

ELECTRONIC COMMUNICATIONS COMMITTEE

ECC Decision
of 24 March 2006 amended 6 July 2007 at Constanta
on the harmonised conditions for devices using
Ultra-Wideband (UWB) technology
in bands below 10.6 GHz

(ECC/DEC/(06)04)

(2007/131/EC)

amended 6 July 2007



EXPLANATORY MEMORANDUM

1 INTRODUCTION

This ECC Decision has been developed within the frame of EC mandates to CEPT to identify the conditions relating to the harmonised introduction in the European Union of radio applications based on ultra-wideband (UWB) technology.

The underlying objective of these mandates was to provide ECC and the European Commission with the necessary information to adopt one or more technical implementing measures harmonising the use of the radio spectrum to enable the timely introduction of UWB technology within Europe. To support the development and deployment of UWB technology it is essential that common spectrum, with the associated regulatory framework and harmonised standards, becomes available throughout Europe as soon as possible.

This Decision is intended to assist Europe to enhance competitiveness in the ICT sector by using the regulatory framework to foster competition and the introduction of new communication technologies. This is one of the leading policy goals defined in the Lisbon Agenda, on the basis that stronger ICT uptake will lead to greater economic competitiveness, growth and employment.

In this context, it is important that this decision establishes regulatory conditions which on one hand will encourage the development of economically-viable markets for UWB applications as commercial opportunities arise, and on the other hand will take into account the need of protection for the existing services.

Harmonising spectrum usage rules across CEPT helps to establish an effective single market for these applications, with consequent economies of scale and benefits to the consumer, as well as avoiding the expected difficulties in enforcing divergent national regulations for highly-portable UWB devices.

UWB technology holds potential for a wide variety of new Short Range Devices (SRD) for communications, measurement, location tracking, imaging, surveillance and medical systems. This decision identifies the conditions required for the use of the radio spectrum by UWB devices. This decision has also identified the technical parameters as well as the appropriate mitigation techniques and review mechanisms that will be required to ensure protection of radio services.

It should be noted that this ECC decision is designed to be part of a “regulatory package”, with regulatory and legal provisions to be adopted by both the CEPT and the European Union, with assistance from ETSI.

2 BACKGROUND

Pursuant to the first mandate issued by the European Commission to CEPT on March 11th, 2004 to develop technical implementing measures for the harmonised use of radio spectrum for UWB applications in the European Union, ECC established a Task Group to develop the ECC responses and complete the technical studies already initiated within CEPT. This ECC Decision applies to generic UWB devices below 10.6 GHz that are exempted from individual licensing and operating on a non-interference, non-protected basis.

ECC Report 64 on the protection requirements of radiocommunication systems below 10.6 GHz from Generic Ultra-wide Band (UWB) applications was adopted February 2005. ECC Report 64 generally assumes an activity factor of 5% and that 80% of the generic UWB devices would be deployed indoor and 20% outdoor.

Based on the deployment scenarios and protection distances assumed in the studies in Report 64, the majority of the radiocommunication services considered require up to 20-30 dB more stringent generic UWB PSD limits than the FCC e.i.r.p. density limits. If the victim radiocommunication service is

operated in an outdoor environment, as is the case for e.g. FS, FSS, RAS, EESS etc, then the increase of noise due to the aggregate UWB interference, generally determines the generic UWB PSD limit. If the victim radiocommunication service is operated in the indoor environment, e.g. DVB-T, IMT-2000, RLAN etc., then the closest UWB interferer becomes the dominant interference factor due to small spatial separation (small path loss).

It was recognized that regulatory solutions based on the maximum generic UWB PSD limits calculated in ECC Report 64, while protecting existing services with a high degree of confidence, would not facilitate UWB operation in Europe.

