



# ECC Decision (04)10

The frequency bands to be designated for the temporary introduction of Automotive Short Range Radars (SRR)<sup>1</sup>

**Approved 12 November 2004**

Amended 1 June 2012

Corrected 6 March 2015

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<sup>1</sup> Comparable technical specifications to those given in this ECC Decision are given in Commission Decision 2005/50/EC of 17 January 2005, amended by Commission Implementing Decision 2011/485/EU of 29 July 2011, for 24 GHz. EU Member States and, if so approved by the EEA Joint Committee, Iceland, Liechtenstein and Norway are obliged to implement these EC Decisions.

## EXPLANATORY MEMORANDUM

### 1 INTRODUCTION

Within Europe, there were and there are still proposals to improve road safety by using new information communications technologies, including building a European strategy to accelerate the research and development, deployment and use of intelligent road safety systems such as Automotive Short Range Radars (SRR).

SRR systems will be an essential element of a future transport infrastructure for Europe and in particular contribute to the long term goal of the European Commission e-safety initiative.

To support a quick development and deployment of SRR systems within a trans-European road network, it is essential that common frequency bands and associated harmonised equipment standards be available throughout CEPT as soon as possible.

It has to be noted that this ECC Decision is part of a "package solution" implying regulatory and legal provisions to be adopted by both CEPT and the European Commission.

### 2 BACKGROUND

To meet the requirement for a permanent, long term solution for SRR equipment the frequency band 77-81 GHz has been designated (ECC/DEC/(04)03 of 19 March 2004). The 79 GHz SRR technology was not available at affordable prices for mass production in the point of time when ECC/DEC/(04)03 was adopted. Therefore, in order to meet an early introduction of SRR applications in Europe, the temporary use of a 5 GHz wide band centred around 24 GHz, hereinafter referred to as the '24 GHz range', was considered as this particular frequency range provides for immediate cost effective solutions.

However, the 24 GHz frequency range is already heavily used in Europe for a wide range of applications that all represent, at different levels, critical national or European services and/or wide economic interests and for which very substantial existing long-term investments have been and are to be made.

Compatibility studies with these services (mainly Fixed Service, Radio Astronomy Service and Earth Exploration-Satellite Service) conducted within CEPT and described in ECC Report 023 concluded that the deployment of 24 GHz SRR is not feasible in the long term.

With regard to Fixed Service, although sharing is not feasible if a protection criteria of  $-20$  dB I/N is to be met in all cases, sharing is considered to be feasible if an excess of the protection criteria by 10 dB (up to  $-10$  dB I/N) in worst case scenarios can be accepted, as far as the percentage of cars equipped with SRR devices in visibility of the FS receiver is limited to less than 10%.

Compatibility with the Radio Astronomy Service within the frequency band 22.21-24 GHz has been shown as not being possible and thus specific measures to protect Radio Astronomy stations in Europe have to be implemented by SRR, for example an automatic deactivation of the SRR in the protection zones to be defined by national administrations. In order to allow an early implementation of 24 GHz SRR Systems such measures were made mandatory from 1 July 2007. Before that date, manual deactivation had been required.

Concerning Earth Exploration-Satellite Service (EESS), sharing studies show that the protection criteria for 100% penetration would be exceeded by 10.8 dB which leads to a maximum SRR penetration level of 8.3% per EESS pixel. However, this analysis has been made with the final set of SRR systems characteristics, proposed to be applied from 2014 by FCC (i.e. vertical attenuation of 35 dB).

Sharing studies and laboratory tests have been conducted on a number of radar speed meter equipment operated in Europe as a Radiolocation Service. It can be concluded that compatibility with 24 GHz SRR systems is possible under certain conditions; principally by decoupling the centre frequencies of the two systems.

The translation of the 10.8 dB negative margin into a market penetration limit did not take into account that, in the case of the interim solution up to 2013, the SRR systems would present, before these dates, lower vertical attenuation (and hence higher interference potential), namely 10 dB up to 2010 and 5 dB between 2010 and 2013. Additional considerations indicate that it is necessary to limit at 7% the maximum SRR penetration per EESS pixel.

