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Reconfigurable Radio Systems (RRS);
Feasibility study on Radio Frequency (RF) performance for Cognitive Radio Systems operating in UHF TV band White Spaces

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Reconfigurable Radio Systems (RRS).

1 Scope

The present document aims to identify the relevant Radio Frequency (RF) scenarios and RF performance applicable to:

- Cognitive Radio Systems (CRS) for the coexistence between CRSs when they are operating in UHF TV band White Spaces.
- Both broadcasting service and Cognitive Radio Systems for the deployment of CRS in the UHF TV band White Spaces when advanced incumbent protection techniques and implementations such as cooperative sensing and advanced geo-location database are considered.
- Both broadcasting service and Cognitive Radio Systems for the coexistence studies in UHF TV band White Spaces in regions outside of CEPT responsibility.

The scenarios described in the preset document are based on [i.22] and [i.3].

2 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.

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2.1 Normative references

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

Not applicable.

2.2 Informative references

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] FCC 10-174: "Second Memorandum Opinion and Order", Sept. 23, 2010.

[i.2] OFCOM, Consultation on license-exempting cognitive devices using interleaved spectrum, Feb. 2009.

[i.3] ECC Report 159 (January 2011): "Technical and Operational Requirements for the Possible Operation of Cognitive Radio Systems in the 'White Spaces' of the Frequency Band 470-790 MHz".

[i.4] IEEE 802.22 (2011): "Standard for Wireless Regional Area Networks. Part 22: Cognitive Wireless RAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Policies and procedures for operation in the TV bands".

[i.5] IEEE 802.11n (2009): "IEEE Standard for Information technology. Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

[i.6] Recommendation ITU-R P.1546-4 (October 2009): "Method for point-to-area predictions for terrestrial services in the frequency range 30 MHz to 3 000 MHz".

[i.7] IEEE Communications Letters, Vol. 14, no. 10, pp. 886-888, October 2010: "Orthogonal multiplexing in a subspace of frequency well-localized signals", Jaap van de Beek.

[i.8] IEEE Transactions on Communications, Vol. 54, no. 12, pp. 2173-2185, December 2006: "Spectrally precoded OFDM", Char-Dir Chung.

[i.9] IEEE Communications Letters, Vol. 10, no. 6, pp. 444-446, June 2006: "Subcarrier weighting: a method for sidelobe suppression in OFDM systems", Ivan Cosovic, Sinja Brandes, Michael Schnell.

[i.10] IEEE Communications Letters, Vol. 13, no. 12, pp. 881-883, December 2009: "Sculpting the multicarrier spectrum: a novel projection precoder", Jaap van de Beek.

[i.11] IEEE Transactions on Communications, Vol. 59, no. 3, pp. 844-853, March 2011: "Optimal orthogonal precoding for power leakage suppression in DFT-based systems", Meng Ma, Xiaojing Huang, Bingli Jiao and Y. Jay Guo.

[i.12] ETSI TS 136 211: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation (3GPP TS 36.211)".

[i.13] Proc. First European Conference on Antennas and Propagation (EuCAP), November 2006: "Deterministic propagation prediction method developed by the European broadcasting union", R. Grosskopf.

[i.14] ERC Report 85: "Compatibility Analysis of Radio Astronomy in the Frequency Range 608-614 MHz within DVB-T".

[i.15] CEPT Chester 97: "The Chester 1997 Multilateral Coordination Agreement relating to Technical Criteria, Coordination Principles and Procedures for the introduction of DVB-T".

[i.16] ETSI TS 136 101 (V10.6.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 10.6.0 Release 10)".

[i.17] ETSI TS 136 104: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception".

[i.18] IEEE International Conference on Communications, June 2006, Vol. 4, pp. 1658-1663: "Cooperative Sensing Among Cognitive Radios", S.M. Mishra, A.Sahai, and R.W. Brodersen.

[i.19] IEEE Signal Processing Letters, vol. 15, pp. 649-652, 2008: "Blindly combined energy detection for spectrum sensing in cognitive radio", Y. H. Zeng, Y.-C. Liang, and R. Zhang.

[i.20] ETSI EN 300 744 (V1.6.1) (01-2009): "Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television".

[i.21] Wenshan Yin, Pinyi Ren, Jun Cai and Zhou Su. A pilot-aided detector for spectrum sensing of Digital Video Broadcasting-Terrestrial signals in cognitive radio networks. Wireless Communications and Mobile Computing 2011.

[i.22] ETSI TR 102 907: "Reconfigurable Radio Systems (RRS); Use Cases for Operation in White Space Frequency Bands".

[i.23] ECC Report 186 (January 2013): "Technical and operational requirements for the operation of WSDs under geo-location approach".

[i.24] Document Number D2.2 Scenario Definitions, Project: Flexible and Spectrum Aware Radip Access through Measurements and Modeling in Cognitive Radio Systems (FARAMIR).

[i.25] Recommendation ITU-R M.2241 (11/2011): "Compatibility studies in relation to Resolution 224 in the bands 698-806 MHz and 790-862 MHz".

[i.26] Electrical Engineering and Computer Sciences, University of California at Berkeley/Technical Report No. UCB/EECS-2009-3, "How much white space is there".

NOTE: Available at http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-3.html.