European Radiocommunications Committee (ERC)
within the European Conference of Postal and Telecommunications Administrations (CEPT)

USE OF THE FREQUENCY BANDS 290 - 300 KHZ AND 500 - 510 KHZ FOR GENERAL INDUCTIVE APPLICATIONS

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1 INTRODUCTION

The typical short range device (SRD), including most RFID systems, consists of a transmitter/reader (interrogator) and a transponder (tag). The tag will transmit a signal only after it has received an interrogation signal from the transmitter/reader. There are other SRDs in use, however, that do not fit this description. These consist of portable miniature transmitters operating continuously at a very low power output along with a fixed receiver which has an adjustable sensitivity. One application of this type of SRD is a system designed to monitor people with dementia to prevent them from leaving a care facility unattended and possible injuring themselves.

The 290 - 300 and 500 - 510 kHz frequency band was chosen for this application because this frequency is not subject to body shielding and interference from long range transmissions, signal reflections, and skip. The system operates in the induction field (near field) and provides a very defined short range (1 - 2.5 m) that can be controlled by adjusting the receiver sensitivity. The antenna in the portable transmitter is an inductor that is an integral part of the circuitry. Pulse code modulation is used in the miniature transmitter, with the pulse width and the repetition rate of each pulse controlled precisely by a microprocessor. This gives each transmitter a unique signature that allows it to be detected through the ambient noise level.

2 PRIMARY USERS

The 285 - 325 kHz frequency band is used in the maritime radio navigation service throughout the European Community. Radio beacon stations may transmit navigational information using narrow band techniques. In the northern regions of Norway, where auroral disturbances occur, fixed service stations are allowed to operate on four frequencies in the 283.5 - 490 kHz band.

According to the Radio Regulations, 500 kHz is an international distress and calling frequency for Morse radiotelegraphy. However, this frequency in not included in the GMDSS scheme following a decision of IMO maritime safety committee. Due to this most European administrations have ceased to keep watch on this frequency.

In the SRD application, the output of the portable low power transmitter has been measured at 4731 µV/m in the 290 - 300 kHz band and at 6237 µV/m in the 500 - 510 kHz at 1 meter by an independent certified test facility. No spurious level can be detected. The measured value given above were in fact the magnetic field component but was displayed as an equivalent electric field strength assuming far field conditions (51.5 dB conversion between E and H). The measured levels correspond to a level of 13.5 dBµV/m, or – 38.0 dBµA/m in the 290 - 300 kHz band and 15.9 dBµV/m, or –35.6 dBµA/m in the 500 - 510 kHz band, at 10 meters, assuming a 60 dB/decade decrease between 1 m and 10 m at that frequency. This is far below the allowable spurious emission limit specified in EN 300 330 (-7 dBµA/m at 300 kHz and -9 dBµA/m at 500 kHz).

Therefore, there is no possibility of these devices interfering with the maritime radio navigation service or maritime mobile service operating in the European Community. At the same time, interference from the maritime service to the SRD is not likely because the transmitters are not nearby and the SRD receivers operate at a low sensitivity.

3 APPLICATION

Use of the 290 – 300 kHz and 500 - 510 kHz bands is for inductive systems in general. There may be applications for access control, anti-theft, identification systems, etc.

4 LIMITS

In order to take into account an increase of the electromagnetic noise in those bands due to a cumulative effect of several transmitters emitting simultaneously, it is recommended to limit the transmitter carriers to -20 dBµA/m measured at a distance of 10 m.

5 CONCLUSION

The emissions of the proposed SRDs in the 300 kHz and the 500 kHz bands are far below the allowable spurious emission limit specified in EN 300 330 (-7 dBµA/m at 300 kHz and -9 dBµA/m at 500 kHz) and are not expected to cause any interference.

Concluding, it is proposed that the bands 290 - 300 kHz and 500 - 510 kHz be included in the CEPT/ERC/Rec. 70-03 for use by general SRD systems emitting less than -20 dBµA/m measured at 10m in order to have a 10 dB margin to take into account possible cumulative effects.