ENERGY-EFFICIENT SPECTRUM AWARE CLUSTERING AND MULTI-HOP ROUTING FOR COGNITIVE RADIO SENSOR NETWORKS

By

Emad Badr El-Deen Abd El-Aziz Helal

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
ELECTRONICS AND COMMUNICATIONS ENGINEERING

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2017

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Title of Thesis:

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Key Words:
Cognitive radio sensor networks; clustering; Multi-hop Routing.

Summary:
In this thesis, we propose an Energy-Efficient Cluster Head Selection (ECHS) approach for Cognitive Radio Sensor Networks (CRSNs). ECHS achieves energy-efficient clustering while taking into account the dynamic spectrum access nature of CRSN. ECHS is a distributed algorithm in which serving as a cluster head depends on two factors: the channel availability in the node's vicinity and the node's energy. To tackle the hot spot problem caused by the high traffic near the sink, ECHS forms many small clusters near the sink to share the forwarding load of the rest of the network. Dynamic Channel Assignment (DCA) at the cluster heads is used to decrease the co-channel interference. We additionally propose a simple Energy-efficient multi-hop Routing protocol (ER) to evaluate the network performance from end-to-end. Simulation results show that our approaches achieve a remarkable increase in throughput while extending the network lifetime with an energy efficient manner.

Acknowledgements

Praise and Gratitude be to Allah, The Lord of All Worlds. My success (in my task) can only come from Allah. In Him have I put my trust, and to Him do I always turn. And Prayers and peace and greetings to the most honoured of messengers our master Muhammad and upon all his family and companions.

I would like to express my sincere appreciation and thanks to my advisors, ***Dr. Yasmine Fahmy*** and ***Dr. Ahmed Khattab*** for their invaluable guidance, support, and encouragement throughout these years. I hope I gain some of their professional attitude and integrity.

I am very much honoured to Prof. Tamer ElBatt, and Prof. Yasser Gadallah my committee members, for their grateful to judge this work and for their effective participation and valuable comments.

I am grateful to my dearest friends, Eng. Rashad Eletreby, Eng. Yichao Jin, and Eng. Ramez Mohamed for their helpful opinions, and supports throughout the working of my thesis.

Also, I would like to thank my friends, especially Eng. Ihab Sami, Eng. Ahmed Gomaa, and Eng. Ahmed Hassany for their real encouragement and help during my thesis work.

No words can express my gratitude to my parents, and all members of my family. I am forever grateful to them for their love, support, prayers, encouragement, sacrifices, and help throughout my life. My thanks also go to my wife for their unlimited support and patience.

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