



# ECC Recommendation (11)09

UWB Location Tracking Systems TYPE 2 (LT2)

Approved 21 October 2011

## INTRODUCTION

This ECC Recommendation has been developed in response to a demand for a large-scale Location Tracking Application at fixed industrial sites using Ultra-Wideband (UWB) technology (known as LT2). The ECC Recommendation should ensure that frequency bands are available on a harmonised basis to enable the introduction of UWB devices in a timely manner and ensuring economies of scale while ensuring protection of existing applications or services.

It should be noted that this ECC Recommendation is designed to be part of a “regulatory package” on UWB, with various regulatory and legal provisions. The generic regulation for UWB devices in Europe given in Decision ECC/DEC/(06)04 was developed to respond primarily to the core market demand for communication applications and cable replacement. It enables also various types of radiodetermination applications using UWB technology in bands below 10.6 GHz such as location-tracking, sensor technologies.

ECC at its meeting in Cordoba in October 2008 recalled that the industry should be guided that in general the generic UWB regulations should be used primarily, including for planned specific UWB applications, without totally excluding the possibility for specific solutions and only in case of duly justified needs. CEPT overall approach and criteria for handling industry requests for specific UWB regulations is presented in CEPT Report 34.

ETSI submitted to CEPT in 2008 a System Reference Document on spectrum requirements for future Location Tracking Applications Type 2 (LT2) for person and object tracking and industrial applications. These requirements as reviewed and amended following active cooperation between ETSI and CEPT are given in ETSI TR 102 495-5. The scope of initial compatibility studies to be performed by CEPT is presented in CEPT Report 34.

CEPT Report 34 makes clear that in the past WG FM had decided that fixed outdoor UWB emitters should not be permitted. Any interference to fixed service receivers from such fixed UWB emitters would (given the short ranges involved) be almost constant in level, unlike that from mobile or nomadic UWB terminals. However, as the only service receivers for which this argument is relevant are also fixed, coordination is possible to avoid interference. Most UWB devices operate under a general authorisation (“licence-exempt”), which makes any coordination unenforceable as well as impractical. However, for a large industrial site a form of authorisation or registration is appropriate, and would enable enforcement.

Such an authorisation/registration regime has been studied and is proposed in ECC Report 167 which concluded that there should be no problems to authorise well defined sites, such as workplace/offices, public buildings, security and manufacturing assembly lines, where the applicant is able to demonstrate that potential victim stations can be protected.

## **ECC RECOMMENDATION OF OCTOBER 2011 ON UWB LOCATION TRACKING SYSTEMS TYPE 2 (LT2)**

“The European Conference of Postal and Telecommunications Administrations,

### *considering*

- a) that Ultra-Wideband (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 the generic UWB regulation presented in Decision ECC/DEC/(06)04 should be used wherever possible for applications using UWB technology in bands below 10.6 GHz;
- c) that the generic UWB regulation excludes fixed outdoor UWB installations;
- d) that the CEPT overall approach and criteria for handling industry requests for specific UWB regulations is presented in CEPT Report 34;
- e) the ETSI System Reference Document TR 102 495-5 has provided information on technical characteristics and sphere of use for Location Tracking applications type 2 (LT2)
- f) that the results of studies on the impact of LT2 systems on radio services operating in the band 3.4-4.8 GHz are presented in ECC Report 170;
- g) that a coordination of LT2 installations with FS, FSS and ARNS may be needed;
- h) that the technical requirements for Detect and Avoid (DAA) mitigation technique to ensure the protection of the radiolocation service in the band 3.1-3.4 GHz are presented in ECC Report 120;
- i) that administrations may wish to consider the registration and coordination procedure provided in ECC Report 167;
- j) In EU/EFTA countries the radio equipment that is under the scope of this Recommendation 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.

### *recommends*

1. that CEPT administrations should authorise the use of Location Tracking Application Type 2 equipments based on the technical requirements and additional measures given in the Annex.
2. that LT2 systems operate on a non-interference and non-protected basis.”

## ANNEX: REGULATORY REQUIREMENTS FOR UWB LT2 SYSTEMS

This Annex provides the regulatory requirements for UWB LT2 systems operating in the frequency band 3.1-4.8 GHz. Section 1 provides the technical requirements and section 2 additional measures required for the protection of radio services.

