the surveillance radar potentially blinds automotive radars operating in the same frequency and area [38]. However, CEPT does not propose any restriction as long as there is no clear evidence provided that such scenarios exist but sees the need to investigate the situation.

Most of the proposed ground based surveillance radar applications are in addition safety related and can prevent damage and harm to human beings. Coexistence with automotive systems may possibly be solved in a similar way to that achieved between multiple automotive radar sensors. Studies are on-going in a European funded project called “MOSARIM” [38] to be finalised at the end of 2012 [3] but preliminary results show that the possibility for harmful interference created by fixed installed outdoor radar applications is existing and needs careful investigation with regard to the automotive radars in 76-77 GHz as well as 77-79 GHz but also with regard to primary radio services such as the radio astronomy service. It is believed that the “MOSARIM” studies will also include different types of radars, e.g. scanning radars have which have much lower capacity for interference.. There is also a need to investigate the compatibility of the automotive radar system within the 76 GHz to 77 GHz band with reference to the defined types of different scenarios for the fixed installed surveillance applications and, if necessary, define appropriate installation guides.

#### ▪ **RTTT category**

The description of the category RTTT is justified by the spectrum compatibility scenarios in existing compatibility studies:

- Bands 5a and 5b: road site units with 2 watts can only be operated spectrum compatible with the radio services in these frequencies when strictly pointing downwards with the need to be at least 15 dB below outside of the main beam (most systems are much further below outside of the main beam due to intra-system interference requirements). Non-specific SRD is allowed to use 100 mW in these bands. Because of the importance of road tolling and the lack of compatibility studies at this moment, no other use than road tolling with 2W e.i.r.p. in the band 5795-5805 MHz is proposed for inclusion in the EC Decision for SRD;
- Band 5c (63-64 GHz) is under ECC/DEC/(09)01 [20] identified also for ITS and as an application within the service. The Harmonised Standard ETSI EN 302 686 [35] also includes rail vehicles in the scope. Real implementation in the market of 63-64 GHz ITS equipment is expected to not occur for a number of years from now. Since the frequency range is also implemented for wideband data transmission systems as well as is proposed in the present document to include an entry in the EC Decision for SRD for non-specific SRD applications, a benefit of changing the RTTT terminology from this perspective is not identified;
- See the situation for band 5d below. A widening of the RTTT scope is for this band only possible based on new compatibility studies;
- All bands, i.e. 5g1 to 5g4 in the 24 GHz range are identified based on specific compatibility studies based on the specific scenario of having automotive radars. A widening of the RTTT scope is for these bands not possible without new studies.

RTTT itself is not defined in the EC decision. Based on the entries in Table 7, it can be seen that RTTT includes ITS, SRR, DSRC and automotive radar applications. On the other side, not all frequency bands for RTTT applications can be opened to a very broad transport application range due to the specific deployment and usage scenario assumptions.

RTTT' means systems in which information and communication technologies are applied in the field of transport (depending on technical restrictions for road, rail, water and air), traffic management, navigation and mobility management, as well as for interfaces with other modes of transport including communication in vehicles between vehicles (e.g. car-to-car), and between vehicles and fixed locations (e.g. car-to-infrastructure) as well as communication from and to users. To avoid the possible misinterpretation of the acronym RTTT, i.e. it may be limited to road transport alone; it is proposed to suppress the “R”.

All the existing RTTT entries in Annex 5 of ERC/REC 70-03 rely on technical considerations or studies purely limited to ground based RTTT stations, hence there are neither standards or specifications nor compatibility studies in existence in support of airborne RTTT applications. It is planned to have technical studies on a helicopter use case under RTTT in the near future. In any case, airborne RTTT stations would need technical

studies first before consideration to allow such a use case. These existing restrictions are actually reflected under the other usage restrictions, where necessary, in the RTTT category.

**CEPT proposes the following definition of TTT (Transport and Traffic Telematics) “TTT’ means systems in which information and communication technologies are applied in the field of transport (depending on technical restrictions for road, rail, water and air), traffic management, navigation and mobility management, as well as for interfaces with other modes of transport including communication in vehicles between vehicles (e.g. car-to-car), and between vehicles and fixed locations (e.g. car-to-infrastructure) as well as communication from and to users”.**

**CEPT proposes to include the band 5795-5805 MHz currently included in annex 5 of ERC/REC 70-03 [15] in the RTTT section of the annex of the EC SRD decision with a restriction for road tolling only.**

**CEPT proposes for inclusion in 24.250-24.500 GHz a complementary automotive radar mode to the existing entries in 24.050-24.250 GHz.**

**There is a need to investigate the situation with different types of radar applications (fixed infrastructure and vehicular radars) in the 76-77 GHz range. No restriction is proposed by CEPT until evidence is provided that fixed installed outdoor radar applications could cause harmful interference to the road-safety related vehicular radar applications.**

**A minor modification is proposed by CEPT to replace the term “terrestrial” by “ground-based” for the 76-77 GHz entry in the EC Decision.**

**5.2.6 Radiodetermination applications**

The table below presents the frequency bands included in Annex 6 of ERC/REC 70-03 [15] and their status with respect to the Commission Decision on SRDs.

**Table 8: Radiodetermination applications**

Annex 6	Radiodetermination applications	Comments / Status
6a	2400 - 2483.5 MHz	Already covered by the EC Decision on SRDs
6b	9200 - 9500 MHz	Only low level of implementation is currently feasible Further consideration may be needed within CEPT pending market demand.
6c	9500 - 9975 MHz	
6d	10.5 - 10.6 GHz	
6e	13.4 - 14.0 GHz	CEPT shall review first compatibility studies performed in the past for these bands and identify additional studies if needed.  Potential for harmonisation is extremely limited. Primary service mil-band.
6f	24.05 - 24.25 GHz	This band has limited implementation in France and the UK. It was found that harmonising this band with this limitation could cause more harm than not including this band at all.  Refer to the study that concluded restrictions in UK, F. In all other countries, it’s covered by non-specific SRD.  24.050/24.000 -24.075
6g	4.5 – 7 GHz	For Tank Level Probing Radar (TLPR).
6h	8.5 - 10.6 GHz	Already covered by the EC Decision on SRDs.
6i	24.05 - 27 GHz	



Annex 6	Radiodetermination applications	Comments / Status
6j	57 – 64 GHz	
6k	75 - 85 GHz	
6l	6.0-8.5 GHz	Candidate for inclusion in the EC Decision.
6m	24.05-26.5 GHz	For industrial Level Probing Radar (LPR).
6n	57-64 GHz	Related detailed requirements in ECC/DEC/(11)02 and ETSI ETSI EN 302 729.
6o	75-85 GHz	
6p	17.1 - 17.3 GHz	Already covered by the EC Decision on SRDs for Ground Based systems only (GBSAR).
6q	30 MHz - 12.4 GHz	For Ground- and Wall- Probing Radar (GPR/WPR) imaging systems, subject to an appropriate licensing regime (individual and general authorisations used throughout Europe) according to ECC Decision (06)08.  Review of the situation in the CEPT in 2011 showed that implementation was now progressing well. GPR/WPR industry and trade associations did not support further harmonisation measures.  Hence, not relevant for the Commission Decision on SRDs.
6r	2.2 - 8 GHz	For Material Sensing Devices.  See Decision ECC/DEC/(07)01.  Covered by the Commission Decision on UWB (2007/131/EC) as amended by Commission Decision 2009/343/EC.  Not relevant for the EC Decision on SRDs.

▪ **Frequency band 6.0-8.5, 24.05-26.5, 57-64, and 75-85 GHz**

These bands are meant for industrial Level probing Radar based on the same technology as tank level probing radar (TLPR). Inclusion of the LPR entries in the EC Decision would roughly double the addressable market for this technology. The technology exists since years and is ready for the market. Timely inclusion is therefore beneficial. Compatibility studies in ECC have led to an ECC decision describing technical requirements such as TPC and a minimum requirement for the used antenna pattern (antenna patterns include the half-sphere e.i.r.p. limits around the LPR device). Also exclusion zones around RAS sites are necessary. The relevant standard is ETSI EN 302 729-2 [33]. LPR may be included in the EC decisions annex if these requirements are reflected.

A discussion about a possible inclusion in the EC UWB decision revealed that some administrations are in favour of doing so and others are not. Since TLPR is in the SRD framework it is advised to also do this with LPR.

In addition, The FCC in the USA indicated to handle the TLPR and LPR application regulation precisely the same way as has been agreed in Europe so far.

**CEPT proposes to include the bands 6.0 - 8.5 GHz, 24.05 - 26.5 GHz, , 57- 64 GHz and 75-85 GHz in the annex of the EC SRD decision with a reference to the TPC, antenna pattern and exclusion zone requirements.**

**5.2.7 Alarms**

The table below presents the frequency bands included in Annex 7 of ERC/REC 70-03[15] and their status with respect to the EC Decision on SRDs. It is likely that the usage description of Annex 7 excludes almost any other application than alarms at this moment. The bands should however not be excluded for other applications than alarms but compatibility with the alarm systems should prove coexistence for new applications.

**Table 9: Alarms**

Annex 7	Alarms	Comments / Status
7a	868.6 - 868.7 MHz	Already covered by the EC Decision on SRDs
7b	869.25 - 869.3 MHz	Already covered by the EC Decision on SRDs
7c	869.65 - 869.7 MHz	Already covered by the EC Decision on SRDs
7d	869.2 - 869.25 MHz	For Social alarms Already covered by the EC Decision on SRDs
7e	869.300 – 869.400 MHz	Already covered by the EC Decision on SRDs
7f	169.4750 - 169.4875 MHz	For Social alarms Already covered by the EC Decision on the harmonisation of the 169.4-169.8125 MHz frequency band (2005/928/EC). In line with the recommendations in CEPT Report 43, CEPT proposes to move this regulation into the annex of the EC SRD decision.
7g	169.5875 - 169.600 MHz	For Social alarms Already covered by the EC Decision on the harmonisation of the 169.4-169.8125 MHz frequency band (2005/928/EC). In line with the recommendations in CEPT Report 43, CEPT proposes to move this regulation into the annex of the EC SRD decision.

Alarms applications need a predictable sharing arrangement. However, the alarms usage category is not clearly defined in the EC Decision (no definition given) and there is some possibility for interpretations.

The question is whether a more application neutral regulation is possible for the alarms frequencies provided in ERC/REC 70-03 [15] annex 7, e.g. to allow non-specific SRD applications with low duty cycle or equivalent spectrum access rules to provide a predictable sharing arrangement and at the same time an improved spectrum sharing and more efficient use of the spectrum.

Some administrations do not have a specific alarm usage category in their national regulations. It was further noted that some wireless alarm systems in the market often also use frequencies identified for non-specific SRD applications.

One possibility which allows greater flexibility is seen to provide improved sharing rules in Harmonised European Standards. So far, no specific harmonised standard exists for wireless alarms covering the art. 3.2 RTTE requirements and these systems often comply with the alarm specific part of the generic harmonised standard ETSI EN 300 220-2 [30].

Based on the current lack of definition and non-existence of a specific harmonised standard for wireless alarm systems, justification needs to be provided for this type of usage category and related restrictions in order to consider keeping this type of use category. The goal of this examination is to ensure that these categories represent appropriate spectrum access rules that facilitate predictable sharing arrangements and foster the coexistence of existing and new spectrum users, instead of just reserving a band for a particular type of application.

**Certain types of SRDs rely on low latency, low duty cycle and/or high reliability spectrum access mechanisms. Examples under investigations are including alarms and social alarms). The considerations on this subject are at an early stage and activities in ECC on-going, following initial considerations in ECC Report 181 [9].**

### 5.2.8 Model Control

The table below presents the frequency bands included in Annex 8 of ERC/REC 70-03 [15] and their status with respect to the EC Decision for SRDs.

**Table 10: Model Control**

Annex 8	Model Control	Comments / Status
8a	26.995, 27.045, 27.095, 27.145, 27.195 MHz	<p>Already covered by the EC Decision on SRDs.</p> <p>27 MHz it is still in use for model cars and boats. For model planes it is not used anymore, probably some older equipment is in existence. There are huge numbers in use for toys. For Germany alone, 1 to 2 million was reported for 2011.</p> <p>CEPT proposes to widen the scope of application to cover all types of narrowband SRD equipment to make the usage of this frequency band more attractive.</p>
8b	34.995 - 35.225 MHz	<p>35 MHz for model planes are still strongly in use, numbers &gt;1 000 000 devices reported for Germany for 2011 alone.</p> <p>However, the tendency is going down. For some special models with reasonable numbers there is still a strong need to use this band in the future.</p> <p>National civil aviation rulings as well as PMR usage in some countries applies.</p>
8c	40.665, 40.675, 40.685, 40.695 MHz	<p>40 MHz devices are extensively used and shared for model planes, cars and boats. Numbers of users are higher than in Band b. The band is also used for toy model control. Number of active systems is estimated greater than 1 000 000 for Germany alone in 2011.</p>

ERC/REC 70-03 [15] superseded T/R 20-03 [25] and T/R 20-04 [24] for the entries in Annex 8, both documents established initially in 1974. Both documents were withdrawn by adoption of the first version of ERC/REC 70-03 [15] in 1997.

