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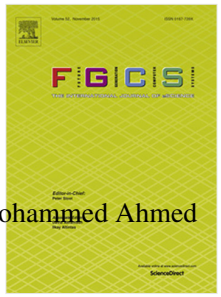

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Satish Anamalamudi, Abdur Rashid Sangi, Mohammed Alkatheiri, Ahmedin Mohammed Ahmed

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AODV routing protocol for Cognitive radio access based Internet of Things (IoT)

[1]Satish Anamalamudi, [2]Abdur Rashid Sangi, [3]Mohammed Alkatheiri, [4]Ahmedin Mohammed Ahmed

***Abstract*—Proactive based RPL is the network layer routing protocol designed for route-discovery to transmit the constrained application data from leaf nodes (LLN) to the LLN boarder router (LBR). From LLN boarder router (LBR) to the destination that is connected to non-constrained networks, traditional wired or wireless network is used to transmit the application data. Due to the flexibility and robustness of wireless networks, it can be used to transmit the application data from LBR to non-constrained networks. Opportunistic access based cognitive radio networks can be the most promising networking technology to transmit the constrained IoT data opportunistically in licensed PU free channels from LLN-LBR to the non-constrained networks. In this paper, hybrid control channel based cognitive AODV routing protocol with directional antennas is proposed to discover the channel-route from the LBR to the destination that is connected within the Cognitive Radio Networks. Experimental results reveal that the proposed cognitive AODV protocol with directional antennas is outperformed in comparison with traditional Infrastructure based wireless networks.**

***Index Terms*— Directional antenna, Common Control Channel, IoT, LLN Networks, AODV protocol.**

I. Introduction

ENHANCED radio access networking technologies are proposed to integrate in next-generation radio communication systems to improve their resilience, efficiency, adaptability, and sustainability[1]. Due to this, a tremendous interest in enabling the concepts of Internet-of-Things (IoT) will be accomplished where thousands of constrained devices (sensors, actuators) are going to interact with their environments and inter-networked together and accessible through the internet to connect with non-constrained networks. In order to provide interoperability among existing proprietary based constrained IoT networks and enable internetworking with external networks, IETF (Internet Engineering Task Force) developed an open standardization protocol stack for LLN networks (IoT) through IP-based connectivity. Currently, 6LoWPAN is the proposed standard to translate the IP datagram to MAC frame through compression and fragmentation. The design of constrained routing protocol plays a significant role in improving the performance of the constrained IoT network with minimal node energy consumption. To achieve, IETF propose a proactive based IPv6 distance vector routing protocol for Low-power and Lossy Networks (RPL). Constrained nodes(Sensors, actuators and constrained boarder routers) within the IoT network that are running RPL protocol are connected by constructing a Destination Oriented Directed Acyclic Graph (DODAG). Root node (LLN boarder router) initiates the DIO(DODAG Information Object) control messages with metric container options to form a DODAG for specific instance. With this, LLN nodes within the constrained network is able to select its parent node (best candidate of intermediate node) within a set of next-hop neighbors (called parent set, parent list) to forward the constrained application data from leaf node to LBR(LLN boarder router). Later, LBR can either send the constrained application data back to the LLN network or send it to external non-constrained network. In general, wired/wireless (WiFi, WiMAX) network is used to transmit the constrained data from one constrained IoT network(LBR) to other constrained network(LBR) or from constrained IoT network(LBR) to non-constrained network (external networks). Broadband Wireless Access (BWA) can be an attractive solution for the network operators to transmit the constrained IoT data in between different LLN networks or from LLN network to non-constrained network (see Figure.1). This is because of

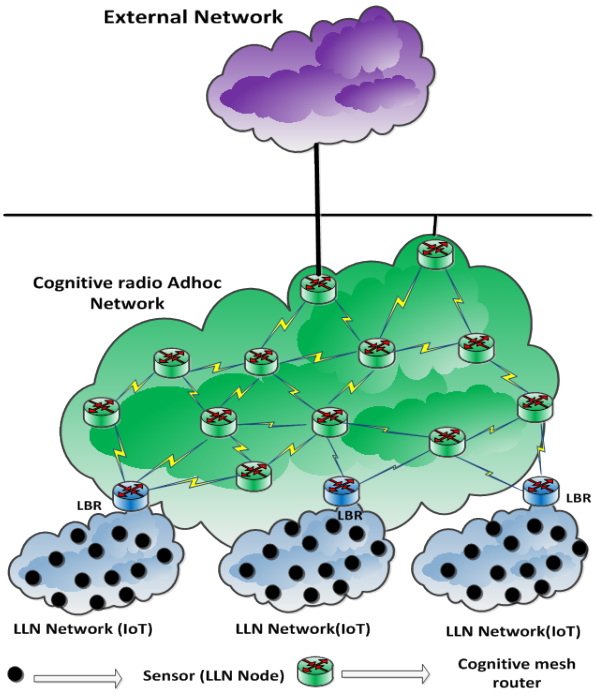

Fig. 1. Collision and delay scenario (a). Multi-channel hidden terminal (b). Deafness.

- *[1]S. Anamalamudi and [2]Abdur Rashid Sangi is with the Faculty of Computer and Software Engineering, Huaiyin Institute of Technology, Huaian, China. Email :satishnaidu80@gmail.com, sangi_bahrian@yahoo.com*
- *[3]Mohammed Alkatheiri is with Department of Computer Science, College of computing and Information Technology, The University of Jeddah, Jeddah, Saudi Arabia. Email :malkathiri.c@gmail.com*
- *[4]Ahmedin Mohammed Ahmed is with Kombolcha Institute of Technology, Wollo University, Kombolcha, Ethiopia. Email : a.m.1985@ieee.org.*