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Electromagnetic compatibility and Radio spectrum Matters (ERM); Report of the CENELEC/ETSI Joint Working Group in response to the EC letter ENTRP/F5/DP/MM/entr.f5.(2013)43164 to the ESOs

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Contents

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been produced by the CENELEC- ETSI Joint Working Group (JWG) in response to the letter from the European Commission dated the 13th February 2013 (see annex A). The letter requested CENELEC and ETSI to undertake the following standardisation activities:

a) Revise or develop harmonised standards conferring presumption of conformity with the EMC Directive and/or R&TTE Directive [i.26], and/or European standards covering the following aspects:

   1) Improved immunity of all broadcast receivers operating in the whole frequency bands 174 - 230 MHz and 470 - 862 MHz including in particular digital terrestrial TV and satellite TV receivers. This implies a new revision of CENELEC EN 55020 [i.2] including reconsideration of the scope of the so-called "exclusion band" in the context of new uses of spectrum, and should cover in particular immunity against signals with discontinuous transmission such as the «idle mode»5 of LTE equipment operating in the 800 MHz band (see below under b)). A European modification of the future CENELEC EN 55035 [i.36] improving immunity at enclosure and antenna ports is also to be considered.

      Selectivity of TV receivers has been covered by existing test suites already developed in Europe (e.g. DTG D-Book 7, Nordig, E-book), and these could be used as the basis for improved antenna port immunity requirements in both CENELEC EN 55020 [i.2] and the future CENELEC EN 55035 [i.36].

   2) Improved immunity and related specifications of other equipment relevant in the reception of digital terrestrial TV services, i.e. amplifiers, passive equipment and filters, especially the immunity of equipment operating below 790 MHz to LTE signals in the 800 MHz band.

   3) To investigate improved robustness of SRD and suitable mitigation techniques in order to enhance the sharing environment between LTE and short-range devices operating in the 800 MHz and adjacent bands.

b) Revise or develop harmonised standards conferring presumption of conformity with the R&TTE Directive [i.26] and/or European standards covering the following aspects:

   - Improved characterization, revision of requirements and appropriate reduction of out of band emissions of LTE equipment. In particular, a comprehensive definition of the idle mode emissions mentioned in item a) above 1 is required.

These standardisation activities should take place, where appropriate, under available standardisation mandates issued in support of the EMC Directive [i.43] and R&TTE Directive [i.26]. In all cases, close co-operation with ECC is to be considered as essential.

Such standardisation efforts are critical for a timely and comprehensive exploitation of the potential of wireless broadband in the 800 MHz band for citizens, business and public services. Taking into account that novel standards proposed to manufacturers generally need at least 18 months before they can reach the market it is urgent that the relevant standards are updated as soon as possible.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Executive summary

The present document is developed jointly by CENELEC and ETSI in response to the EC letter ENTRP/F5/DP/MM/entr.f5.(2013)43164 to the ESOs. The text of the letter is given in annex A of the present document.

The interference situation between the mobile service and the existing services in the 800 MHz band was considered and is addressed in the present document.

NOTE: More detailed information on the interference assessment is provided in several annexes of the present document.

Initial assumptions were made for the future situation in the 700 MHz band, even though the new services in this band are not standardised yet.

Some issues for further investigation and also a need for a new standard for terrestrial TV mast head amplifiers were identified.

The resulting activities, which were also asked by the EC letter, are:

- ETSI EN 301 908-13 [i.14] will be updated with a SEM reduction of 3 dB.
- ETSI EN 300 220 [i.35] will be updated deleting the Cat 3 for the 863 - 870 MHz band. Cat. 2 will therefore become the minimum performance and investigation on the possible introduction of a new Category 1,5 are ongoing.
- New Harmonised Standards will be created for satellite and terrestrial broadcasting TV receivers.
- Cable networks were addressed under the work of JWG DD [i.1].

Introduction

The present document has been produced jointly between CENELEC and ETSI addressing the objectives as given in the scope.

The present document presents in clause 4 a description of the new systems operating in the 800 MHz band and those expected in the 700 MHz band.