T/R 20-03 [25] was on telecommand and telemetry equipment for use in toys and scale models and covered the 26/27 MHz and 40 MHz entries from Annex 8 of 70-03[15] for a max. e.r.p. of 100 mW.

T/R 20-04 [24] was on ALL telecommand and telemetry equipment in 27.3-32.3 MHz, also incl. 10 kHz spacing and max e.r.p. of 100 mW (scope was wider than just model control). However, although it was indicated that T/R 20-04 [24] was “superseded” by the first version of ERC/REC 70-03[15], these frequencies were interestingly not included in ERC/REC 70-03 [15].

The spectrum environment for the bands 8a, 8b, 8c as well as 27.3-32.3 MHz shows a comparable spectrum environment and hence coexistence conditions. The 40 MHz entries are not even identified for PMR in the ECA. The 34/35 and 40 MHz ranges are used for flying models, changing the typical use of these bands could create a potential safety problem especially with heavy (>25kg) models. However, indications from the market clearly show that model control applications use nowadays more and more other frequencies due to the chipset costs having decreased dramatically for other solutions than the bands identified in Annex 8.

Based on the overall considerations, it is proposed by CEPT to widen the scope of annex 8a to ALL types of controls for the transmissions of telecommand and telemetry equipment (and not only model control) and keep an eye on the possibility to also include bands 8b and 8c at a later stage. A duty cycle limitation seems compatible with this approach, also to avoid uninterrupted transmissions necessary for this application and to create a potential safety problem with larger scale flying models. It is to note that such a widening of the scope is a careful step towards a more efficient use of the spectrum and may even be subject to further considerations to open the band also for other SRD applications using 100 mW e.r.p. in the future. Industry reported that at the present time, duty cycle limitations would not be acceptable for model control equipment because of 'permanent' transmission requirement, and even LBT will not be an alternative.

A non-specific SRD entry with 10 mW and 100% DC exists. The proposal is trading the power limit and the duty cycle. SRD applications in this band do not have significant antenna gains. The DC of 0.1% should sufficiently protect other use at these 5 narrowband channels of entry 8a but allows other applications than just model control.

**CEPT proposes to widen the scope of band 8a to ALL types of non-specific SRD, e.g. for the transmissions of telecommand and telemetry equipment (and not only model control). A duty cycle limitation for anything but model controls of 0.1% is proposed.**

### 5.2.9 Inductive applications

The table below presents the frequency bands included in Annex 9 of ERC/REC 70-03 [15] and their status with respect to the EC Decision on SRDs.

**Table 11: Inductive applications**

Annex 9	Inductive applications	Comments / Status
9a1	9 - 90 kHz	Already covered by the EC Decision on SRDs
9a2	90 - 119 kHz	Already covered by the EC Decision on SRDs
9a3	119 - 135 kHz	For RFID, Already covered by the EC Decision on SRDs
9b	135 - 140 kHz	Already covered by the EC Decision on SRDs
9c	140 - 148.5 kHz	Already covered by the EC Decision on SRDs
9d	6765 - 6795 kHz	Already covered by the EC Decision on SRDs
9e	7400 - 8800 kHz	Already covered by the EC Decision on SRDs
9f	13.553 - 13.567 MHz	Already covered by the EC Decision on SRDs
9f1	13.553 - 13.567 MHz	For RFID and EAS, Already covered by the EC Decision on SRDs
9g	26.957 - 27.283 MHz	Already covered by the EC Decision on SRDs
9h	10.2 - 11 MHz	Already covered by the EC Decision on SRDs
9k	3155 - 3400 kHz	Already covered by the EC Decision on SRDs
9l1	148.5 kHz - 5 MHz	Already covered by the EC Decision on SRDs
9l2	5 - 30 MHz	Already covered by the EC Decision on SRDs
9l3	400 - 600 kHz	For RFID, Already covered by the EC Decision on SRDs

The following studies are background for material that contains the compatibility studies which led to the limits included in Annex 9:

- ECC Report 135: Inductive limits in the frequency range 9 kHz to 148.5 kHz;
- ECC Report 067: Inductive SRDs below 30MHz;
- ECC Report 007: Compatibility between inductive LF RFID systems and radio communications systems in the frequency range 135-148.5 kHz;
- ERC Report 096: 290-300 kHz and 500-510 kHz for general inductive applications;
- ERC Report 095: 3155-3400 kHz for general inductive applications;
- ERC Report 092: Sharing inductive SRD and radio communication systems in 10.2-11 MHz;
- ERC Report 069: Propagation model and interference range calculation for inductive systems 10 kHz - 30 MHz - Sample Programme CILIR110.

With regard to the ECC Report 135 [39], the coexistence conditions between inductive SRD devices and time signal services are to be noted. Such time signal systems have been in existence since many decades. Meanwhile other technical solutions have also materialised and a time signal can nowadays also be conveyed by a lot of other technical solutions in a reliable way. Such solutions include e.g. transmissions in the normal radio broadcasting (e.g. RDS), mobile services, paging systems in VHF and UHF supporting also multipoint and broadcasting messaging etc. and also provide the needed European wide harmonisation for cost efficient and reliable conveyance of time signal information. In addition, these other later developments created options which supersede services such as DCF 77 in capacity (estimated 10 kb/minute to several 100 kb/minute) and frequency of repetition of the information by great extent. Because of the capacity, these alternatives are flexible for the development of additional services (alert and non-alert). For some of these services, European coverage might be beneficial. In general this may improve quality of the services compared with older solutions. Another benefit for spectrum management: It may allow for phasing out older technologies and hence free up spectrum. As an example, DCF 77 represents now a “notch” in the spectrum for inductive applications. A long-term plan is therefore envisaged to be developed that will lead to the phasing out of the time signals CEPT therefore proposes to study a comparison of the various solutions addressing items such as coverage and reliability, economic feasibility and possible bundling with other services for such solutions and if considered appropriate, to provide a plan for phasing out or relaxing the protection of such time signals in the spectrum over a medium to long-term time-plan (e.g. over 10 years).

#### 5.2.10 Radio microphones applications including aids for the hearing impaired

The table below presents the frequency bands included in Annex 10 of ERC/REC 70-03 [15] and their status with respect to the Commission Decision on SRDs.

**Table 12: Radio microphones applications**

Annex 10	Radio microphones applications including aids for the hearing impaired	Comments / Status
10a	29.7 - 47 MHz	Frequency band identified on a tuning range basis. Not planned for inclusion in the Commission Decision on SRDs.
10b	173.965 - 174.015 MHz	Not planned for inclusion since the band is used by either governmental or mobile service applications in 7 EU countries at the end of 2011. Usage of T-DAB in the broadcast channel 5A also leads to the result

Annex 10	Radio microphones applications including aids for the hearing impaired	Comments / Status
		that this entry cannot be used to some extent for hearing aids anymore. The entry 10b is for aids for the hearing impaired.
10c	863 - 865 MHz	Already covered by the Commission Decision on SRDs
10d	174 - 216 MHz	Further investigations are required. Candidate for future inclusion. Based on the recommendations in CEPT Report 43, for assistive listening devices using frequency agile technology. Studies on-going in CEPT.
10e1	470 - 786 MHz	Frequency band identified on a tuning range basis. Individual license required in the majority of European countries. Not planned for inclusion in the EC Decision on SRDs yet. It is proposed to wait until a suitable geo-location and cognitive radio solution will have been developed on a harmonised European basis.
10e2	786 - 789 MHz	The majority of member states have no or limited licence-exempt implementation of these frequency bands.
10e3	823 - 826 MHz	
10e4	826 - 832 MHz	Inclusion of these bands in the EC decision is not possible. It is proposed to wait until a suitable geo-location and cognitive radio solution will have been developed on a harmonised European basis. These bands are discussed under the EC mandate on technical conditions regarding spectrum harmonisation options for wireless radio microphones and cordless video-cameras (PMSE equipment)” - Technical conditions for the use of the bands 821-832 MHz and 1785-1805 MHz for wireless radio microphones in the EU.
10f	1785 - 1795 MHz	This band is discussed under the EC mandate on technical conditions regarding spectrum harmonisation options for wireless radio microphones and cordless video-cameras (PMSE equipment)” - Technical conditions for the use of the bands 821-832 MHz and 1785-1805 MHz for wireless radio microphones in the EU.
10g	1795 - 1800 MHz	This band is discussed under the EC mandate on technical conditions regarding spectrum harmonisation options for wireless

Annex 10	Radio microphones applications including aids for the hearing impaired	Comments / Status
		radio microphones and cordless video-cameras (PMSE equipment)” - Technical conditions for the use of the bands 821-832 MHz and 1785-1805 MHz for wireless radio microphones in the EU.
10h1	169.4000 - 169.4750 MHz	For assistive listening devices. Already covered by the EC Decision on the harmonisation of the 169.4-169.8125 MHz frequency band (2005/928/EC). In line with the recommendations in CEPT Report 43, CEPT proposes to move this regulation into the annex of the EC SRD Decision.
10h2	169.4875 – 169.5875 MHz	For assistive listening devices. Already covered by the EC Decision on the harmonisation of the 169.4-169.8125 MHz frequency band (2005/928/EC). In line with the recommendations in CEPT Report 43, CEPT proposes to move this regulation into the annex of the EC SRD Decision.
10i	169.4 - 174.0 MHz	Based on the recommendations in CEPT Report 43, studies were carried out. Not a candidate for inclusion. See also section 5.3

▪ **Frequency band 169.4-169.8125 MHz**

CEPT Report 043 [18] describes the proposed actions in response to the Mandate to CEPT (“169 MHz-Review Mandate”) to undertake the necessary technical studies in support of a possible review of Commission Decision 2005/928/EC [4], as amended by Commission Decision 2008/673/EC [3] (hereafter 169 MHz Decision) in order to ensure the efficient use of the harmonised frequency range (169.4-169.8125 MHz), pursuant to Art. 5 of the 169 MHz Decision.

The first step of investigations was to undertake a survey of the current users of the harmonised frequency range (169.4-169.8125 MHz) covered by the 169 MHz Decision, i.e. in both the low power and the high power bands, and provide detailed feedback on the current use of the harmonised sub-band C.

This considered inter-alia:

- an investigation and preliminary assessment was conducted based on the responses received to the questionnaire;
- study the implications for current users of increasing the flexibility in the lower power part of the band (sub-bands A and B) by removing the established channelling arrangements and the implications of the altered usage parameter for social alarms (proposed to be 10mW e.r.p. and < 0,1% duty cycle).

CEPT Report 043 [18] proposes actions which include items for further spectrum engineering work. As an interim result after step one of the investigations conducted by the SRD/MG, the following possible changes to the Decision 2005/928/EC are under study:

- There seems to be no requirement for a European harmonisation measure regarding high power radio applications in the 169 MHz band. Therefore the removal of the high power part C from the Commission Decision should be considered. Almost all existing usage in the sub-band C is local or nationwide but there was no evidence for a requirement for having European- wide harmonisation neither from the technical side nor from the application perspective. Such a removal of an EC harmonisation measure would on the other side not affect the existing services;
- There is evidence that sub-band C is under-used. Further investigations by the SRD/MG are proposed to see whether some utilisation by low power SRD applications in parts of sub-band C is possible. This investigation for possible co-existence should include two items:
  - 1) non-specific SRDs using Low Duty Cycle (LDC) for applications in the whole range from 169.4-169.8125 MHz such as Meter Reading;
  - 2) additional frequency opportunities for hearing aids.

Two measurements sessions were organised in Kolberg, Germany in the premises of BNetzA (25-26 January 2012 and 28-29 February 2012). The study considered Hearing aids (also called Assistive Listening Devices, ALD), Smart Grid/Smart Metering and PMR devices and the following initial conclusions from the spectrum engineering work has been reached:

- To open band B for Smart Grid / Smart Metering and other LDC applications may be possible with a long term duty cycle; but then the risk of a permanent blocking by smart grid “Concentrators” needs to be avoided.
- The usage of ALD and Smart Grid / Smart Metering (with long term duty cycle) applications in band C maybe considered.
- The deployment of Smart Grid / Smart Metering concentrators in band A could limit the value of band A for ALDs.