When the first version of this ECC Decision was developed, it was assumed that, allowing 24 GHz equipment on the European market until 1 July 2013 would hence allow the first product lines of vehicles in Europe equipped with SRR and thus introduce the SRR solutions on the market while developing the 79 GHz technology to provide the final solution. It was furthermore assumed that the 24 GHz frequency band (within 21.65-26.65 GHz) shall therefore only be made available for installation of SRR systems in Europe until 1 July 2013. After this date all new SRR equipment shall either use the 79 GHz band or the smaller band 24.25-26.65 GHz until the 1 January 2018 (this date is extended by 4 years for SRR equipment mounted on motor vehicles for which a type-approval application has been submitted pursuant to Article 6(6) of Directive 2007/46/EC of the European Parliament and of the Council<sup>2</sup> in those countries where applicable and has been granted before 1 January 2018).

As the penetration levels are important to avoid interference to radio services in the 24 GHz band a monitoring process was established by the European Commission's Radio Spectrum Committee providing collective commitment from the automotive manufacturers to comply with the regulatory conditions in this ECC Decision as well as in the relevant EC Decisions and to provide monitoring information about vehicles equipped with SRR systems on a European and on national markets.

### **3 REQUIREMENT FOR AN ECC DECISION**

The allocation of radio frequencies in CEPT member countries is laid down by law, regulation or administrative action. The ECC recognizes that for SRR systems to be introduced successfully throughout Europe, confidence must be given on the one hand to manufacturers to make the necessary investment in the new pan European radiocommunications systems and services and on the other hand to users of existing services in the 21.65-26.65 GHz band that their protection will be ensured. A commitment by CEPT member countries to implement an ECC Decision will provide a clear indication that the required frequency bands will be made available on time and on a Europe-wide basis and that the means to ensure protection of existing services will be applied.

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<sup>2</sup> Official Journal of the European Union, L 263, 9 October 2007, page 1

**ECC DECISION OF 12 NOVEMBER 2004 ON THE FREQUENCY BANDS TO BE DESIGNATED FOR THE TEMPORARY INTRODUCTION OF AUTOMOTIVE SHORT RANGE RADARS (SRR) (ECC/DEC/(04)10) AMENDED ANNEX 1 JULY 2005; AMENDED 5 SEPTEMBER 2007; AMENDED 1 JUNE 2012; CORRECTED 6 MARCH 2015**

“The European Conference of Postal and Telecommunications Administrations,

*considering*

- a) that within Europe, there are proposals to improve road safety by using new information communications technologies, including building a European strategy to accelerate the research and development, deployment and use of intelligent road safety systems such as Automotive Short Range Radars (SRR);
- b) that the availability of spectrum for SRR equipment in Europe would contribute to the long term goal of the European Commission e-Safety-initiative;
- c) that the 79 GHz frequency band (77-81 GHz) has been designated as the permanent band for SRR equipment (ECC/DEC/(04)03 of 19 March 2004);
- d) that 79 GHz SRR technology was not commercially available at the time of adoption of the first version of this ECC Decision;
- e) that in order to allow an early introduction of SRR applications in Europe the use of the 24 GHz frequency range (24.05-24.25 GHz for the carrier and 24.15 GHz +/- 2.5 GHz for the Ultra Wide Band component) was requested by the automotive industry as this particular frequency range provides for immediate cost effective solutions;
- f) that narrow-band vehicular radar systems operating at 24 GHz in accordance with the conditions given in ERC/REC 70-03 are not under the scope of this ECC Decision;
- g) that the 24 GHz frequency band is heavily used in Europe for a wide range of applications that all represent, at different levels, critical national or European services and/or wide economic interests and for which very substantial existing long-term investments have been and are to be made;
- h) that the frequency band 24.05-24.25 GHz is allocated to the Radiolocation Service on a primary basis in the ITU Radio Regulations;
- i) that in a number of European countries there are radar speed meters operated by police forces at 24 GHz as a Radiolocation Service and these also contribute to road safety;
- j) that based on sharing studies and laboratory tests that have been conducted on a number of radar speed meter equipment operated in Europe, it can be concluded that compatibility with 24 GHz SRR systems with radar speed meters is possible under certain conditions; principally by decoupling the centre frequencies of the two systems;
- k) that the bands 21.2-23.6 GHz and 24.5-26.5 GHz are allocated to the Fixed Service on a primary basis in the ITU Radio Regulations. These bands are extensively used by fixed links and expanding across Europe to meet, among others, the infrastructure requirement for existing 2G and 3G mobile networks or to develop broadband fixed wireless networks;
- l) that the band 23.6-24 GHz is allocated to passive services including the Radio Astronomy and Earth Exploration-Satellite Services on a primary basis in the Radio Regulations and is covered by footnote 5.340 which prohibits all emissions into the band;
- m) that the 23.6-24 GHz frequency band is a unique natural resource of primary interest for the scientific and meteorological communities to measure water vapour content which is essential for temperature measurements (for EESS) and within the 22.21-24 GHz frequency range to measure spectral lines of ammonia and water as well as continuum observations for Radio Astronomy Service;