Further analysis has been performed within the frame of a second mandate issued by the European Commission to CEPT in June 2005, including in particular:

- complementary technical studies focused on three selected coexistence scenarios (Fixed Satellite Services, outdoor Fixed Services and indoor FWA scenarios);
- an impact analysis, structured per frequency range, initially considering a mean e.i.r.p. spectral density limit of -55 dBm/MHz in the 3.1-10.6 GHz frequency range, taking into account possible mitigation factors in particular restriction to indoor UWB applications.

The impact of different PSD limits has been studied on both radiocommunication services and UWB devices.

Decision ECC/DEC/(06)04 on the harmonised conditions for devices using UWB technology in bands below 10.6 GHz was first adopted by the ECC at its meeting March 2006. It was however agreed that further technical studies would still be needed in several areas in order to finalize generic regulatory solutions for UWB operation in Europe, in particular concerning maximum mean e.i.r.p. spectral densities in the bands 2.7 - 3.8 GHz and 8.5 - 9 GHz, Detect And Avoid (DAA) and Low Duty Cycle (LDC) mitigation techniques and UWB installations in road and rail vehicles.

As requested by the ECC meeting July 2006, a report on the regulatory and enforcement implications of a possible harmonized transition measure (phased approach) applicable to frequency band 4.2-4.8 GHz was also developed. Such a phased approach would mean that the first generation (1G) of UWB devices operating in the 4.2-4.8 GHz frequency band with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz without additional mitigation is introduced earlier in Europe, and after a cut-off date (in 2010) it will gradually be replaced with the second generation (2G) of UWB devices implementing a mandatory requirement for additional mitigation in this frequency band.

ECC agreed at its meeting November 2006 that such harmonized transition measure should be based on the following 5 principles:

- 1G UWB devices are not to be placed on the market after the cut-off date, but the use of these devices is still permitted after the cut-off date
- Fixed cut-off date (31 December 2010), also included in a corresponding EC Decision.
- 2G Harmonised Standard developed sufficiently ahead of the cut-off date and the 1G Harmonised Standard is superseded by the 2G Harmonised Standard by the cut-off date.
- EC to take the appropriate steps to ensure that Notified Bodies do not give a positive opinion on the compliance of 1G UWB equipment with essential requirements after the cut-off date.
- Development and subsequent signing of a MoU by UWB industry, in order to ensure a smooth transition from 1G to 2G UWB equipment, including the issue of stopping the placing of 1G UWB equipment on the European market by the cut-off date.

Decision ECC/DEC/(06)04 was finally revised so as to reflect the outcome of these further studies on UWB.

3 REQUIREMENT FOR AN ECC DECISION

The allocation or designation of frequency bands under specified conditions in CEPT member countries is laid down by law, regulation or administrative action. ECC Decisions are required to deal with the carriage and use of equipment throughout Europe. The ECC also recognizes that for UWB devices to be introduced successfully throughout Europe, confidence must be given on the one hand to manufacturers to make the necessary investments and on the other hand to users of existing services that their protection will be ensured.

The harmonisation on a European basis would support the *Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.*

A commitment by CEPT member countries to implement an ECC Decision will provide a clear indication that the required frequency range 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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Comparable technical specifications to those given in this ECC Decision are given in EC Decision no. (2007/131/EC). EU Member States and, if so approved by the EEA Joint Committee, Iceland, Liechtenstein and Norway are obliged to implement the EC Decision.