Social alarms should be kept in the range 169.4750 MHz to 169.4875 MHz but with a maximum e.r.p. of 10 mW and a duty cycle limit of 0.1%. The ECC recently received ETSI System Reference Document TR 103 056 [47] about alarm and social alarm systems. The document does not suggest the use of the 169 MHz band for social alarms. The VHF environment is not preferred because of antenna size issues and confirms the result of the earlier ECC survey under step 1 of the activities that the vast majority of the social alarm products on the market are operating in the UHF frequencies and not in the VHF frequency range. It is proposed that this situation would be best addressed with a non-specific designation that is backward compatible for existing social alarms.

The spectrum engineering study provided so far evidence that LDC spectrum access for non-specific SRD may be possible without undue impact on the existing services and applications, there should not be exclusive spectrum access specified anymore for sub-band B.

The existing channelling for hearing aids, meter reading and asset tracking and tracing in frequency sub-bands A and B of the EC Decision may be kept since it is either meanwhile adopted in applicable standards or helps to avoid interference. A removal was by the vast majority of responding stakeholders not seen as offering a real benefit. However, introducing a possibility for accessing the frequencies by means of the LDC medium access / mitigation technology may provide at the same time a solution for increased flexibility and has potential to be used by a wide variety of non-specific SRD applications. LDC is the most promising technology but other technologies may also be investigated in the future, if requested.

As a result of the above mentioned on-going investigations, there is the possibility to finally withdraw the Decision 2005/928/EC. The remaining harmonisation measures (existing and additional ones) for low power / short range devices are incorporated in the present proposed amendment of the technical annex of the EC Decision for Short Range Devices. This approach provides better visibility and transparency for the 169 MHz regulation.

The plan and actions proposed above appear to be fully backwards- compatible with the existing usage in the frequency band 169.4-169.8125 MHz. In addition, the plan provides a simpler regulation due to the withdrawal of one EC Decision and introduces flexibility that can be used by many different SRD applications having LDC / limited transmitter activity factors. It may therefore also foster innovation;



New SRD applications operating in the sub-band C should not cause harmful interference to existing services and applications (reason for duty cycle limitation) and have to protect themselves against interference from existing high power applications. The latter can be achieved for example by spreading over the frequency range or by supporting frequency agility used as an interference mitigation technique;

ECC is going to amend of ECC/DEC/(05)02 [14];

Recommendation T/R 25-08 on the planning criteria and coordination of frequencies in the Land Mobile Service in the range 29.7-921 MHz should also contain a reference to the new amended ECC/DEC/(05)02 [14] and brought in line with the final results of this process.

### **Frequency bands 174-216 MHz**

Further investigations have been started on technical parameters and usage conditions in the frequency band 174-216 MHz (ERC/REC 70-03 [15] Annex 10 band d) that may allow the usage of adaptive hearing aids in order to give a more robust environment and some additional frequency opportunities. The technical characteristics of the Hearing Aids (ALD transmitters) for these studies are understood to be the same as for equipment operating in the 169.4 MHz to 169.8125 MHz band (not excluding new digital equipment) and the equipment can operate over a tuning range covering the 169.4 MHz to 169.8125 MHz as well as 174-216 MHz range. This environment is also considered far more robust for ALD applications than use in the frequency range of sub-band C;

#### ▪ **Frequency bands 1785-1795 MHz and 1795-1800 MHz**

These bands fall under the responsibility of FM51 and under the EC mandate on technical conditions regarding spectrum harmonisation options for wireless radio microphones and cordless video-cameras (PMSE equipment)” - Technical conditions for the use of the bands 821-832 MHz and 1785-1805 MHz for wireless radio microphones in the EU. At this moment it is not proposed to include these bands since studies are on-going.

**CEPT proposes to add the existing regulations for meter reading, asset tracking and tracing and social alarms from EC Decision 2005/928/EC [4] as amended by Commission Decision 2008/673/EC [3].**

**In addition, the existing regulation for hearing aids should be included as for Adaptive Listening Devices (ALD) and the existing regulation for asset tracking and tracing and social alarms as for non-specific SRD with the respective duty cycle limits.**

**The Commission Decision 2005/928/EC [4] can be withdrawn as already outlined in CEPT Report 043 [18].**

**CEPT proposes to add in the band 169.4-169.8125 MHz a new regulation for non-specific SRD with Low Duty Cycle (LDC) parameters. Exclusion of equipment that concentrates/multiplexes SRD LDC individual equipment data such as metering concentrators is also considered necessary from this proposal.**

**In addition, a new regulation for non-specific SRD is proposed to be added in the range 169.4-169.8125 MHz. Adaptive ALD usage in the frequency ranges 174-216 MHz is under investigation in the ECC and proposed to be added to the list of future consideration and inclusion in the EC Decision for SRD.**

### **5.2.11 Radio frequency identification applications**

The table below presents the frequency bands included in Annex 11 of ERC/REC 70-03[15] and their status with respect to the EC Decision on SRDs.

**Table 13: RFID**

<b>Annex 11</b>	<b>RFID</b>	<b>Comments / Status</b>
11a	2446 - 2454 MHz	For 500 mW e.i.r.p. already covered by the EC Decision on SRDs. Not harmonised in Europe for 4W power levels. A 4 W power level is not requested by industry at this

Annex 11	RFID	Comments / Status
		moment and such a power level will also lead to incompatibilities with the military service in a substantial number of member states. Inclusion of higher power levels of 500mW is therefore not feasible.
11b1	865.0 - 865.6 MHz	Already covered by the Commission Decision on UHF RFID (2006/804/EC)
11b2	865.6 - 867.6 MHz	
11b3	867.6 - 868.0 MHz	

▪ **Definition of RFID**

RFID is rather a technology than an application. The Commission Decision for SRD does not contain a definition for RFID or similar but the Commission Decision 2006/804/EC [7] on harmonisation of the radio spectrum for radio frequency identification (RFID) devices operating in the ultra-high frequency (UHF) band does. It is defined as "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 RFID readers (this term includes terminals, interrogators, or similar) and transponders/interrogators (this term includes tags, contactless cards and similar devices) all fall within the definition of "radio equipment" and must be assessed against the essential requirements of the R&TTE Directive.

The Telecommunication Standardization Sector (ITU-T) creates globally agreed and globally accepted ICT standards for RFID which are seen as usually always being a part of a telecommunication network ("networked" RFID). RFID is hence seen as a technology that enables all kinds of networked application fields and scenarios, often also described as the "internet of things" or "machine-to-machine communications".

The crucial point is that due to interaction between a reader and the corresponding transponder these two parts of a system cannot readily be independently assessed for compliance with Article 3.2. of the RTTE directive. As such, an RTTT DSRC system for example may also be seen as RFID-technology based system. It is suggested to change the application category in tag / interrogator based systems to make the current situation clearer. RFID are seen as a subset of this category.

▪ **Frequency band 2446-2454 MHz**

500 mW was implemented during the last update of the Commission Decision for SRD and a higher harmonised power level would require new compatibility studies to be conducted. No change is proposed.

**CEPT proposes to define the current category "RFID". CEPT proposes to keep the RFID terminology which is also used in other documentation (e.g. ITU-R, ISO) since the early 1990's and add a new and broad RFID definition which includes all kind of tag/interrogator based systems.**

**Similar to the integration of Commission Decision 2005/928/EC [4], the EC Decision 2006/804/EC [7] for UHF RFID should also be integrated in the next update of the EC Decision for SRD. This will facilitate a common and transparent update processing the future as well as more efficient implementation work for the administrations.**

**5.2.12 Active Medical Implants and their associated peripherals**

In the table below, the frequency bands which were included in previous versions of Annex 12 of ERC/REC 70-03 [15] are shown with their status in respect of the EC decision on SRDs.

**Table 14: Active Medical Implants and their associated peripherals**

nnex 12	Active Medical Implants and their associated peripherals	Comments / Status
12a	402 - 405 MHz	Already covered by the EC Decision on SRDs Deleted from ERC/REC 70-03 in 2012
12a1	401 - 402 MHz	Already covered by the EC Decision on SRDs Deleted from ERC/REC 70-03 in 2012
12a2	405 - 406 MHz	Already covered by the EC Decision on SRDs Deleted from ERC/REC 70-03 in 2012
12b	9 - 315 kHz	Already covered by the EC Decision on SRDs Investigate possible non-specific use
12c	315 - 600 kHz	Already covered by the EC Decision on SRDs Investigate possible non-specific use
12d	30 - 37.5 MHz	Already covered by the EC Decision on SRDs Investigate possible non-specific use
12e	12.5 - 20 MHz	Already covered by the EC Decision on SRDs Investigate possible non-specific use
12f	2483.5 - 2500 MHz	This band is recently added to ERC/REC 70-03 and the Harmonised European Standard ETSI EN 301 559 has been published in June 2012. This band will benefit from harmonisation and inclusion in the EC Decision on SRDs and is therefore proposed.

▪ **Frequency bands 401-402, 402-405 and 405-406 MHz**

The frequency bands 401-402 MHz, 402-405 MHz and 405-406 MHz have been deleted from ERC/REC 70-03 annex 12 [15] in 2012. This deletion followed the amendment of ERC/DEC/(01)17 [22] that includes a new Decides 4. Decides 4 of this ERC Decision defines that protection of ULP-AMI communication systems from short range device applications shall be ensured in the 401-406 MHz frequency band. This provision is relevant especially with regard to future SRD applications, different from ULP-AMI, in the band 401-406 MHz.

ETSI made a proposal during the creation of the present report to propose to the EC the removal in the EC Decision of the 401-406 MHz band used by ULP-AMI. The reasoning provided for this was to resolve a discrepancy between the amended ERC/DEC/(01)17 [22] and the EC Decision on SRD from the perspective of the status.

The spectrum usage parameters including the spectrum access rules for ULP-AMI operating in the frequency band from 401 MHz to 406 MHz are the same in ERC/DEC/(01)17 [22] and the EC Decision for SRD. Therefore, from this perspective, there is no technical discrepancy. SRD/MG could not agree to support the proposal made from ETSI, i.e. to propose removal of ULP-AMI operating in the frequency range 401-406 MHz from the technical annex of the EC Decision for SRD. Especially, the benefits remained unclear that the proposed approach would have for users of ULP-AMI when proposing a removal from the EC Decision for SRD.

It was also noted that ERC/DEC/(01)17 [22] is implemented by 35 administrations and 5 additional administrations have indicated to have the ERC/DEC/(01)17 [22] implemented as “Yes, partly” with the addition that they are bound by Commission Decision 2006/771/EC [6] as amended. Therefore, no discrepancy could be derived from the implementation status.

The following statements were provided by the ECC in a liaison statement to EC as provided in document ECC(11)094 annex 10 in December 2011:

- ECC noted that in the Commission Decision the band 402-405 MHz has been designated for “Active medical implants” and the bands 401-402 MHz and 405-406 MHz have been designated for “Active medical implants and associated peripherals”. Such devices operating in these bands are in the market in great numbers for usage at medical premises and also at homes (e.g. home monitoring of the implant). Outdoor usage is also not excluded;
- The bands should however not be excluded a-priori for other SRD applications than medical but compatibility studies should be conducted and should prove coexistence before acceptance of any other future SRD application;
- ECC is further considering the possible impact of the amended ERC Decision on the current regulation, and also the relation between other different SRD applications.

A similar situation exists with regard to ITS applications operating in the 63-64 GHz range which are under ECC/DEC/(09)01 [20] as well as the EC Decision for SRD (under TTT) with identical usage parameters. The ECC/DEC/(09)01 [20] recognises this application as under the mobile service and the ECC Decision is implemented by 37 administrations. The 63-64 GHz entry was recently been removed during the revision of annex 5 of ERC/REC 70-03 [15], similar to the removal of ULP-AMI in 401-406 MHz from annex 12, and this was also not seen as a discrepancy.

Compatibility studies for ULP-AMI assume a typical density of devices and a duty cycle and duty cycle pattern. Studies also assume indoor use in hospital or medical premises but do not exclude outdoor use and use at home. ULP-AMI applications for both use cases (medical premises and home usage, e.g. implant status monitoring usage) are in the market in great numbers.

It is likely that the usage description excludes any other application than medical implants at this moment. ULP-AMI operating in 401-406 MHz are protected from any short range device as determined in the amended ERC/REC/(01)17 [22]. In addition, ULP-AMI operate in sharing with governmental services (e.g. meteorological radio sondes) in the band and in adjacent bands (e.g. COSPAS SARSAT). The current conditions were established after 10 years of study at ITU level. The bands should however not be excluded for other devices than medical but compatibility studies should prove coexistence for new applications based on a proper technical description of duty cycle, duty cycle pattern and typical device density. A true non-specific SRD status is not recommended.