Clause 5 is a description of interference mechanisms for the different services operating in the 800 MHz band and those expected in the 700 MHz covering in its subclauses the mobile, digital terrestrial television broadcasting, as well as the impact on short range devices in the band 863 - 876 MHz band and the private/professional mobile radio (PMR).

Clause 6 presents the relevant harmonised standards recognized needing to be updated and recommendations for development of any new standardisation work.

Clause 7 presents information on a list of issues identified that are not covered by the present document but are recommended to be addressed.

Clause 8 presents a conclusion with the key points arising from the present document with an Executive Summary included at the beginning of the present document produced as a summary also for the European Commission.

Detailed supporting information for each of the main clauses above are provided in corresponding annexes to the present document.

Background information on the JWG DD, that also worked on the 800 MHz band:

The updating of the relevant standards for cable network systems had already been fulfilled by the work of CENELEC TC 210 and TC 209 as was identified by the JWG on Digital Dividend (DD) [i.1].

With regards to Cable Systems JWG DD identified that LTE800 (790 - 862 MHz) disturbed consumer services where LTE800 is operated in coexisting and adjacent channels. ETSI or CENELEC has not itself verified level of disturbance to consumer services caused by LTE800 however this has been demonstrated by third party laboratory testing and some field testing. Furthermore the details are documented from the reports produced during the JWG DD. Recommendations arising from the output of JWG DD resulted in changes to the relevant standards with the assessment completed and the harmonised standards CENELEC EN 55020 [i.2] and CENELEC EN 50083-2 [i.3] adapted to the new requirements. There is no requirement for any further standardisation work. Any changes in existing radio environment from new mobile use cases would need further investigation.

The experiences from the studies given below in the present document on the 800 MHz band may support the potential implications to the 700 MHz, for example:

- The EC decision [i.4] on 800 MHz had an impact on cable networks, however this is manageable for existing equipment for examples as in Austria and Netherlands where the Authorities encouraged the mobile LTE operators to manage the disturbance to cable consumer services in cooperation with the Cable Operators. Furthermore in Austria the criteria used is the relevant CENELEC Standards for Cable.

- In the first draft JWG report [i.1], the Mobile Operator stated that the very high transmit power described in the CEPT report 30 [i.5] is not usable in many networks. Due to planning reasons and coexistence with the adjacent signals from the other mobile operators the output transmission power has to be reduced which are operational requirements.

- The recommendations [i.6] for updating CENELEC standards resulted in new values within CENELEC EN 55020 Amendment 11 [i.2] and the new version of the CENELEC EN 50083-2 [i.3]. In the work of this standardisation projects all relevant stakeholders were involved and accepted the new requirements.

- Due to the fact that the band plan for 700 MHz is not agreed yet and the services in this band are not known or standardised yet it is hard to assess the impact on cable networks. Without a clear assessment on the different technologies no predictions can be made at this point of time.

- The changes done to CENELEC EN 55020 [i.2] and the CENELEC EN 50083-2 [i.3] may also be sufficient to have the cable services coexisting with new services in the 700 MHz band if the technical decisions for mobile services in 700 MHz band are such that they aim to maintain the same level of performance as today for mobile in 800 MHz band. This consideration is based on the improved propagation characteristics in frequencies below 790 MHz band such that a reduction in the BS and UE transmit power levels is feasible.

1 Scope

The present document:

- investigates and documents anticipated and/or planned changes in frequency use in the band 470 MHz - 862 MHz including the relevant characteristics of the expected radio technologies to be deployed in these and neighbouring bands, in particular the 863 - 870 MHz band used by Short-Range Devices (SRD);
- develops a description of the emerging electromagnetic environment in the above bands and evaluate how these changes will affect the co-existence services, systems and equipment;
- makes recommendations to the CENELEC and ETSI committees to revise affected Harmonised Standards and other European Standards as necessary to improve to co-existence of relevant services and equipment.

The present document is developed jointly by CENELEC and ETSI in response to the EC letter ENTRP/F5/DP/MM/entr.f5.(2013)43164 to the ESOs. The text of the letter is given in annex A of the present document.