“The European Conference of Postal and Telecommunications Administrations,

considering

- a) that UWB technology shall mean technology for short-range radiocommunication, involving the intentional generation and transmission of radio-frequency energy that spreads over a very large frequency range, which may overlap several frequency bands allocated to radiocommunication services;
- b) that this Decision is applicable to technologies with bandwidth significantly wider than 50 MHz;
- c) that Short Range Devices (SRD) using UWB technology can be used for communications, measurement, location, imaging, surveillance and medical systems;
- d) that harmonised conditions across CEPT/EU help to establish an effective single market for these applications, with consequent economies of scale and benefits to the consumer, and avoid difficulties in enforcing divergent national regulations;
- e) that a suitable CEPT/EU harmonized solution would encourage the global convergence of products by the UWB industry which would lead to greater economies of scale and the associated benefits;
- f) that devices using UWB technology operate on a non-interference, non-protected basis ;
- g) that the devices using UWB technology which are permitted to operate under this Decision present the potential to transmit in bands allocated to passive services that are covered in the RR footnote 5.340 which prohibits all emissions;
- h) that this ECC Decision is primarily intended to respond to the market demand for UWB indoor and handheld devices providing communication applications;
- i) that some categories of UWB devices characterized by predominantly outdoor usage are explicitly excluded from the scope of this Decision or subject to specific provisions as they can present a significant risk of interference to radio services deployed outdoor and operating in frequency bands where maximum UWB emission levels would be allowed;
- j) that the frequency range below 5 GHz is being considered for the development of cellular networks such as IMT-Advanced discussed within the frame of Agenda Item 1.4 of WRC-07;
- k) that the higher maximum power densities in frequency band 6 – 8.5 GHz without requirement for additional mitigation will facilitate UWB operation;
- l) that the protection requirements of radiocommunication systems below 10.6 GHz from Generic UWB Applications have been studied in ECC Report 64 assuming in particular for aggregate interference analyses 80% of UWB devices operating indoor, 20% outdoor and an average 5% activity factor;

- m) that the maximum mean e.i.r.p. spectral densities limits of -85 dBm/MHz around 2 GHz and -80 dBm/MHz at 3.5 GHz are based on single interference analyses with IMT-2000 services and BWA services respectively assuming minimum separation distance of 36 cm and receiver sensitivity;
- n) that the maximum mean e.i.r.p. spectral density limit of -70 dBm/MHz in the band 2.7 – 3.4 GHz is based on single interference analyses with aeronautical radars assuming in particular minimum separation distance of 170 m, a 7 dB main antenna beam attenuation and a 3 dB Multiple System/Technology Allowance factor;
- o) that in addition a maximum peak e.i.r.p. limit of -36dBm measured in 50MHz in the band 2.7 – 3.4 GHz is based on test measurements with aeronautical radars and addresses the potential interference from UWB devices with low PRF and undithered pulses;
- p) that a maximum mean e.i.r.p. spectral density of -65 dBm/MHz in the band 8.5 - 9 GHz is based on single interference analyses with radar systems assuming a minimum separation distance of 25 m;
- q) that, for the Radio astronomy service, the protection levels given in ECC Report 64 are well below the maximum mean e.i.r.p. spectral densities given in the Annex 1, but when taking into account mitigation factors specific to a single existing radio astronomy station coexistence might be feasible;
- r) that ECC Report 64 has considered interference potential resulting from mean power and only limited consideration has been given to peak power interference, time gating and frequency hopping. ECC may review this Decision in the light of these possible implications;
- s) that complementary technical studies (using different propagation models and assuming 100% of UWB devices operating indoor with an average 1% activity factor) provide some level of confidence regarding the protection of outdoor stations from the Fixed Service and the Fixed Satellite Service with a maximum mean e.i.r.p. spectral density level of -41.3 dBm/MHz;
- t) that the issue of compatibility of UWB devices operated on-board either an aircraft or a vessel is the responsibility of the relevant aeronautical and maritime regulatory authorities;
- u) that the compatibility studies performed within CEPT include, inter alia, the presumption that video signals will be transmitted using predominantly high-efficiency coding;
- v) that if actual UWB deployment significantly exceeds assumptions used in the complementary technical studies, in particular if a significant amount of devices appear on the market without efficient video coding, then this regulation will have to be reviewed;
- w) that, to reduce interference on outdoor radio stations, it is important to minimise the outdoor activity of UWB;
- x) that the operation of UWB devices installed in road and rail vehicles can be justified mainly due to the average screening attenuation of vehicles and is subject to the implementation of appropriate mitigation techniques for the protection of outdoor radio stations;
- y) that a harmonized transition measure (phased approach) will enable first generation (1G) of UWB devices operating in the 4.2-4.8 GHz frequency band with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz without additional mitigation to be placed on the market until a fixed cut-off date (31 December 2010);
- z) that the principle of a fixed cut-off date is justified by the need to ensure future development of radio services with indoor coverage operating in this band together with long-term protection of defence systems operating in this band;
- aa) that future World Radiocommunication Conferences may make revisions to the Radio Regulations that change the impact of UWB on Radiocommunication Services operating in accordance with the Table of Allocations;
- bb) that CEPT can develop other Decisions for specific classes of UWB device (e.g. Ground and Wall Probing Radar imaging systems) which do not meet the technical requirements of this Decision for generic UWB devices;