- n) that interference to any EESS pixel in the 23.6-24 GHz band would jeopardise the global measurements performed in this frequency band and could affect the overall passive measurements;
- o) that the compatibility studies given in ECC Report 023 and in CEPT Report 3 have been performed within CEPT between existing services and 24 GHz SRR-equipment (within 21.65-26.65 GHz) with an e.i.r.p. mean power density of  $-41.3$  dBm/MHz, an e.i.r.p. peak limit of 0 dBm/50 MHz;
- p) that the vertical attenuation of 24 GHz SRR (within 21.65-26.65 GHz) for emissions within the 23.6-24 GHz band that appear  $30^\circ$  or greater above the horizontal plane as included in the FCC regulations and used in ECC Report 023, is the one assumed for dates after 2014 (35 dB), whereas this value will be 25 dB up to 2010 and 30 dB between 2010 and 2014;
- q) that ECC Report 023 concludes that sharing between 24 GHz SRR (within 21.65-26.65 GHz) with a 100% market penetration and the Earth Exploration-Satellite Service (EESS) within the 23.6-24 GHz band as well as with the Fixed Service within the 24 GHz range is not possible;
- r) that ECC Report 023 concludes that to maintain the protection requirements of the Fixed Service, sharing with SRRs is only be feasible on a temporary basis if the percentage of vehicles equipped with SRR devices in the visibility of the fixed service receiver is limited to less than 10% considering an excess by -10 dB can be accepted;
- s) that, taking into account ECC Report 023 and the gradual values of vertical attenuation of SRR as described in considering p), sharing between Earth Exploration-Satellite Service (EESS) and SRRs can only be feasible on a temporary basis if the percentage of vehicles equipped with 24 GHz SRR devices (within 21.65-26.65 GHz) in any EESS pixel is limited to 7.0%;
- t) that ECC Report 023 also indicates that sharing between 24 GHz SRR (within 21.65-26.65 GHz) and the Radio Astronomy Service within the band 22.21-24 GHz would in general not be feasible. A number of mitigation factors might locally lead to reduction of the interference level to allow sharing with low penetration of SRR equipment, provided that the vehicles are equipped with automatic deactivation to protect radio astronomy stations within the agreed protection range;
- u) that there is a worldwide primary amateur and amateur-satellite service allocation at 24.00-24.05 GHz and stations within this service can radiate a significant power;
- v) that the period before the reference date of 1 July 2013 allowed the first product lines of vehicles on the European market to be equipped with 24 GHz SRR systems (within 21.65-26.65 GHz) while ensuring protection of radio services in the band. After this reference date all new SRR equipment placed on the market in Europe must use the 79 GHz band (see ECC/DEC/(04)03) or alternative permitted technical solutions while existing 24 GHz equipment (within 21.65-26.65 GHz) may still operate to the end of lifetime of the vehicles;
- w) that ETSI has developed the harmonised European standard EN 302 288-2 for short range radar equipment operating in the 24 GHz range;
- x) that SRR-equipment is not considered as a safety of life applications in accordance with the ITU Radio Regulations. SRR in the 24 GHz band must operate on a non-interference and non-protected basis in accordance with the ITU Radio Regulations;
- y) that ECC Report 046 shows that SRR will have to operate in a high level of interference in the vicinity of FS transmitters and stipulates that it is the responsibility of the SRR manufacturers to carefully design their systems to minimize the effect of interference from radiocommunication services (in particular Fixed Service) as well as other SRR devices by implementing adequate mitigation techniques;
- z) that the most sensitive service to aggregate interference from SRR is the Earth Exploration-Satellite Service for which a maximum of 5.9% of SRR penetration can be accepted in each EESS pixel. However, based on further consideration, ECC agreed on a compromise of 7 % penetration rate per country;