### 1. TECHNICAL REQUIREMENTS FOR UWB LT2 SYSTEMS

#### 1.1 Maximum e.i.r.p. for fixed outdoor terminals

**Table 1: Maximum e.i.r.p. for fixed outdoor terminals**

Frequency range)	Maximum mean e.i.r.p. spectral density	Maximum peak e.i.r.p. (defined in 50 MHz)
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 (Note 1)	-36 dBm
3.4 to 4.8 GHz	-41.3 dBm/MHz (Note 2 and 3)	0 dBm
4.8 to 10.6 GHz	-70 dBm/MHz	-30 dBm
Above 10.6 GHz	-85 dBm/MHz	-45 dBm

Note 1: within the band 3.1-3.4 GHz, terminals implementing Detect-And-Avoid (DAA) mitigation technique (see technical parameters for DAA in the band 3.1-3.4 GHz as defined in ECC/DEC/(06)04) may be permitted to operate with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz. A maximum duty cycle of 5% per transmitter per second and a maximum Ton = 25 ms also apply.

Note 2: a maximum duty cycle of 5% per transmitter per second and a maximum Ton = 25 ms apply.

Note 3: the maximum mean e.i.r.p. spectral density in the band 4.2-4.4 GHz for emissions that appear 30° or greater above the horizontal plane should be less than -47.3 dBm/MHz.

#### 1.2 Maximum e.i.r.p. for mobile terminals and fixed indoor terminals

**Table 2: Maximum e.i.r.p. for mobile terminals and fixed indoor terminals**

Frequency range)	Maximum mean e.i.r.p. spectral density	Maximum peak e.i.r.p. (defined in 50 MHz)
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 (Note 1)	-36 dBm
3.4 to 4.8 GHz	-41.3 dBm/MHz (Note 2)	0 dBm
4.8 to 10.6 GHz	-70 dBm/MHz	-30 dBm
Above 10.6 GHz	-85 dBm/MHz	-45 dBm

Note 1: within the band 3.1-3.4 GHz, terminals implementing Detect-And-Avoid (DAA) mitigation technique (see technical parameters for DAA in the band 3.1-3.4 GHz as defined in ECC/DEC/(06)04) may be permitted to operate with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz. A maximum duty cycle of 5% per transmitter per second and a maximum Ton = 25 ms also apply.

Note 2: a maximum duty cycle of 5% per transmitter per second and a maximum Ton = 25 ms apply. The duty cycle should also be limited to 1.5% per minute or equipment should implement an alternative mitigation technique that provides at least equivalent protection.

## 2. ADDITIONAL MEASURES REQUIRED TO ENSURE THE PROTECTION OF SPECIFIC RADIOCOMMUNICATION SERVICES

The following additional measures are recommended in order to ensure the protection of specific radiocommunication services:

- Fixed Service: 3.4-4.2 GHz and 4.4-4.8 GHz;
- Fixed Satellite Service: 3.4-4.2 GHz and 4.5-4.8 GHz;
- Aeronautical Radio Navigation Service: 4.2-4.4 GHz;
- Mobile Service : 4.4-4.8 GHz;
- Radioastronomy.

Where protection distances are given below for fixed receivers of specific radiocommunication services, if these are respected for all such receivers around a proposed site then no further protection measures are required. If such a receiver is within its protection distance, then further measures must be taken to reduce the received power appropriately (see guidance in ECC Report 167), including possible coordination by the national administration.

Administrations may wish to consider the registration and coordination procedure provided in ECC Report 167.

### 2.1 Fixed Service: 3.4-4.2 GHz and 4.4-4.8 GHz

The protection distance to fulfil an I/N of -20 dB is about 20 km in the main lobe direction and about 2 km in the side lobe direction (>5° angular decoupling from the mainbeam).

With 10 dB mitigation those distances will be changed to about 5 km in the main beam direction and 500 m in the sidelobes. The reduction of the peak power by 10 dB may be able to provide this mitigation (-41.3 dBm/MHz mean e.i.r.p. and -10dBm/50MHz peak e.i.r.p.).

Detailed results of compatibility studies are provided in ECC Report 170

### 2.2 FIXED SATELLITE SERVICE: 3.4-4.2 GHZ AND 4.5-4.8 GHZ

The protection distance is up to 2.6 km

### 2.3 Mobile Service: 3.4-3.8 GHz

The protection distance for mobile terminals of this service is 35 m.

### 2.4 Aeronautical Radio Navigation Service: 4.2-4.4 GHz

Definition of sensitive zones around airports up to 13 km is required. Additional mitigation measure, such as a maximum mean e.i.r.p. spectral density of -47.3 dBm/MHz for mobile outdoor terminals, is recommended (see ECC Report 170) for operation within sensitive zones.

### 2.5 Mobile Service: 4.4-4.8 GHz

Administrations may provide information about sensitive zones they want to protect (including military trials and training areas).

Information on protection distances (including for UAV ground station and receiver in the aircraft) is provided in ECC Report 170.

## **2.6 Radio astronomy**

Applicants for authorisation of LT2 operation on a site should determine whether any RAS station can be in direct line of sight to a terminal, using information supplied by the administration. If there is such a station, direct contact should be made to establish if any of the bands used for observations would be adversely affected by interference.