The letter of the European Commission mentions the band 174 - 230 MHz with regard to the broadcast receivers. This does not imply any intention to modify the 174 - 230 MHz band. The band does not fall under the scope of the present document.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Report on CENELEC/ETSI Joint Working Group on the Digital Dividend.

NOTE: Available at http://ec.europa.eu/DocsRoom/documents/10530/attachments/1/translations/en/renditions/native.

[i.2] CENELEC EN 55020:2007/A.1:2011: "Sound and television broadcast receivers and associated equipment - Immunity characteristics - Limits and methods of measurement".

[i.3] CENELEC EN 50083-2: "Cable networks for television signals, sound signals and interactive services - Part 2: Electromagnetic compatibility for equipment".

[i.4] Commission Decision 2010/267/EU of 6 May 2010 on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union.

[i.5] CEPT Report 30: "The identification of common and minimal (least restrictive) technical conditions for 790 - 862 MHz for the digital dividend in the European Union".

[i.6] CENELEC/ETSI Joint Working Group Digital Dividend, TC210/Sec0657/INF: "List of standards to be considered by their respective committees for revision to take into account changes in spectrum use resulting from the UHF Digital Dividend".

NOTE: Available at http://ec.europa.eu/DocsRoom/documents/10530/attachments/2/translations/en/renditions/native.

[i.7] DTG D-Book.

NOTE: Available at http://www.dtg.org.uk/publications/dbook.html.

[i.8] NorDig.

NOTE: Available at http://www.nordig.org/.

[i.9] CENELEC EN 62216: "Digital terrestrial television receivers for the DVB-T system".

[i.10] CEPT Report 53: "to develop harmonised technical conditions for the 694-790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives".

[i.11] Commission implementing Decision 2013/752/EU of 11 December 2013 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2005/928/EC.

[i.12] ECC Recommendation 70-03: "Relating to the Use of Short Range Devices (SRD)".

[i.13] ECC Report 207: "Adjacent band co-existence of SRDs in the band 863-870 MHz with LTE usage below 862 MHz".

[i.14] ETSI EN 301 908-13 (V7.1.1) (12-2015): "IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Radio Equipment Directive 2014/53/EU; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)".

[i.15] ITU-R Report IMT. Beyond 2020 Traffic.

[i.16] ETSI EN 300 086-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Part 1: Technical characteristics and methods of measurement".

[i.17] ETSI EN 300 086-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.18] ETSI EN 300 296-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Part 1: Technical characteristics and methods of measurement".

[i.19] ETSI EN 300 296-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.20] ETSI EN 300 113: "Land Mobile Service; Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.21] ETSI EN 302 561: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using constant or non-constant envelope modulation operating in a channel bandwidth of 25 kHz, 50 kHz, 100 kHz or 150 kHz; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.22] ETSI EN 300 341: "Land Mobile Service; Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.23] ETSI EN 300 390: "Land Mobile Service; Radio equipment intended for the transmission of data (and speech) and using an integral antenna; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.24] ETSI EN 301 166: "ElectroMagnetic Compatibility and Radio spectrum Matters (ERM); Land mobile service; Technical characteristics and test conditions for radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrowband channels and having an antenna connector".

[i.25] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (Radio Equipment Directive, "RED").

[i.26] 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 ("R&TTE Directive").

[i.27] ECC Report 199: "User requirements and spectrum needs for future European broadband PPDR systems (Wide Area Networks)".

[i.28] ETSI TS 136 101: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101)".

[i.29] ETSI TS 136 521: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception".

[i.30] ETSI EN 302 208: "Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W and in the band 915 MHz to 921 MHz with power levels up to 4 W; Harmonized Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.31] ECC Report 138: "DVB-T performance in the presence of UMTS".

[i.32] ECC Report 148: "DVB-T performance in the presence of LTE".

[i.33] Recommendation ITU-T G.9700: "Fast access to subscriber terminals (G.fast) - Power spectral density specification".

[i.34] Recommendation ITU-T G.9701: "Fast access to subscriber terminals (G.fast) - Physical layer specification".

[i.35] ETSI EN 300 220-1: "Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 1: Technical characteristics and test methods".

