

ELECTRONIC COMMUNICATIONS COMMITTEE

ECC Decision
of 12 November 2004
on the frequency bands to be designated
for the temporary introduction of
Automotive Short Range Radars

(ECC/DEC/(04)10)



EXPLANATORY MEMORANDUM

1 INTRODUCTION

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).

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 Europe 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). The 79 GHz SRR technology is however not yet available at affordable prices for mass production. 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', has been 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 economical 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 23 concluded that the deployment 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 shall be made mandatory from 1 July 2007. Before that date, manual deactivation is 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 center 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 an 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.

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. The 24 GHz frequency band 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 use the 79 GHz band.

As the penetration levels are important to avoid interference to other services a monitoring process shall be established by the Radio Spectrum Committee providing collective commitment from the automotive manufacturers to comply with the regulatory conditions in this ECC Decision 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 21.625-26.625 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.

**ECC Decision
of 12 November 2004**

**on the frequency bands to be designated for the temporary introduction of
Automotive Short Range Radars (SRR)**

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“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);
- d) that 79 GHz SRR technology is not yet commercially available at the time of adoption 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) has been 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 currently given in Annex 6 of 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 economical 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 by the 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 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 center 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 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 23 have been performed within CEPT between existing services and 24 GHz SRR-equipment 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 for emissions within the 23.6-24 GHz band that appear 30° or greater above the horizontal plane as included in the FCC regulations and used in ECC Report 23, 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 23 concludes that sharing between 24 GHz SRR 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 23 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 23 and the gradual values of vertical attenuation of SRR as described in considering n), 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 in any EESS pixel is limited to 7.0%;
- t) that ECC Report 23 also indicates that sharing between 24 GHz SRR 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. In order to allow an early implementation of 24 GHz SRR Systems the automatic deactivation shall be made mandatory from 1 July 2007. Before that date, manual deactivation is required;
- u) that a manual deactivation mechanism would ensure that emissions are restricted only to those countries that have implemented the temporary solution;
- v) that there is a world wide primary amateur and amateur satellite service allocation at 24.00-24.05 GHz and stations within this service can radiate a significant power;
- w) that the period before the reference date of 1 July 2013 would allow the first product lines of vehicles on the European market to be equipped with 24 GHz SRR systems while ensuring protection of other services. After this reference date all new SRR equipment placed on the market in Europe must use the 79 GHz band (see ECC Decision (04)03) or alternative permitted technical solution while existing 24 GHz equipment may still operate in the 24 GHz band to the end of lifetime of the vehicles;
- x) that in order to place 24 GHz SRR-equipment on the market in Europe for a limited period of time specific measures would have to be taken on a harmonised European basis, in particular in accordance with the Directive 1999/5/EC (the R&TTE Directive);
- y) that SRR-equipment is not considered as a safety of life applications in accordance with the Radio Regulations. SRR in the 24 GHz band must operate on a non-interference and non-protected basis in accordance with the Radio Regulations;
- z) 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;

- aa) 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;
- bb) 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;
- cc) that a general review of the actual market penetration situation and availability of 79 GHz technology is needed during the period until 2013. Such a review should take place during 2009 and shall include participation of all interested parties;
- dd) that administrations and the European Commission should be invited to ensure commitment from automotive industry on limited placing on the market and reporting of the market penetration of vehicles with 24 GHz SRR equipment during the period until 2013;
- ee) that Radio Regulation 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.

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 as follows:
 - a. 24.15 GHz \pm 2.5 GHz for the Ultra Wideband component, with a maximum mean power density of -41.3 dBm/MHz e.i.r.p. and peak power density of 0 dBm/50MHz e.i.r.p;
 - b. 24.05-24.25 GHz 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. that the temporary frequency designation for SRR equipment in the 24 GHz range is on a non-interference and non-protected basis;
4. that emissions within the 23.6-24 GHz band that appear 30° or greater above the horizontal plane shall be attenuated by at least 25 dB up to 2010 and 30 dB up to 1 July 2013 for SRR systems operating in the 24 GHz range as defined in Decides 2;
5. that 24 GHz SRR systems transmitting in the band 23.6-24 GHz with an eirp higher than -74 dBm/MHz or in any band listed in considering ee) with an eirp higher than - 57 dBm/MHz, shall be fitted with an automatic deactivation mechanism to ensure protection of Radio Astronomy sites as well as manual deactivation to ensure that emissions are restricted only to those countries that have implemented the temporary solution. In order to allow an early implementation of 24 GHz SRR Systems the automatic deactivation shall be made mandatory from 1 July 2007. Before that date, manual deactivation is required;
6. that where an automatic deactivation mechanism is implemented, 24 GHz SRR systems must be de-activated within the specified separation distance from the radio astronomy sites referenced in Annex 1¹;
7. that the 24 GHz frequency range may only be used within CEPT countries for new SRR systems until the reference date, that is set to 1 July 2013. After this reference date, 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 existing 24 GHz equipment may still operate in the 24 GHz band to the end of lifetime of the vehicles;

¹ Note that Annex 1, comprising separation distances for radio astronomy sites, will be considered for adoption by the ECC meeting scheduled for June 2005 and published in a revision of this Decision

8. that the percentage of vehicles equipped with 24 GHz SRR devices must not exceed 7.0% in each European national market;
9. that the reference date may be set earlier, in case the agreed national market penetration threshold would be exceeded in one EU country, subject to decision by the Radio Spectrum Committee and the European Commission;
10. to invite the European Commission to encourage the Automotive Components Industry to work towards an early introduction of equipment operating in the 79 GHz band by means of research and development programmes;
11. that a CEPT country not being a member of the EU can take its own national measures to stop placing on the market if the penetration threshold is exceeded;
12. to invite administrations and the European Commission to ensure commitment from automotive industry on limited placing on the market and reporting of the market penetration of vehicles with 24 GHz SRR equipment during the period until 1 July 2013;
13. that the 24 GHz frequency band should be made available not later than 1 July 2005
14. that this Decision will enter into force on 12 November 2004;
15. 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 web site (<http://www.ero.dk>) for the up to date position on the implementation of this and other ECC decisions.

ANNEX 1 to ECC/DEC/(04)10

Regulatory Annex: list of radio astronomy sites for which automatic deactivation 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
	Floirac	44°50'10" N	00°31'37" W	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