- aa) that in order to ensure protection of other services and thus that vehicles equipped with 24 GHz SRR is limited to a penetration level not exceeding 7.0% on each European national market, an arrangement is required which commits automobile manufacturers to reporting on sales of SRR-equipped vehicles;
- bb) that a fundamental review, including radio compatibility studies with regard to possible alternative approaches, was carried out by CEPT on the basis of the EC Mandate which had been issued to CEPT on 7 November 2008;
- cc) that in response to parts 1 and 2 of the EC Mandate, CEPT developed CEPT Reports 36 and 37, additionally ECC Report 158 was developed;
- dd) that based on these deliverables and by taking into account the discussions within the ECC and the EC, it has been decided to make available the band 24.25-26.65 GHz for automotive SRR equipment mounted on motor vehicles beyond 1 July 2013 but still limited in time;
- ee) that ITU Radio Regulation provision N° 5.149 urges administrations to take all practicable steps to protect the radio astronomy service from harmful interference in making assignments to stations of other services in several bands, including 22.01-22.5 GHz, 22.81-22.86 GHz and 23.07-23.12 GHz;
- ff) that in order to protect the passive radio services, the maximum emitted power for the out-of-band emission in the band 23.6 GHz to 24 GHz, caused by Ultra Wideband SRR equipment operating within 24.25-26.65 GHz, shall not exceed -74 dBm/MHz e.i.r.p. and any emissions within the band 23.6-24.0 GHz that appear 30° or greater above the horizontal plane shall be kept to a minimum considering typical antenna elevation pattern as depicted in figure 15 of ECC Report 158;
- gg) that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the R&TTE Directive. Conformity with the essential requirements of the R&TTE Directive may be demonstrated by compliance with the applicable harmonised European standard or by using the other conformity assessment procedures set out in the R&TTE Directive,

### *DECIDES*

1. that for the purpose of this Decision, a SRR is defined as a radio communication equipment that falls in the general category of vehicular radar systems and provides collision mitigation and traffic safety applications;
2. that in order to allow early introduction of SRR applications in Europe the 24 GHz frequency range is designated for SRR systems on a temporary basis;
3. that in order to ensure a gradual transfer of technology to the long-term SRR frequency band at 79 GHz, two reference dates are defined which involve a reduction of the frequency bandwidth availability as follows:
  - a) 21.65-26.65 GHz until 30 June 2013,
  - b) 24.25-26.65 GHz until 1 January 2018; this date is extended by 4 years for SRR equipment mounted on motor vehicles for which a type-approval application has been submitted and has been granted before 1 January 2018;
4. that the technical requirements detailed in Annex 1 apply to SRR devices operating within the band 21.65-26.65 GHz;
5. that the technical requirements detailed in Annex 2 apply to SRR devices operating within the band 24.25-26.65 GHz;
6. that the temporary frequency designations for SRR equipment are on a non-interference and non-protected basis;
7. that it shall be verified that the total number of vehicles equipped with 24 GHz Ultra Wideband SRR devices does not exceed the level of 7% of the total number of vehicles in circulation in each country;

8. that this Decision enters into force on 1 June 2012;
9. that the preferred date for implementation of this Decision shall be 1 September 2012;
10. that CEPT administrations shall communicate the national measures implementing this Decision to the ECC Chairman and the Office when the Decision is nationally implemented.”

*Note:*

*Please check the Office documentation database <http://www.ecodocdb.dk> for the up to date position on the implementation of this and other ECC Decisions.*