[i.36] CENELEC EN 55035: "Electromagnetic Compatibility of Multimedia equipment - Immunity Requirements".

[i.37] ETSI TR 102 546: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics for Professional Wireless Microphone Systems (PWMS); System Reference Document".

[i.38] ETSI EN 300 422: "ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Technical characteristics and test methods for wireless microphones in the 25 MHz to 3 GHz frequency range".

[i.39] ETSI EN 300 454: "ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Wide band audio links".

[i.40] ETSI EN 300 357: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Service description".

[i.41] ETSI TS 136 141: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141)".

[i.42] ETSI TR 136 942: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Frequency (RF) system scenarios (3GPP TR 36.942)".

[i.43] Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC Text with EEA relevance (EMC Directive).

[i.44] ECC Report 204: "Spectrum use and future requirements for PMSE".

[i.45] CEPT Report 32: "Report from CEPT to the European Commission in response to the Mandate on "Technical considerations regarding harmonisation options for the digital dividend in the European Union - Recommendation on the best approach to ensure the continuation of existing Program Making and Special Events (PMSE) services operating in the UHF (470-862 MHz), including the assessment of the advantage of an EU-level approach".

[i.46] ECC Report 174: "Compatibility between the mobile service in the band 2500-2690 MHz and the radio determination service in the band 2700-2900 MHz".

[i.47] ETSI EN 301 357-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Cordless audio devices in the range 25 MHz to 2 000 MHz; Part 1: Technical characteristics and test methods".

[i.48] ETSI TS 134 114: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; User Equipment (UE) / Mobile Station (MS) Over The Air (OTA) antenna performance; Conformance testing (3GPP TS 34.114)".

[i.49] LTE 800 radio sites.

NOTE: Available at https://www.google.fr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjjt_qjwO3KAhUDCBoKHfVVAoQQFggiMAA&url=http%3A%2F%2Fwww.anfr.fr%2Ffileadmin%2Fmediatheque%2Fdocuments%2Fsites%2FGuide_COMSIS_LTE_800_MHz__V2_1.pdf&usg=AFQjCNFoUvL7Y3h4nI5jnWVMjHEwoA19ZA&sig2=ladqAMTYHK6hukaY_MkX3w&bvm=bv.113943665,d.bGs.

[i.50] LTE 800 licences France.

NOTE: Available at http://www.arcep.fr/index.php?id=8571&tx_gsactualite_pi1%5buid%5d=1470&cHash=0a37c71df491974af4e0b66e1e389e92.

[i.51] ETSI EN 302 296: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Transmitting equipment for the digital television broadcast service, Terrestrial (DVB-T); Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.52] ETSI EN 303 340: "Digital Terrestrial TV Broadcast Receivers; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.53] ETSI EN 303 345: "Radio Broadcast Receivers; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.54] ETSI EN 303 354: "Amplifiers for broadcast reception in domestic premises; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.55] Mobile-DTT(14)20: Meeting minutes of PTD-CG Mobile-DTT#4, 20 March 2014, Maisons-Alfort.

NOTE: Available at http://www.cept.org/ecc/groups/ecc/cpg/cpg-pt-d/client/meeting-documents?flid=2979.

[i.56] CPG-PTD(14)044_rev1: "Measurements for assessing the impact of OOBE as well as short pulse interferences from IMT user equipment to DTTB reception", CPG PTD#5, 13-17 January 2014, Rome.

NOTE: Available at http://www.cept.org/ecc/groups/ecc/cpg/cpg-pt-d/client/meeting-documents/file-history?fid=15116.

[i.57] EBU technical study: "How can mobile and broadcasting networks use adjacent bands?", ISSN: 1609-1469, 2011.

NOTE: Available at https://tech.ebu.ch/docs/techreview/trev_2011-Q1_digital-dividend_sami.pdf.

[i.58] Ofcom study: "80dB DTT ACS - is it possible, and at what cost?", November 2013.

NOTE: Available at http://stakeholders.ofcom.org.uk/binaries/spectrum/UHF700MHz/DTT_RX_study_stakeholder_presentation_20131125_released_20131122.pdf.