Both the EC and the ECC decision can be seen as complementary instruments whereby the first guarantees harmonised spectrum access throughout the internal market while the latter one could prevent Member States from being less restrictive without undertaking the necessary studies.

At the national level, an individual administration still has the possibility to implement “relaxed regulations” although without conducting a coexistence study before so doing, this would be against the aim of ERC Decision (01)17. Therefore, pursuant to recommends 5.10 and 5.21 of the RSPG opinion on streamlining the regulatory environment for the use of spectrum [54], CEPT proposes to add a footnote in the EC Decision which states that “ERC Decision (01)17 defines that protection of active medical implant communication systems from short range device applications shall be ensured in the 401-406 MHz frequency band. Additionally, protection of the primary service shall be ensured.

5.10 and 5.21 from the RSPG opinion state:

*Recommends 5.10: “The RSPG recommends that every effort be made to ensure the consistency of ECC and Commission decisions, recognizing that ECC Decisions also contain sharing conditions which are respected in ETSI harmonised standards rather than specified in Commission spectrum Decisions.”*

*Recommends 5.21: “The RSPG considers that the possibility for the Commission to cite ECC decision in a way similar to what is done with harmonised standards in the R&TTE process should be investigated.”*

- **Frequency band 2483.5-2500 MHz**

This band is recently added to ERC/REC 70-03 [15] and a harmonised standard (ETSI EN 301 559 [32]) for medical implants in this band has been published in June 2012. This band will benefit from harmonisation and inclusion in the EC Decision on SRDs and is therefore proposed.

A remark was made about the effects this application may have on the Galileo navigation system (Outcome of WRC-12, agenda item 1.18 [37]). The sharing compatibility study ECC Report 149 [19] already considered this case under a request from ECC/WGFM, so this item is already covered.

**CEPT proposes to include the band 2483.5-2500 MHz for active medical implants in the annex of the EC SRD decision.**

**CEPT proposes to add a footnote in the EC Decision which states that “ERC Decision (01)17 defines that protection of active medical implant communication systems from short range device applications shall be ensured in the 401-406 MHz frequency band. Additionally, protection of the primary service shall be ensured”.**

### 5.2.13 Wireless Audio Applications

The table below presents the frequency bands included in Annex 13 of ERC/REC 70-03 [15] and their status with respect to the EC Decision on SRDs.

**Table 15: Wireless Audio Applications**

Annex 13	Wireless Audio Applications	Comments / Status
13a	863 - 865 MHz	Already covered by the EC Decision on SRDs
13b	864.8 - 865 MHz	Already covered by the EC Decision on SRDs
13c	1795 - 1800 MHz	Industry requests to consider inclusion.  The band is currently under study in the CEPT for PMSE under the EC mandate on PMSE.  The band is not implemented in 7 EU countries. Subject to individual license in UK.
13d	87.5 - 108 MHz	Already covered by the EC Decision on SRDs

- **Category Wireless Audio Applications**

This category initially started for analogue application's using a 100% duty cycle. As technology has progressed both analogue and digital systems are now in use. Digital systems simply transmit data and do not distinguish between audio or video therefore the category is being renamed “Wireless Audio and Multimedia Streaming Devices” however these systems still require a 100% duty cycle.

Please refer to the EC Decisions for specific band information.

The difference between “Wireless Audio and Multimedia Streaming” and “data streaming” is that the “Wireless Audio and Multimedia Streaming” requires a different minimum QOS, particularly in ensuring the latency of any streamed content is such that the coherence of the received data is preserved.

### 5.3 SPECIFIC ISSUES

This section contains the specific issues indicated in the guidance document of the European Commission not already dealt with in section 5.1.

#### 5.3.1 Generic power limits for SRDs above 30 MHz

A generic low power limit is assumed to be an e.i.r.p. limit which guarantees compatibility (no interference) with services and other SRDs without the need for further mitigation techniques or to take into account the deployment of devices using the limit. This excludes generic UWB since a dominant indoor deployment is assumed and specific UWB because it requires specific mitigation techniques.

The SRD Decision already contains generic limits below 30 MHz and CEPT was invited to study generic power limits for SRDs above 30 MHz. These investigations should be carried out on a case by case basis and for separate frequency ranges in line with the suggestion in CEPT Report 035 [17].

Currently SE-24 has WI23 “maximising spectrum efficiency” in its finalisation stage. A number of suggestions have been done to make spectrum access more generic and not application based/restricted. Spectrum utilisation is well defined in Recommendation ITU-R SM.1046-2[26] “Definition of spectrum use and efficiency of a radio system.” It is defined as the product of the frequency bandwidth, the geometric (geographic) space, and the time denied to other potential users. For SRD’s there are practical limitations to this approach based on the physical limits of receivers in relation to the balance of power and for example the resulting hidden node problem in specific frequency bands and for specific applications.

CEPT was requested to investigate the possibility to create generic overlay bands or bands with common spectrum access parameters beyond the current frequency segments above 30 MHz.

This means that the exercise consists in defining extremely low power generic limits (in each frequency segment) for SRDs. Therefore this approach raises two issues:

- How to define a generic limit?
- What is the real benefit in defining an extremely low power limit?

Considering current SRD Regulations in Europe, one can note that, at least in shared bands, specific arrangements are required to allow SRDs to operate while ensuring protection of incumbent services, such as:

- maximum e.i.r.p., e.r.p. or magnetic field strength (to cover all cases)
- duty cycle (in some cases)
- indoor restrictions (e.g. RLAN 5 GHz, UWB)
- DFS, DAA or LBT (e.g. RLAN 5 GHz, UWB)
- Power control
- Maximum bandwidth
- Antenna discrimination (e.g. SRR 24 GHz)

In most of the cases, these arrangements result from compatibility studies and are associated to offer required levels of protection to existing regular radio-applications, recognising that, alone, a maximum power (or e.i.r.p.) cannot provide such protection.

In addition, in the large majority of compatibility studies, operational characteristics of specific SRD under consideration (data rates, activity factors, direction of transmissions, assumptions on market deployment (i.e. numbers)) are taken into account to assess compatibility but are not reported or specified in the related Regulations.

Considering Generic ULP SRDs, all types of applications need to be assumed, presenting a variety of operational and technical characteristics. One should in particular note that some characteristics present advantages compared to a given type of potential victim service (e.g. terrestrial) while presenting obvious disadvantages compared to another type of radio service (e.g. satellite) and vice-versa.

Also, being generic, a large number of different applications with each huge number of devices would coexist in the same band, obviously presenting a maximum aggregation factor without any possibility of considering

specific mitigation factors. A generic limit approach also implies that there is no clear framework on types of equipment implemented in the future for each considered frequency bands and this implies a major issue about principle under which this approach should be investigated.

This means that, to determine a generic ULP SRDs limit (actually only a maximum e.i.r.p. density can respond to the requirement) that would ensure protection of all existing radio services, there is no other way than to consider worst case assumptions that can be summarised as follows :

- outdoor usage;
- possibility of pointing at all elevations (equivalent to a 0 dBi antenna associated to an e.i.r.p. density limit);
- 100 % activity factor;
- 100 % duty cycle;
- A maximum number of devices in order to assess the impact of the aggregation effect.

The result of such process would be summarized by a too low generic power limit and too stringent operating conditions which would more than likely not be compatible with minimum industry requirements to produce compliant devices.

Some industries may have an interest for such a low power limit, but this has never been expressed to CEPT (specific request, SRDoc, etc). On the contrary, a lot of industry representatives have already expressed concerns about such ultra-low power generic limits.

Some current example demonstrates that without a clear request, defining or relaxing a regulation doesn't necessarily foster the innovation. (e.g. 17.1 to 17.3 GHz for Wide Band Transmission System). One reason may be that on the SRDs market, the economic aspect is one of the key elements which is taken into account to decide whether or not a device may be developed. Especially, developing a specific chipsets for an application may be regarded as a blocking point.

**Based on the existing information, CEPT is of the view that defining extremely low power limits for SRD are neither beneficial for administrations nor for the industry. They even may impose a risk for the current used applications and services.**

### 5.3.2 Use of SRD allocations in the 863-870 MHz range

CEPT was requested to investigate the current and projected density of usage of current SRD bands, especially the allocations in the 863-870 MHz range. Based on these investigations follow-up discussions could take place on new sharing possibilities or the need for additional spectrum.

In 2008 ECC/WGFM Project Team FM-22 has performed a monitoring campaign in the 863-870 MHz band for three distinctive reasons. The first reason is to gain experience with SRD monitoring as a new monitoring task. The second reason is to verify the prediction that the occupancy of the SRD band 863-870 MHz is increasing, eventually leading to congestion and rendering the bands useless in certain areas. The third reason was to investigate sharing possibilities in the existing frequency allocations in the 863-870 MHz Band. Monitoring took place on the basis of monitoring plan that involved monitoring mainly at previously identified hotspots with actual expected traffic. These hotspots were selected by industry as well as the administrations involved in FM-22. The measurement plan was later published as [Report ITU-R SM.2154](#) "short-range communication devices occupancy measurement techniques".

Although a pure technical analysis is fairly straightforward a detailed analysis involves specific knowledge of the applications being present in the frequency band that was monitored. This was the main objection from some manufacturers / users against the hard occupancy figures presented in the final report. The occupancy was based on the frequency bins used by the analyser and not necessary on the channel occupancy of the devices. Also because of the timing of the SRDs in combination with the acquisition (sweep)time of the used analysers some transmissions could be lost giving an incorrect occupancy figure specially in those cases where devices with low duty cycle were measured.

A second monitoring campaign and report covered this problem partly by presenting the occupancy figures on an hourly basis with a normalized acquisition time. Monitoring engineers argued that transmissions occurring for example only once an hour may still be "missed" in the registrations but that with such low

occupancy figures the frequencies at least could be considered uncongested at that particular monitoring location.

Conclusions from the campaign were that certain frequency segments had no or only very low occupation. Manufacturers / users argued that this was not automatically a sign of under-use; a particular application could be designed in such a way that occupation only occurs in an emergency situation or that a low occupation is necessary for proper functioning of the application. Although true it requires a more detailed investigation to determine if sharing is possible anyway in these bands.

One general conclusion which may be gained by such experience is that the measurement approach cannot be used as a single approach to assess the spectrum occupation especially in a context of a frequency band which is used by applications operating on the basis of mitigation techniques like the restriction of the duty cycle.

Another conclusion was that certain frequency segments such as audio applications and RFID have strong location dependent occupancy figures that may indicate sharing possibilities.

Another important observation is that there is a distinct division in occupation in the segments 863-865 MHz, 865-868 MHz and 868-870 MHz. The existing designation for non-specific SRDs through the entire range 863-870 MHz by appropriate generic SRD rules is not used as much as expected.

CEPT also issued in October 2010 a questionnaire addressed primarily to SRD industry aiming to review in detail the relevance of existing regulatory requirements for SRD operating in the 863-870 MHz frequency band. CEPT seeks a minimum SRD regulation that meets the evolution of technology while ensuring an efficient use of the spectrum.

An overall conclusion is that spectrum use in the 863-870 MHz range may be improved. This is important to cover the time period between the predicted increase in demand and the availability of new (additional) frequency space for SRDs in the same frequency range A specific work item (WI-42) in ECC SE-24 will address this issue.

### **5.3.3 Investigate how to address receiver capabilities and identify areas where improved receivers could improve spectrum access for SRDs**

Receivers are passively using the spectrum just as transmitters use it actively. Therefore it makes sense to treat them the same way when for example calculating efficient spectrum use or assess interference. In the most ideal case the technical properties of receivers in a communication system are optimally adapted to the transmitted signal they are supposed to receive and the environment they are designed to operate in.

In general we can state that if we improve the receivers' capabilities in a particular environment more devices may utilise the medium at a given moment. In the spectrum area of SRDs there are two families of receivers, the SRD receivers and the receivers of the radiocommunication services the SRD shares the medium with. For SRD's receiver parameters are defined in some cases and may be changed according the needs of the user and industry or changes in the radio environment. An example are the receiver categories in the ETSI EN 300 220 [30]. Receiver parameters of existing and new users need to be addressed when interference is expected or a new family of users enters a particular part of the medium (spectrum and location). It is therefore needed to have the receiver parameters documented specially in the case they are not optimal.

