Abstract

We consider cooperative spectrum sensing in which multiple cognitive radios collaboratively detect the spectrum holes through energy detection and investigate the optimality of cooperative spectrum sensing with an aim to optimize the detection performance in an efficient and implementable way. The optimal voting rule has been derived for any detector applied to cooperative spectrum sensing. Also, detection threshold is optimized when energy detection is employed. Finally, a fast spectrum sensing algorithm for a large network is proposed which requires fewer than the total number of cognitive radios in cooperative spectrum sensing while satisfying a given error bound.

References

2. Amir Ghasemi, Communications Research Centre Canada and University of Toronto
Elvino S. Sousa, University of Toronto, “Spectrum Sensing in Cognitive Radio Networks:
Requirements, Challenges and Design Trade-offs,” IEEE Communications Magazine, vol. 46,
no. 4, pp. 32–39, April 2008.
3. Zhu Han and Hai Jiang, “Replacement of Spectrum Sensing and Avoidance of Hidden
Terminal for Cognitive Radio,” in IEEE Wireless Communications and Networking Conference,
4. W. Zhang and K. B. Letaief, “Cooperative spectrum sensing with transmit and relay
5. G. Ganesan and Y. G. Li, “Cooperative spectrum sensing in cognitive radio networks,” in
Proc. IEEE Symp. New Frontiers Dynamic Spectrum Access Networks (DySPAN’05), Baltimore,
Terminal Problem,” Science Academy Transactions on Computer and Communication Network
7. Wei Zhang, Member, Ranjan K. Mallik, Senior Member, , and Khaled Ben Letaief,
Fellow,” Optimization of Cooperative Spectrum Sensing with Energy Detection in Cognitive
Radio Networks,” IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS, VOL. 8, NO.
12, DECEMBER 2009 5761
8. Z. Quan, S. Cui, and A. H. Sayed, “Optimal linear cooperation for spectrum sensing in
2008.
9. E. Peh and Y.-C. Liang, “Optimization for cooperative sensing in cognitive radio
27–32.
10. Y.-C. Liang, Y. Zeng, E. Peh, and A. T. Hoang, “Sensing-throughput tradeoff for
11. S. M. Mishra, A. Sahai, and R. Brodersen, “Cooperative sensing among cognitive
1658–1663.
13. A. Ghasemi and E. S. Sousa, “Collaborative spectrum sensing for opportunistic access
Networks (DySPAN’05), Baltimore, USA, Nov. 2005, pp. 131–136.

Index Terms

Computer Science

Wireless
Keywords