- cc) that, in order to support procedures of review of ECC Decisions, administrations are encouraged to collect market data on the numbers and types of UWB devices being placed on national markets;
- dd) that administrations are encouraged to conduct measurements on the characteristics of these devices;
- ee) that administrations are encouraged to monitor the impact of UWB devices on incumbent users, including the rise in noise due to the aggregate effect;
- ff) that administrations are encouraged to collect evidence of any interference caused to incumbent services by UWB devices;
- gg) 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(s) or by using the other conformity assessment procedures set out in the R&TTE Directive.

DECIDES

1. that this ECC Decision defines general harmonised conditions for the use in Europe of devices using UWB technology in bands below 10.6 GHz;
2. that the devices permitted under this ECC Decision are exempt from individual licensing and operate on a non-interference, non-protected basis;
3. that this ECC Decision is not applicable to:
 - a) devices and infrastructure used at a fixed outdoor location or connected to a fixed outdoor antenna;
 - b) devices installed in flying models, aircraft and other aviation;
4. that the technical requirements detailed in Annex 1 apply to devices permitted under this ECC Decision;
5. that this Decision enters into force on 6 July 2007;
6. that the preferred date for implementation of this Decision shall be 1 February 2008;
7. 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

Technical requirements for devices using UWB technology in bands below 10.6 GHz

Maximum e.i.r.p. limits

Frequency range	Maximum mean e.i.r.p. spectral density (dBm/MHz)	Maximum peak e.i.r.p. (measured in 50MHz)
Below 1.6 GHz	-90 dBm/MHz	-50 dBm
1.6 to 2.7 GHz	-85 dBm/MHz	-45 dBm
2.7 to 3.4 GHz	-70 dBm/MHz	-36 dBm
3.4 to 3.8 GHz	-80 dBm/MHz	-40 dBm
3.8 to 4.2 GHz	-70 dBm/MHz	-30 dBm
4.2 to 4.8 GHz (Notes 1 and 2)	-70 dBm/MHz	-30 dBm
4.8 to 6 GHz	-70 dBm/MHz	-30 dBm
6 to 8.5 GHz (Note 2)	-41.3 dBm/MHz	0 dBm
8.5 to 10.6 GHz	-65 dBm/MHz	-25 dBm
Above 10.6 GHz	-85 dBm/MHz	-45 dBm

Note 1: UWB devices placed on the market before 31st December 2010 are permitted to operate in the frequency band 4.2 - 4.8 GHz with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz and a maximum peak e.i.r.p. of 0dBm measured in 50MHz.

Note 2: In case of devices installed in road and rail vehicles, operation is subject to the implementation of Transmit Power Control (TPC) with a range of 12 dB with respect to the maximum permitted radiated power. If no TPC is implemented, the maximum mean e.i.r.p. spectral density is -53.3 dBm/MHz.

DEFINITIONS

Maximum mean e.i.r.p. spectral density

The highest signal strength measured in any direction at any frequency within the defined range. The mean e.i.r.p. spectral density is measured with a 1MHz resolution bandwidth, an RMS detector and an averaging time of 1ms or less.

Maximum peak e.i.r.p.

The highest signal strength measured in any direction at any frequency within the defined range. The peak e.i.r.p. is measured within a 50MHz bandwidth centred on the frequency at which the highest mean radiated power occurs.