Considerable work has been performed until today concerning the specification of receiver performance:

- ETSI TR 102 914 (2009) [50]: Aspects and implications of the inclusion of receiver parameters within ETSI standards;
- ETSI EG 201 399 (2010) [51]: Guide for the production of HSs);
- ECO Report 02 (2010) [52]: The impact of receiver parameters on spectrum management
- Regulations.



However, addressing receiver parameters may not be the only solution, when new services enter the spectrum / location. In the case of in band interference, no matter how good the receiver, the interference cannot be rejected. Alternative ways of mitigating in-band interference are available within the present equipment standardisation framework.

There are many types of receivers, each being different. Receiver performance can be distinguished by their usage performance and their interference performance.

Usage performance characterises how well the receiver operates on the application level. The metrics differ, e.g. for voice it's the articulation index, for video the resolution and noise, and for data the speed, latency and jitter. The receiver sensitivity and data throughput (incl. processing and error correction) are general parameters for nearly all receivers.

Interference performance is characterised at the physical level, mainly by the adjacent channel rejection, spurious response rejection, blocking (desensitisation), intermodulation immunity, image frequency rejection, i.e. the parameters which demonstrate how the receiver will perform under conditions such as "receiver overload" or "out-of-band emissions from transmitters in the adjacent spectrum. In addition, receiver performance degradation due to very strong adjacent channel interference must be mitigated by both the interfering transmitter and the victim receiver design, e.g. by means of a transmitter and receiver filter.

In principle there are two ways of making reasonable regulations:

1. Regulate the interference performance in those cases where justified by increasing the value of spectrum use by improving receiver performance or establish at least a recommendation, e.g. similar to the ERC/REC 74-01 [23] that recommends spurious emission limits in the unwanted emission domain;
2. Establishing minimum performance standards to reduce their susceptibility to interference.

This way forward is also in line with other recent developments. The FCC seems also to proceed in this direction (2009 Wireless innovation notice of inquiry, June 2012 workshop on receiver performance standards).

It may be advisable not to consider devices in studies when receiver parameters or alternative mitigation techniques are not given but this is a spectrum engineering and standardisation issue not to be considered in the EC decision. The equipment standardisation framework relies on the standardisation bodies remaining vigilant in ensuring the receiver parameters or alternative mitigation techniques remain appropriate as the use of the radio spectrum evolves.

For radio services the case is not very different, except that the receiver parameters are solely defined based on the needs of the particular service. For compatibility with SRDs usually the worst case scenario is used.

A particular example of this is the protection of long wave time transmitter service, the reception is protected throughout Europe while the coverage of the transmitter and the associated receivers is limited to specific countries. It is advisable to leave the restrictions in the EC decision as they are for the moment but relax the restrictions as much as possible on a national basis and keep track of these relaxations.

**CEPT cooperates with ETSI in the area of receiver performance to ensure coherence between the regulatory framework and relevant Harmonised European Standards. CEPT invites ETSI to continue to develop improved SRD receiver specifications and/or alternative mitigation techniques, where needed, in collaboration between ETSI and the CEPT, to improve spectrum sharing and spectrum efficiency through standardisation in the case where various SRD applications need to share the same band. E.g. ETSI EG 201 399 [51] and ETSI TR 102 914 [50] procedures for choosing receiver minimum performance, where justified, for Harmonised European Standards and associated regulatory guidance (e.g. an ECC Recommendation similar to ERC/REC 74-01 on unwanted emissions in the spurious domain [23]). The receiver specifications are a prerequisite for CEPT to perform compatibility studies and investigate spectrum access methods.**

**The result would be a regime of certifiable receiver performance standards and associated regulations that protect the rights of compliant receivers, provide a level of certainty to entrant systems and especially the new emerging class of more dynamic sharing entrants, and grant no rights to rogue receivers that fail to comply with the basic standards that they will in the future be required to meet. This could also lead to a situation where new applications can be introduced and usage restrictions could be removed by using newer, state-of-the-art equipment.**

#### **5.3.4 Issues on the 169 MHz mandate and SRD roadmap investigation**

It appears that the vast majority of the social alarm products on the market are operating in the UHF frequencies and not in the VHF frequency range. However, social alarms should be kept in the range 169.4750 MHz to 169.4875 MHz but with a maximum e.r.p. of 10 mW and a duty cycle limit of 0.1% but as for non-specific SRD with this duty cycle limitation.

CEPT proposes to add the existing regulations for meter reading, asset tracking and tracing and social alarms from Commission Decision 2005/928/EC [4] as amended by Commission Decision 2008/673/EC [3]. In addition, the existing regulation for hearing aids should be included as for Adaptive Listening Devices (ALD) and the existing regulation for asset tracking and tracing and social alarms as for non-specific SRD with the respective duty cycle limits. The Commission Decision 2005/928/EC [4] can be withdrawn as already outlined in CEPT Report 43 [18]. CEPT proposes to add in the band 169.4-169.8125 MHz a new regulation for non-specific SRD with Low Duty Cycle (LDC) parameters. Exclusion of equipment that concentrates/multiplexes SRD LDC individual equipment data such as metering concentrators is also considered necessary from this proposal. Studies indicate that a single LDC device does not cause interference, however a concentrator which combines a large number of LDC devices becomes a high duty cycle system (e.g. by showing polling characteristics) and will cause interference.

Metering devices as a category are proposed to be kept. Typical transmitter duty cycles for such systems are in the range up to 10%, e.g. for multiplexers and concentrators of data while individual readers have normally much lower transmitter duty cycles (sub-metering).

Recent investigations have indicated that wireless metering devices may appear in very high deployment numbers in the market in the future. Estimates go up to about 25 000 devices per square kilometre in urban environments. It is therefore proposed to keep this category in the 169 MHz range for the existing regulation for meter reading in the 169 MHz range where limited propagation attenuation exists compared with higher frequency ranges, and where non-specific SRD applications with the same parameters (500 mW, 10% duty cycle, no further spectrum access requirement) could lead to severe interference problems. In addition, the band is also shared with some applications such as asset tracking and tracing which need a predictable sharing environment.

Following the indications provided in CEPT Report 43 [18], one task was to define the precise low duty cycle parameter set to avoid interference. The CEPT Report 43 [18] includes a list of LDC examples for some applications. A study was performed to look at sharing with ALDs in the band 169.4-169.8125 MHz on the basis of low duty cycles.

This LDC limit should be set so as to not impose undue harmful interference to existing users (e.g. Assistive listening devices ALD) while at the same time noting that some time limited interference in this band occurs anyway due to the position of the 169 MHz frequency band inside of the PMR band from 146-174 MHz.

LDC limits for the protection of ALDs in sub-band B (sub-band B is 169.475-169.6 MHz and ALDs use in the central 100 kHz, 169.4875-169.5875 MHz) were analysed, A measurement report suggested to open sub-band B for other LDC applications, this may be possible with a long term duty cycle; but then the risk of a permanent blocking by smart grid “Concentrators” needed to be avoided. The conclusion was that as ALDs are 100% Duty Cycle this was possible only with extremely low duty cycle. Since ALDs are used nearly always during the day or evening at locations such as schools or theatres, day/night sharing is considered possible in this case. This allows in sub-band B a higher duty cycle during the night. Night in this context is understood to be from 0h to 6h local time when ALD are hardly ever in use.

The value and appeal of the very low duty cycle limit in sub-band B during the day remains difficult to evaluate (0.001% is equivalent 36 ms within an hour) since no demand was expressed to CEPT but it is considered after analysis to provide no harm to the existing users and as an opportunity. Exclusion of equipment that concentrates/multiplexes SRD LDC individual equipment data such as metering concentrators is also considered necessary for this proposal to work. This is to avoid accumulated higher emission durations or permanent blocking mechanisms at a given location that could provide harmful interference to ALDs. This new day/night duty cycle is an essential technical requirement. A Harmonised European Standard is needed to describe the possibilities of how this can be implemented in the equipment.

Future work on sharing in this band should concentrate on means of sharing on a basis other than duty cycle alone and day/night sharing such as frequency re-use on a geographic basis by means of a database. One possible sharing application for consideration is asset tracking and tracing equipment which are used for tracing and tracking of goods, leading to their recovery, consisting in general of a radio transmitter placed on the item to be protected and a receiver and may also include an alarm. Typical transmitter duty cycles for such systems are in the range up to 1%. Such systems need a predictable sharing environment.

One possibility which allows greater flexibility is to provide improved sharing rules in Harmonised European Standards. So far, no specific harmonised standard exists for asset tracking and tracing systems covering the art. 3.2 RTTE requirements and these systems often comply with the generic harmonised standard ETSI EN 300 220-2 [30]. I.e. this entry from 2005/928/EC [4] is proposed to be included in the EC Decision for SRD as non-specific SRD entry.

### **5.3.5 Non-specific industrial applications in the 2446-2454 MHz range**

In the UK the band 2445-2455 MHz is already available for this type of applications with a power of 100mW and 2446-2454 MHz is currently harmonised for RFID with 500mW and railway applications. Based on this it was suggested to open 2446–2454 MHz for industrial applications with a power of 100mW.

TCAM instructed ETSI in 2008 to widen the scope of ETSI EN 300 328 [31] (Harmonised Standard for 2.4 GHz Wide Band Systems) to make it more generic. However all systems that would fit now into the revised scope would also have to implement an adequate sharing technique. Nevertheless, non-critical industrial applications together with a variety of other new applications will be soon be able to use the revised standard ETSI EN 300 328 v1.8.1 [31].

For the more critical industrial applications, ETSI produced a Systems Reference Document asking the CEPT for additional spectrum, outside the 2.4 GHz band. In total 76 MHz of spectrum is sought, out of which a minimum 40 MHz should be contiguous. The opinion of a number of administrations is that due to the above referenced activities in- and outside the 2.4 GHz band, further consideration of only the band 2446-2454 MHz is no longer required for these critical industrial applications.

CEPT advises not to include this band in Commission Decisions for SRD for industrial applications.

These studies are on-going and CEPT investigations prioritised 5 GHz frequencies for the first step of investigations to find a solution. This investigation is for industrial wireless applications for a compatibility study as well as development of a regulatory concept for the frequency band 5.725-5.875 GHz, dealing with the concept of a limitation at the boundary of the industrial premises.

## 6 OVERVIEW OF CEPT PROPOSAL

- CEPT proposes to add the existing regulations for meter reading, asset tracking and tracing and social alarms from Commission Decision 2005/928/EC [4] as amended by Commission Decision 2008/673/EC [3]. In addition, the existing regulation for hearing aids should be included as Assistive Listening Devices (ALD) and the existing regulation for asset tracking and tracing and social alarms as non-specific SRD with the respective duty cycle limits. The EC Decision 2005/928/EC [4] can be withdrawn as already outlined in CEPT Report 43 [18]. CEPT proposes to add in the band 169.4-169.8125 MHz a new regulation for non-specific SRD with Low Duty Cycle (LDC) parameters. Exclusion of equipment that concentrates/multiplexes SRD LDC individual equipment data is also considered necessary as a regulatory requirement in the band 169.4875-169.5875 MHz. Sharing in the band 169.4875-169.5875 is only possible with an extremely low duty cycle or day/night sharing;
- CEPT proposes to include the frequency range 57-64 GHz for non-specific SRD with a power of 20 dBm 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;
- CEPT proposes the following definition of TTT (Transport and Traffic Telematics). “TTT’ means systems in which information and communication technologies are applied in the field of transport (depending on technical restrictions for road rail, water and air), traffic management, navigation and mobility management, as well as for interfaces with other modes of transport including communication in vehicles between vehicles (e.g. car-to-car), and between vehicles and fixed locations (e.g. car-to-infrastructure) as well as communication from and to users”;
- CEPT proposes to include the Eurobalise and Euroloop transmit spectra. These are connected to the telepowering link at 27 MHz which is already included in the annex of the EC Decision;
- The power limit in relation to the antenna for Euroloop should be included in the regulation;
- CEPT proposes the 5795-5805 MHz spectrum for TTT road tolling purposes with a maximum of 2 watts e.i.r.p. for inclusion in the EC Decision for SRD;
- CEPT also proposes for inclusion in 24.250-24.500 GHz a complementary automotive radar mode to the existing entries in 24.050-24.250 GHz;
- A minor modification is proposed by CEPT to replace the term “terrestrial” by “ground-based” for the 76-77 GHz entry in the EC Decision;
- CEPT proposes for inclusion entries for Level Probing Radar (LPR) with description of the essential regulatory parameters such as TPC and antenna pattern and allowing exclusion zones to protect the radio astronomy service under radio determination applications;
- CEPT proposes to widen the scope of application of the 26 and 27 MHz frequency entries for model control to encompass all kinds of wireless controls: a new entry with a maximum transmit power of 100 mW is proposed to be added for non-specific SRD applications whereby all applications should implement a Duty Cycle of 0.1 % except for model controls which still can use a higher duty cycle. The entry for model control for this frequency range is no longer needed;
- CEPT proposes to include the band 2483.5-2500 MHz for active medical implant SRDs;
- CEPT proposes to change the application category name from “Wireless Audio Applications” to “Wireless Audio and Multimedia Streaming Devices”;
- CEPT proposes to change the application category “detection of avalanche victims” in a more generic description “emergency detection of buried victims and valuable items” and include it in a new section in the annex of the EC Decision;
- CEPT proposes to define the current category “RFID”. CEPT proposes to keep the RFID terminology which is also used in other documentation since the early 1990’s (e.g. ITU-R, ISO) and add a new and broad RFID definition which includes all kind of tag/interrogator based systems;
- CEPT does not propose generic low power limits since the usefulness is considered doubtful and even may impose a risk for the current used applications and services;
- Pursuant to recommends 5.10 and 5.21 of the RSPG opinion on streamlining the regulatory environment for the use of spectrum [54], CEPT proposes to add a footnote in the EC Decision which states that “ERC/DEC/(01)17 [22] defines that protection of active medical implant communication systems from short range device applications shall be ensured in the 401-406 MHz frequency band. Additionally, protection of the primary service shall be ensured;
- CEPT proposes to remove the usage restriction to exclude video applications for the frequency band 26.957 to 27.283 MHz.