**ANNEX 1: TECHNICAL REQUIREMENTS FOR SRR DEVICES OPERATING WITHIN THE BAND 21.65-26.65 GHz**

1. The frequency band 21.65-26.65 GHz is designated for the Ultra Wideband component of SRR devices, with a maximum mean e.i.r.p. density of -41.3 dBm/MHz and a peak e.i.r.p. density of 0 dBm/50MHz, until the reference date 30 June 2013.
2. The frequency band 24.05 to 24.25 GHz is designated for the narrow-band emission mode/component, which may only consist of an unmodulated carrier, with a maximum peak power of 20 dBm e.i.r.p and a duty cycle limited to 10% for peak emissions higher than -10 dBm e.i.r.p.
3. SRR transmitting in the band 23.6-24 GHz with a mean e.i.r.p density higher than -74 dBm/MHz or in the bands 22.01-22.5 GHz, 22.81-22.86 GHz and 23.07-23.12 GHz with a mean e.i.r.p. density higher than -57 dBm/MHz, shall be fitted with an automatic deactivation mechanism to ensure protection of Radio Astronomy sites. Moreover, within the band 23.6-24 GHz, emissions that appear 30° or greater above the horizontal plane shall be attenuated by at least 30 dB up to 1 July 2013.
4. SRR devices shall be de-activated within the specified separation distance from the radio astronomy sites referenced in Annex 3.
5. After 30 June 2013, the 79 GHz range for new SRR systems, or alternative permitted technical solutions (e.g. according to Annex 2), must be used for road vehicle collision mitigation and traffic safety applications, while all existing equipment detailed in this annex may still operate to the end of lifetime of the vehicles.



**ANNEX 2: TECHNICAL REQUIREMENTS FOR SRR DEVICES OPERATING WITHIN THE BAND  
24.25-26.65 GHz**

1. The frequency band 24.25-26.65 GHz is designated for the Ultra Wideband component of SRR devices, with a maximum mean e.i.r.p. density of -41.3 dBm/MHz and a peak e.i.r.p. density of 0 dBm/50MHz, until the reference date 1 January 2018 (this date is extended by 4 years for SRR equipment mounted on motor vehicles for which a type-approval application has been submitted and has been granted before 1 January 2018).
2. The maximum emitted power for the out-of-band emission in the band 23.6 GHz to 24 GHz shall not exceed -74 dBm/MHz e.i.r.p. Moreover, any emissions within the 23.6 GHz to 24 GHz band that appear 30° or greater above the horizontal plane shall be kept to a minimum considering typical antenna elevation pattern as depicted in figure 15 of ECC Report 158.
3. After 1 January 2018 (this date is extended by 4 years for SRR equipment mounted on motor vehicles for which a type-approval application has been submitted and has been granted before 1 January 2018), the 79 GHz range for new SRR systems, or alternative permitted technical solutions, must be used for road vehicle collision mitigation and traffic safety applications, while all existing equipment detailed in this annex may still operate to the end of lifetime of the vehicles.

**ANNEX 3: LIST OF RADIO ASTRONOMY SITES FOR WHICH AUTOMATIC DEACTIVATION FOR SRR DEVICES OPERATING IN THE BAND 21.65-26.65 GHz IS REQUIRED WITH GEOGRAPHIC COORDINATES AND RELATED SEPARATION DISTANCE**

Country	Name of the station	Geographic Latitude	Geographic Longitude	Separation distance (km)
France	Plateau de Bure	44°38'01" N	05°54'26" E	35
Germany	Effelsberg	50°31'32" N	06°53'00" E	6.5
Spain	Yebes	40°31'27" N	03°05'22" W	15
	Robledo	40°25'38" N	04°14'57" W	7
Finland	Metsähovi	60°13'04" N	24°23'37" E	7
	Tuorla	60°24'56" N	22°26'31" E	5
Italy	Medicina	44°31'14" N	11°38'49" E	20
	Noto	36°52'34" N	14°59'21" E	8
	Sardinia	39°29'50" N	09°14'40" E	15
UK	Cambridge	52°09'59" N	00°02'20" E	9
	Darnhall	53°09'22" N	02°32'03" W	5
	Jodrell Bank	53°14'10" N	02°18'26" W	9
	Knockin	52°47'24" N	02°59'45" W	5
	Pickmere	53°17'18" N	02°26'38" W	5
Poland	Kraków–Fort Skala	50°03'18" N	19°49'36" E	1
	Toruń - Piwnice	52°54'48" N	18°33'30" E	1
Sweden	Onsala	57°23'45" N	11°55'35" E	12
Russia	Dmitrov	56°26'00" N	37°27'00" E	35
	Kalyazin	57°13'22" N	37°54'01" E	35
	Pushchino	54°49'00" N	37°40'00" E	35
	Zelenchukskaya	43°49'53" N	41°35'32" E	35
Switzerland	Bleien	47°20'26" N	08°06'44" E	3
Latvia	Ventspils	57°33'12" N	21°51'17" E	8.5
Hungary	Penc	47°47'22" N	19°16'53" E	2