## 7 WORK ITEMS FOR FURTHER INVESTIGATIONS

- Identifying designations for SRDs above 40 GHz is an on-going task for future updates;
- There is a need to amend the Commission Decision on UWB (2007/131/EC) [5] as amended by Commission Decision 2009/343/EC [2] since there are additional regulations in the ECC/DEC/(06)04 [21] amended in 2011. This is covered in a separate CEPT Report in response to the Fifth Mandate on UWB;
- At this moment new spectrum in the UHF range is investigated in a number of ECC and ETSI groups. The results of these studies may be considered in future updates of the EC decisions for SRD. At the same time a study is going on in ECC WGSE about optimising the use of the 863-870 MHz band, the results may also be incorporated in future revisions of the EC Decision for SRD. The possibility of sharing and the associated conditions in the 863-870 MHz band based on present available (monitoring) reports and other reports to be expected in the near future should be a continuous process;
- CEPT proposes to study a comparison of the various solutions for the provision of time signals addressing items such as coverage and reliability, economic feasibility and possible bundling with other services for such solutions and if considered appropriate, to provide a plan for phasing out or relaxing the protection of such time signals in the spectrum over a medium to long-term time-plan (e.g. over 10 years). This will allow for the provision of contiguous spectrum without “notches” for inductive non-application specific SRD. It is also proposed to monitor the actual need for the protection of time services in the inductive applications range;
- At this moment SRD applications using LDC and VLDC as a mitigation technique are investigated. It is likely that more frequency bands outside the traditional SRD bands may become available. It is advisable to follow these developments and reflect this in the EC Decision for SRD in the future;
- The growing requirement for safety-related devices, which are often politically mandated, increases the need for additional radio spectrum. To provide the increased reliability required for such applications, they should operate in a predictable sharing environment. This could be achieved by designating frequency space with defined usage scenarios to a number of specified SRD services, applications or technologies. Further work is needed, based on suitable scenarios, within the compatibility studies;
- CEPT proposes to investigate the possibility to include the band c in annex 8 of ERC/REC 70-03 [15] in the EC Decision for SRD, possibly also for non-model applications, should interest be expressed in this;
- CEPT investigates the need to change the necessary operating parameters of SRDs in 122-122.25 GHz range in order to ensure protection of EESS (passive) service. Studies in CEPT are on-going at the present time;
- CEPT investigates additional frequency opportunities for Assistive Listening Devices (ALD) in the frequency range 174-216 MHz;
- Similar to the integration of EC Decision 2005/928/EC [4], the Commission Decision 2006/804/EC [7] for UHF RFID should also be integrated in the next update of the EC Decision for SRD. This will facilitate a common and transparent update processing the future as well as more efficient implementation work for the administrations;
- The TTT usage category may still be reconsidered in the future with regard to the question of widening the scope of the application field subject to intra-SRD compatibility issues. This could allow other use and therefore more efficient use of these frequencies and hence, an increased economy-of-scale for such equipment. Especially, radio determination and industrial applications could be considered as interesting fields where the same technology could be used;
- Certain types of SRDs rely on low latency, low duty cycle and/or high reliability spectrum access mechanisms. Examples under investigations are alarms (incl. social alarms), wireless audio, ALDs, asset tracking and tracing and also some TTT applications, which could potentially be pooled in a limited number of more general categories. The considerations on this subject are at an early stage and activities in ECC on-going, following initial considerations in ECC Report 181 [9];
- A study was performed to look at sharing with ALDs in the band 169.4-169.8125 MHz on the basis of duty cycle. The conclusion is that as ALDs are 100% Duty Cycle, this was possible only with extremely low duty cycle. Future work on sharing in this band should concentrate on means of sharing on a basis other than duty cycle or day/night sharing such as frequency re-use on a geographic basis by means of a database;
- There is a need to investigate the situation with different types of radar applications (fixed infrastructure and vehicular radars) in the 76-77 GHz range. No restriction is proposed by CEPT until evidence is provided that fixed installed outdoor radar applications could cause harmful interference to the road-safety related vehicular radar applications;
- CEPT cooperates with ETSI in the area of receiver performance to ensure coherence between the regulatory framework and relevant Harmonised European Standards. CEPT invites ETSI to continue to develop improved SRD receiver specifications and/or alternative mitigation techniques, where needed, in

collaboration between ETSI and the CEPT, to improve spectrum sharing and spectrum efficiency through standardisation in the case where various SRD applications need to share the same band. E.g. ETSI EG 201 399 [51] and ETSI TR 102 914 [50] procedures for choosing receiver minimum performance, where justified, for Harmonised European Standards and associated regulatory guidance (e.g. an ECC Recommendation similar to ERC/REC 74-01 on unwanted emissions in the spurious domain [23]). The receiver specifications are a prerequisite for CEPT to perform compatibility studies and investigate spectrum access methods.

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

### GUIDANCE TO CEPT ON THE FIFTH UPDATE OF THE SRD DECISION

#### 1. PERMANENT MANDATE ON UPDATING THE TECHNICAL ANNEX TO THE SRD DECISION

This document provides the Commission services' guidance to CEPT for the fifth 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<sup>1</sup>.

#### 2. GENERAL PRINCIPLES

In line with previous updates CEPT is requested to take the following general principles into account when preparing its response to the permanent mandate (in addition to the general objectives of the Mandate).

- The **SRD Decision is a legal document** and must fulfil the legal standards applicable to Commission Decisions.
- The updating exercise aims to modify the SRD Decision in place. The relevant technical parameters should be presented in a manner compatible with the RIG II template<sup>2</sup>, where appropriate.
- The update should focus on widening the scope of the Decision with least constraining usage conditions and allow for as much flexibility as possible for manufacturers and users. The removal of as many restrictions as possible from existing and proposed allocations in the technical annex should be pursued. More constraining usage conditions for already existing entries should be avoided (they can only be introduced in duly justified cases).
- The **EU regulatory environment for SRD spectrum usage consists of the (updated) SRD Decision, the R&TTE Directive and the Regulatory framework for Electronic Communications**

#### 3. SPECIFIC ISSUES

On top of the general principles mentioned in section 2 CEPT is requested to pay attention to a number of specific issues (the list of specific issues is not exhaustive and should not limit the scope of CEPT's analysis):

- In the context of the permanent Mandate the CEPT is requested to perform an **examination of the "type of short-range device" and the "other usage restrictions" categories in the technical annex** in order to widen the scope of the Decision with the least constraining usage conditions, to allow for as much flexibility as possible for manufacturers and users and to remove as many restrictions as possible. There are four objectives of the examination:
  - To reduce the number of application-specific harmonised bands in order to **maximise the number of non-application specific harmonised bands** with the least constraining usage conditions attached;
  - To **ensure the definition of appropriate spectrum access rules** that facilitates **predictable sharing arrangements** and fosters the **beneficial coexistence** of spectrum users;
  - To **provide documented justifications for applications-specific designations** and for **"other usage restrictions"** that are retained; and

<sup>1</sup>RSCOM06-27 Rev.

<sup>2</sup>See document RSCOM08-23

- To **assess** to what extent the **application descriptions** in the "type of short-range device" category qualify as justified "other usage restrictions" or as informative descriptions of typical usage.
- Given the growing importance as well as the advent of new wireless applications for different transport modes, the CEPT is requested to **broaden the category "Road Transport and Traffic Telematics"** in the technical annex, in order to enable the use of the harmonised frequency bands for a broader range of applications for intelligent transport systems.
- CEPT should also continue the investigations into **generic power limits for SRDs above 30 MHz**, with the goal of including such limits during the forthcoming fifth update of the technical annex; given the value such harmonised limits can have in terms of stimulating technological developments to overcome the practical limitations of today. In addition, CEPT is invited to also identify **non-application specific spectrum access parameters for SRDs above 40 GHz** and investigate the possibility to designate generic overlay bands or bands with common spectrum access parameters.
- CEPT should also consider **further inclusions of new SRD designations** in the technical annex of the SRD Decision, specifically those applications that so far have not been identified as priority for inclusion and those for which the regulatory parameters have already been studied. In addition, the results of the on-going work on the 169 MHz Mandate and the investigations into the density of use of the 863-870 MHz should be taken into account, in particular in regard to **new sharing possibilities** and **the needs for additional spectrum**.
- Given the recent example of the need to harmonise protected sub-bands between 9 kHz – 135 kHz as well as the overall objective to improve the efficiency of the spectrum use, CEPT is requested to **investigate how to address receiver capabilities** as a necessary component of sharing arrangements that foster the beneficial coexistence of spectrum users and to **identify areas where improved receivers could improve spectrum access for SRDs**.

## 1. ROADMAP FOR THE 2012 UPDATE CYCLE

- **RSC#36 (July 2011):** launch of the fifth update cycle. CEPT starts work on the update proposal pursuant to the permanent Mandate and this guidance document.
- **RSC#41 (October 2012):** CEPT to submit its report (subject to public consultation) pursuant to the permanent Mandate.
- **Fourth quarter 2012:** Commission services examine the CEPT proposal for amendment of the technical annex. Commission services will exchange with CEPT on a preliminary draft updated technical annex to the SRD Decision prior to its submission in RSC. Simultaneously CEPT will hold a public consultation on its report pursuant to the permanent Mandate.
- **RSC#42 (December 2012):** CEPT submits final CEPT report and the Commission services present a draft Commission Decision updating the technical annex to the SRD Decision.



**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  
THE TECHNICAL 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.**

## **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.<sup>3</sup>

## **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:

- a. Modify, whenever appropriate, the technical conditions of use of the frequency bands included in the technical annex;
- b. 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;
- c. 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);
- d. Continuously improve the presentation of the technical annex to reflect best practices.

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.

---

<sup>3</sup>Commission Decision 2006/XX/EC on the technical harmonisation of radio spectrum for use by shortrange radio devices.

## 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.

In implementing this mandate, the CEPT shall, where relevant, take the utmost account of Community law applicable, notably the RTTE Directive, 1999/5/EC[29], 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 16: Harmonised frequency bands and technical parameters for short-range devices

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
Non-specific short-range devices <sup>8</sup>	6765 - 6795 kHz	42 dBµA/m at 10 metres			1 October 2008
	13.553 - 13.567 MHz	42 dBµA/m at 10 metres			1 October 2008
	26.957 - 27.283 MHz	10 mW effective radiated power (e.r.p.), which corresponds to 42 dBµA/m at 10 metres		<del>Video applications are excluded</del>	1 June 2007
	40.660 - 40.700 MHz	10 mW e.r.p.		Video applications are excluded	1 June 2007
	169.400 - 169.4875 MHz	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 1999/5/EC must be used.  Duty cycle limit <sup>10</sup> : 0.1%		[1 October 2013]

<sup>4</sup> Member States must allow the usage of adjacent frequency bands within this table as a single frequency band provided the specific conditions of each of these adjacent frequency bands are met.

<sup>5</sup> Member States must allow the usage of spectrum up to the transmit power, field strength or power density given in this table. In conformity with Article 3(3) of Commission Decision 2006/771/EC, they may impose less restrictive conditions, i.e. allow the use of spectrum with higher transmit power, field strength or power density.

<sup>6</sup> Member States may only impose these 'additional parameters (channelling and/or channel access and occupation rules)', and may not add other parameters or spectrum access and mitigation requirements. Less restrictive conditions within the meaning of Article 3(3) of Commission Decision 2006/771/EC 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.

<sup>7</sup> Member States may only impose these 'other usage restrictions', and may not add additional usage restrictions. As less restrictive conditions may be introduced within the meaning of Article 3(3) of Commission Decision 2006/771/EC, Member States may omit one or all of these restrictions.

<sup>8</sup> This category is available for any type of application which fulfils the technical conditions (typical uses are telemetry, telecommand, alarms, data in general and other similar applications).

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
	169.4875 – 169.5875 MHz		Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 1999/5/EC must be used.  Duty cycle limit <sup>10</sup> : 0.001% except for 00:00h to 06:00 h local time where the duty cycle limit <sup>10</sup> is 0.1%	Equipment that concentrates or multiplexes individual equipment is excluded	
	169.5875 – 169.8125 MHz		Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 1999/5/EC must be used.  Duty cycle limit <sup>10</sup> : 0.1%		
	433.050 - 434.040 <sup>9</sup> MHz	1 mW e.r.p. and -13dBm/10 kHz power density for bandwidth modulation larger than 250 kHz	Voice applications allowed with advanced mitigation techniques	Audio and video applications are excluded	1 November 2010
		10 mW e.r.p.	Duty cycle limit <sup>10</sup> : 10%	Analogue audio applications other than voice are excluded. Analogue video applications are excluded	1 November 2010
	434.040 - 434.79 MHz	1 mW e.r.p. and -13dBm/10 kHz power density for bandwidth modulation larger than 250 kHz	Voice applications allowed with advanced mitigation techniques	Audio and video applications are excluded	1 November 2010

<sup>9</sup> For this frequency band Member States must make all the alternative sets of usage conditions possible.

<sup>10</sup> 'Duty cycle' means the ratio of time during any one-hour period when equipment is actively transmitting. Less restrictive conditions within the meaning of Article 3(3) of Commission Decision 2006/771/EC mean that Member States may allow a higher value for 'Duty cycle'.

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
		10 mW e.r.p.	Duty cycle limit <sup>10</sup> : 10% Duty cycle limit <sup>10</sup> : 100% subject to channel spacing up to 25 kHz Voice applications allowed with advanced mitigation techniques	Analogue audio applications other than voice are excluded. Analogue video applications are excluded	1 November 2010
Non-specific short-range devices (cont.)	863.000 - 865.000 MHz	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 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 0.1% may also be used	Analogue audio applications other than voice are excluded. Analogue video applications are excluded	1 November 2010
	865.000 - 868.000 MHz	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 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 1% may also be used	Analogue audio applications other than voice are excluded. Analogue video applications are excluded	1 November 2010
	868.000 - 868.600 MHz	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 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 1% may also be used	Analogue video applications are excluded	1 November 2010
	868.700 - 869.200 MHz	25 mW e.r.p.	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised	Analogue video applications are excluded	1 November 2010

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
			standards adopted under Directive 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 0.1% may also be used		
Non-specific short-range devices (cont.)	869.400 - 869.650 MHz	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 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 10% may also be used. <del>Channel spacing must be 25 kHz, except that the whole band may also be used as a single channel for high-speed data transmission</del>	Analogue video applications are excluded	1 November 2010
		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 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 0.1% may also be used	Analogue audio applications other than voice are excluded. Analogue video applications are excluded	1 November 2010
	869.700 - 870.000 MHz	5 mW e.r.p.	Voice applications allowed with advanced mitigation techniques	Audio and video applications are excluded	1 June 2007
		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 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 1% may also be used	Analogue audio applications other than voice are excluded. Analogue video applications are excluded	1 November 2010
	2400 - 2483.5 MHz	10 mW equivalent isotropic radiated power (e.i.r.p.)			1 June 2007



Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
	5725 - 5875 MHz	25 mW e.i.r.p.			1 June 2007
	24.150 - 24.250 GHz	100 mW e.i.r.p.			1 October 2008
	57 - 64 GHz	100 mW e.i.r.p., a maximum tx power of 10dBm and a maximum e.i.r.p. power spectral density of 13dBm/MHz			[1 October 2013]
	61.0 - 61.5 GHz	100 mW e.i.r.p.			1 October 2008
	122 - 123 GHz	100 mW e.i.r.p.			1 June 2012
	244 - 246 GHz	100 mW e.i.r.p.			1 June 2012
Emergency detection of buried victims and valuable items	456.9 - 457.1 kHz	7 dBµA/m at 10 m			[1 October 2013]
Wideband data transmission systems	2400 - 2483.5 MHz	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 1999/5/EC must be used		1 November 2009
	57.0 - 66.0 GHz	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 1999/5/EC must be used	Fixed outdoor installations are excluded	1 November 2010
Assistive	169.400 - 169.475 MHz	500 mW e.r.p.	Channel spacing: max 50 kHz		[1 October 2013]

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
Listening Devices (ALD) <sup>11</sup>	169.4875 - 169.5875 MHz				
Meter Reading <sup>12</sup>	169.400 - 169.475 MHz	500 mW e.r.p.	Channel spacing: max 50 kHz Duty cycle limit <sup>9</sup> : 10.0%		[1 October 2013]
Non-specific short-range devices	169.400 - 169.475 MHz	500 mW e.r.p.	Channel spacing: max 50 kHz Duty cycle limit <sup>9</sup> : 1.0%		[1 October 2013]
Alarm systems	868.600 - 868.700 MHz	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 <sup>10</sup> : 1.0%		1 October 2008
	869.250 - 869.300 MHz	10 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit <sup>10</sup> : 0.1%		1 June 2007
	869.300 - 869.400 MHz	10 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit <sup>10</sup> : 1.0%		1 October 2008
	869.650 - 869.700 MHz	25 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit <sup>10</sup> : 10%		1 June 2007
	869.200 - 869.250 MHz	10 mW e.r.p.	Channel spacing: 25 kHz Duty cycle limit <sup>10</sup> : 0.1%	This set of usage conditions applies to social alarms only	1 June 2007
Inductive applications <sup>13</sup>	9.000 - 59.750 kHz	72 dBµA/m at 10 metres			1 November 2010
	59.750 - 60.250 kHz	42 dBµA/m at 10 metres			1 June 2007
	60.250 - 74.750 kHz	72 dBµA/m at 10 metres			1 June 2012

<sup>11</sup> Means a radio communications system which usually includes one or more radio transmitters and one or more radio receivers allowing persons suffering from hearing disability to increase their listening capability;

<sup>12</sup> Means a system which allows remote status monitoring, measuring and service commands using radio communication devices.

<sup>13</sup> This category covers, for example, 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 handheld devices, automatic article identification, wireless control systems and automatic road tolling.

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
	74.750 - 75.250 kHz	42 dBμA/m at 10 metres			1 June 2012
	75.250 - 77.250 kHz	72 dBμA/m at 10 metres			1 June 2012
	77.250 - 77.750 kHz	42 dBμA/m at 10 metres			1 June 2012
	77.750 - 90 kHz	72 dBμA/m at 10 metres			1 June 2012
	90 - 119 kHz	42 dBμA/m at 10 metres			1 June 2012
	119 - 128.6 kHz	66 dBμA/m at 10 metres			1 June 2012
	128.6 - 129.6 kHz	42 dBμA/m at 10 metres			1 June 2012
	129.6 - 135 kHz	66 dBμA/m at 10 metres			1 June 2012
	135 - 140 kHz	42 dBμA/m at 10 metres			1 June 2012
	140 - 148.5 kHz	37.7 dBμA/m at 10 metres			1 October 2008
	148.5 - 5000 kHz. In the specific bands mentioned below, higher field strengths and additional usage restrictions apply:	-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 October 2008
	400 - 600 kHz	-8 dBμA/m at 10 metres		This set of usage conditions applies to RFID <sup>14</sup> only	1 October 2008
	3155 - 3400 kHz	13.5 dBμA/m at 10 metres			1 October 2008
	5000 - 30000 kHz. In the specific bands mentioned below, higher	-20 dBμA/m at 10 metres in any bandwidth of 10 kHz. Furthermore the total field			1 October 2008

<sup>14</sup> This category covers inductive applications used for Radio Frequency Identification (RFID).

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
	field strengths and additional usage restrictions apply:	strength is -5 dBµA/m at 10 m for systems operating at bandwidths larger than 10 kHz			
	6765 - 6795 kHz	42 dBµA/m at 10 metres			1 June 2007
	7400 - 8800 kHz	9 dBµA/m at 10 metres			1 October 2008
	10200 - 11000 kHz	9 dBµA/m at 10 metres			1 October 2008
	13553 - 13567 kHz	42 dBµA/m at 10 metres			1 June 2007
		60 dBµA/m at 10 metres		This set of usage conditions applies to RFID <sup>24</sup> and EAS <sup>15</sup> only	1 October 2008
	26957 - 27283 kHz	42 dBµA/m at 10 metres			1 October 2008
Active medical implants <sup>16</sup>	9 - 315 kHz	30 dBµA/m at 10m	Duty cycle limit <sup>10</sup> : 10%		1 October 2008
	30.0 - 37.5 MHz	1 mW e.r.p.	Duty cycle limit <sup>10</sup> : 10%	This set of usage conditions applies to ultra low power medical membrane implants for blood pressure measurements only	1 November 2010
	402 - 405 MHz	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		1 November 2009

<sup>15</sup> This category covers inductive applications used for Electronic Article Surveillance (EAS).

<sup>16</sup> This category covers the radio part of 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 and their peripherals (OJ L 189, 20.7.1990, p. 17). ERC Decision (01)17 defines that protection of active medical implant communication systems from short range device applications shall be ensured in the 401-406 MHz frequency band. Additionally, protection of the primary service shall be ensured.

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
			be used provided they result at least in an equivalent performance to the techniques described in harmonised standards adopted under Directive 1999/5/EC to ensure compatible operation with the other users and in particular with meteorological radiosondes		
	401 - 402 MHz	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 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 0.1% may also be used		1 November 2010
	405 - 406 MHz	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 1999/5/EC must be used. Alternatively a duty cycle limit <sup>10</sup> of 0.1% may also be used		1 November 2010
	2483.5 - 2500 MHz	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 1999/5/EC must be used. In addition, a duty cycle limit <sup>10</sup> of 10% applies.  Channel spacing: 1 MHz	Peripheral master units are for indoor use only.	[1 October 2013]

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
			The whole frequency band may also be dynamically used as a single channel for high-speed data transmission.		
Active medical implants <sup>16</sup>	315 - 600 kHz	-5 dBµA/m at 10m	Duty cycle limit <sup>10</sup> : 10%	This set of usage conditions applies to animal implantable devices <sup>17</sup> only	1 November 2010
	12.5 - 20.0 MHz	-7 dBµA/m at 10m in a bandwidth of 10 kHz	Duty cycle limit <sup>10</sup> : 10%	This set of usage conditions applies to indoor applications of animal implantable devices <sup>17</sup> only	1 November 2010
Low power FM transmitters <sup>18</sup>	87.5 - 108.0 MHz	50 nW e.r.p.	Channel spacing up to 200 kHz		1 November 2010
Wireless audio applications Wireless Audio and Multimedia Streaming <sup>19</sup>	863 - 865 MHz	10 mW e.r.p.			<del>1 November 2010</del> [1 October 2013]
Radio determination applications <sup>20</sup>	2400 - 2483.5 MHz	25 mW e.i.r.p. <sup>21</sup>			1 November 2009
	17.1 - 17.3 GHz	26 dBm e.i.r.p. <sup>21</sup>	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 1999/5/EC must be used	This set of usage conditions applies to ground-based systems only	1 November 2009

<sup>17</sup> This category covers transmitting devices which are placed inside the body of an animal for the purpose of performing diagnostic functions and/or delivery of therapeutic treatment.

<sup>18</sup> This category includes applications which connect personal audio devices, including mobile phones, and the automotive or home entertainment system.

<sup>19</sup> Applications for wireless audio systems, including: wireless microphones, assistive listening devices, cordless loudspeakers; cordless headphones; cordless headphones for portable use, e.g. portable CD, cassette or radio devices carried on a person; cordless headphones for use in a vehicle, for example for use with a radio or mobile telephone, etc.; in-ear monitoring and wireless microphones for use at concerts or other stage productions.

<sup>20</sup> This category covers applications used for determining the position, velocity and/or other characteristics of an object, or for obtaining information relating to these parameters.

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
Radio determination applications <sup>20</sup>	4.5 - 7.0 GHz	24 dBm e.i.r.p. <sup>21</sup>	Techniques to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 1999/5/EC must be used	This set of usage conditions applies to Tank Level Probing Radar only <sup>22</sup>	1 November 2009
	8.5 - 10.6 GHz	30 dBm e.i.r.p. <sup>21</sup>			1 November 2009
	24.05 - 27.0 GHz	43 dBm e.i.r.p. <sup>21</sup>			1 November 2009
	57.0 - 64.0 GHz	43 dBm e.i.r.p. <sup>21</sup>			1 November 2009
	75.0 - 85.0 GHz	43 dBm e.i.r.p. <sup>21</sup>			1 November 2009
Radio determination applications <sup>20</sup>	6.0 - 8.5 GHz	7 dBm/50 MHz peak e.i.r.p. and -33 dBm/MHz mean e.i.r.p.	Automatic power control as well as equivalent techniques and antenna requirements to access spectrum and mitigate interference that provide at least equivalent performance to the techniques described in harmonised standards adopted under Directive 1999/5/EC must be used	This set of usage conditions applies to Level Probing Radar only <sup>23</sup>  Established exclusion zones around radio astronomy sites should be obeyed (except 57-64 GHz not being allocated to the radio astronomy service)	[1 October 2013]
	24.05 - 26.5 GHz	26 dBm/50 MHz peak e.i.r.p. and -14 dBm/MHz mean e.i.r.p.			[1 October 2013]
	57 - 64 GHz	35 dBm/50 MHz peak e.i.r.p. and -2 dBm/MHz mean e.i.r.p.			[1 October 2013]
	75 - 85 GHz	34dBm/50 MHz peak e.i.r.p. and -3 dBm/MHz mean e.i.r.p.			[1 October 2013]
Non-specific short-range devices	26990 - 27000 kHz	100 mW e.r.p.	Applications other than model controls shall implement a maximum Duty Cycle <sup>10</sup> of 0.1%		[1 October 2013]
	27040 - 27050 kHz				[1 October 2013]
	27090 - 27100 kHz				[1 October 2013]

<sup>21</sup> The power limit applies inside a closed tank and corresponds to a spectral density of -41,3dBm/MHz e.i.r.p. outside a 500 litre test tank.

<sup>22</sup> Tank Level Probing Radars (TLPR) are a very specific type of radiodetermination application, which are used for tank level measurements and are 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.

<sup>23</sup> This category covers Level Probing Radars (LPR) and mainly targets a wide range of industrial applications.

Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
	27140 - 27150 kHz				[1 October 2013]
	27190 - 27200 kHz				[1 October 2013]
Radio Frequency Identification (RFID) <sup>24</sup>	2446 - 2454 MHz	500 mW e.i.r.p.	Tag-interrogator interaction as described in harmonised standards adopted under Directive 1999/5/EC must be used.		1 June 2012
Transport and Traffic Telematics <sup>25</sup>	984 - 7484 kHz	9 dBµA/m at 10m	Duty cycle limit <sup>10</sup> : 1% for Eurobalise and using the 27 MHz train telepowering link	Transmitting only in presence of trains.	[1 October 2013]
	7.3 - 23.0 MHz	-7 dBµA/m at 10m	Antennas as specified in harmonised standards for Euroloop and using the 27 MHz train telepowering link	The 27 MHz telepowering link is covered by the non-specific section of his annex	[1 October 2013]
	5.795 - 5.805 GHz	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 1999/5/EC must be used.	This applies to road tolling applications only	[1 October 2013]
	24.050 - 24.075 GHz	100 mW e.i.r.p.			1 June 2012
	24.075 - 24.150 GHz	0.1 mW e.i.r.p.			1 June 2012
	24.075 - 24.150 GHz	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 1999/5/EC must be used.	This set of usage conditions applies to ground-based vehicle radars only	1 June 2012

<sup>24</sup> RFID describe a range of technologies using tag-interrogator interaction. RFID are typically used to track, identify and collect/carry data relating to animate or inanimate objects to which tags are attached. The tags may be either battery-less, or battery assisted or battery powered. The responses from the tags are validated by its interrogator and passed to its host system.

<sup>25</sup> Means systems in which information and communication technologies are applied in the field of transport (depending on technical restrictions for road rail, water and air), traffic management, navigation and mobility management, as well as for interfaces with other modes of transport, including communication in vehicles between vehicles (e.g. car-to-car), and between vehicles and fixed locations (e.g. car-to-infrastructure) as well as communication from and to users.



Type of short-range device	Frequency band <sup>4</sup>	Transmit power limit/field strength limit/power density limit <sup>5</sup>	Additional parameters (channelling and/or channel access and occupation rules) <sup>6</sup>	Other usage restrictions <sup>7</sup>	Implementation deadline
			Dwell time limits and frequency modulation range apply as specified in harmonised standards		
	24.150 - 24.250 GHz	100 mW e.i.r.p.			1 June 2012
	24,250 - 24.495 GHz	-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 1999/5/EC must be used.	This set of usage conditions applies to wideband ground-based vehicle radars only for exclusive operation in combination with the ranges 24.050-24.075 GHz, 24.075-24.150 GHz and 24.150-24.250 GHz	[1 October 2013]
	24.495 - 24,500 GHz	-8 dBm e.i.r.p.	Duty cycle <sup>10</sup> limits and frequency modulation range apply as specified in harmonised standards.		
	24.250 - 24.500 GHz	20 dBm e.i.r.p. (forward facing radars) 16 dBm e.i.r.p. (rear facing radars)			
	63 - 64 GHz	40 dBm e.i.r.p.		This set of usage conditions applies to vehicle-to-vehicle, vehicle-to-infrastructure and infrastructure-to-vehicle systems only	1 June 2012
	76.0 - 77.0 GHz	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 applies to ground- based vehicle and infrastructure systems only	1 November 2010

**ANNEX 4: LIST OF REFERENCES**

- [1] Commission Decision [2011/829/EU](#) amending Decision [2006/771/EC](#) on harmonisation of the radio spectrum for use by short-range devices
- [2] Commission Decision [2009/343/EC](#) 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
- [3] Commission Decision [2008/673/EC](#) amending Decision [2005/928/EC](#) on the harmonisation of the 169.4-169.8125 MHz frequency band in the Community
- [4] Commission Decision 2005/928/EC on the harmonisation of the 169.4-169.8125 MHz frequency band in the Community
- [5] 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
- [6] Commission Decision [2006/771/EC](#) on the harmonisation of the radio spectrum for use by short-range devices (SRD)
- [7] Commission Decision [2006/804/EC](#) on harmonisation of the radio spectrum for radio frequency identification (RFID) devices operating in the ultra high frequency (UHF) band
- [8] Commission Decision 2000/299/EC on establishing the initial classification of radio equipment and telecommunications terminal equipment and associated identifiers
- [9] ECC Report 181 on improving spectrum efficiency in the SRD bands
- [10] Radio Regulations, Edition of 2008 International Telecommunications Union, 2008
- [11] ETSI EN 301 091 V1.1.1 (1998-06) on Technical characteristics and test methods for radar equipment operating in the 76 GHz to 77 GHz band
- [12] ETSI EN 301 091-1 V1.3.3 (2006-11) on Road Transport and Traffic Telematics (RTTT); Radar equipment operating in the 76 GHz to 77 GHz range;
- [13] TR 102 704 V1.2.1 (2012-03) on Short Range Devices (SRD); Radar sensors for non-automotive;
- [14] ECC/DEC/(05)02 on the use of the frequency band 169.4-169.8125 MHz
- [15] ERC/REC 70-03 on Relating to the use of Short Range Devices (SRD)
- [16] CEPT Report 014 to Develop a strategy to improve the effectiveness and flexibility of spectrum availability for Short Range Devices (SRDs)
- [17] CEPT Report 035” the Annual update of the technical annex of the Commission Decision on harmonisation of the radio spectrum for use by short-range devices”
- [18] CEPT Report 043 “To undertake technical studies on the efficient use of the harmonised 169.4-169.8125 MHz frequency band (169 MHz – Review Mandate)”
- [19] ECC Report 149 on analysis on compatibility of Low Power-Active Medical Implant (LP-AMI) applications within the frequency range 2360-3400 MHz, in particular for the band 2483.5-2500 MHz, with incumbent services
- [20] ECC/DEC/(09)01 on the harmonised use of the 63-64 GHz frequency band for Intelligent Transport Systems (ITS)
- [21] ECC/DEC/(06)04 on the harmonised conditions for devices using UWB technology in bands below 10.6 GHz
- [22] ERC/DEC/(01)17 on harmonised frequencies, technical characteristics and exemption from individual licensing of Short Range Devices used for Ultra Low Power Active Medical Implants operating in the frequency band 401 - 406 MHz
- [23] ERC/REC 74-01 on Unwanted Emissions in the Spurious Domain
- [24] Recommendation T/R 20-04 on Low-power telecommand and telemetry equipment operating on collective frequencies in ISM bands
- [25] Recommendation T/R 20-03 on Low-power telecommand and telemetry equipment for use outside the ISM frequency bands
- [26] Recommendation ITU-R SM.1046-2 on definition of spectrum use and efficiency of a radio system
- [27] Directive 2010/40/EU on the framework for the deployment of ITS in the field of road transport and for interfaces with other modes of transport
- [28] Directive 2004/52/EC on the interoperability of electronic road toll systems in the Community
- [29] Directive 1999/5/EC on the approximation of the laws of the Member States concerning foods and food ingredients treated with ionizing radiation
- [30] ETSI 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
- [31] ETSI EN 300 328 (V1.8.1) on Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques

- [32] ETSI EN 301 559 on Low Power Active Medical Implants (LP-AMI) operating in the frequency range 2 483,5 MHz to 2 500 MHz
- [33] ETSI EN 302 729 on 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
- [34] ETSI EN 300 718 on Avalanche Beacons; Transmitter-receiver systems
- [35] ETSI EN 302 686 on Radiocommunications equipment operating in the 63 GHz to 64 GHz frequency band
- [36] ETSI EN 300 674 on Technical characteristics and test methods for 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
- [37] WRC-12 Agenda Item 1.18: to consider extending the existing primary and secondary radiodetermination-satellite service (space-to-Earth) allocations in the band 2 483.5-2 500 MHz in order to make a global primary allocation, and to determine the necessary regulatory provisions based upon the results of ITU R studies, in accordance with Resolution 613 (WRC 07);
- [38] Div. deliverables from [www.mosarim.eu](http://www.mosarim.eu); MOre Safety for All by Radar Interference Mitigation; European funded Project to study the interference between and from other applications to a automotive radar sensor
- [39] ECC Report 135: Inductive limits in the frequency range 9 kHz to 148.5 kHz;
- [40] ECC Report 064 on The protection requirements of radiocommunications systems below 10.6 GHz from generic UWB applications
- [41] ECC Report 111 on Compatibility studies between Ground Based Synthetic Aperture Radar (GBSAR) and existing services in the range 17.1 GHz to 17.3 GHz
- [42] ETSI EN 300 440 on Radio equipment to be used in the 1 GHz to 40 GHz frequency range
- [43] ETSI EN 302 567 on 60 GHz Multiple-Gigabit WAS/RLAN Systems
- [44] ECC Report 098 on studying the compatibility issues of the UIC Euroloop system with other systems in the frequency band 9.5 to 17.5 MHz
- [45] ETSI Special Task Force 411 works on Method for a harmonised definition of Low Duty Cycle Transmission (LDC) as a passive mitigation technique used by short range devices and related conformance test methods
- [46] Recommendation ITU-R M.1730 on Maritime mobile service including Global Maritime Distress and Safety System (GMDSS); aeronautical mobile service and radiodetermination service
- [47] ETSI TR 103 056 on Electromagnetic compatibility and Radio spectrum Matters (ERM); System Reference Document; Short Range Devices (SRD); Technical characteristics for SRD equipment for social alarm and alarm applications
- [48] ECC Report 176 on The impact of non-specific SRDs on radio services in the band 57–66 GHz
- [49] Recommendation T/R 25-08 on Planning criteria and coordination of frequencies in the Land Mobile Service in the range 29.7-921 MHz
- [50] ETSI TR 102 914 (2009) Aspects and implications of the inclusion of receiver parameters within ETSI standards;
- [51] ETSI EG 201 399 (2010) Guide for the production of HSs);
- [52] ECO Report 02 (2010) The impact of receiver parameters on spectrum management regulations
- [53] ITU-R Recommendation BS.450 : Transmission standards for FM sound broadcasting at VHF
- [54] RSPG08-246: RSPG Opinion on Streamlining the Regulatory Environment for the Use of Spectrum