LOAD AWARE CHANNEL ESTIMATION AND CHANNEL SCHEDULING FOR 2.4GHZ FREQUENCY BAND BASED WIRELESS NETWORKS FOR SMART GRID APPLICATIONS

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Abstract - The advanced monitoring and control applications consider Wireless Sensor Networks (WSN) as a promising technology for modern applications like the Internet of Things (IoT), Smart Grid and Wireless Body Area Networks (WBAN). The WSN has important features like less cost, low power usage, supportable data rates and complexity. There is a need for continuous research on improving characteristics and abilities of WSN. The reliable performance of WSN depends on the latency necessities depending on the type of application and Quality of Service (QoS) parameters. The technologies like Zigbee, WiFi, and Bluetooth operating in 2.4GHz are mostly considered for deploying the WSN. Because of coexistence environment, the performance of Zigbee gets affected in terms of channel switching and causes the significant amount of delay. Also, the data transmission should be performed without any collision. In this paper, initially, the pseudorandom – based interference evading scheme is introduced for efficient data communication. During this scheme, if node attains a channel it must wait for a network reconfiguration time for moving to next channel. Hence, during this time other nodes are allowed for moving to the new channel. Secondly, for moving to the new channel load aware channel estimation is proposed to assess the possibility of traffic weight assignment at each channel. Finally, the Particle swarm optimization (PSO) based collision avoiding multiple-channel based superframe scheduling is proposed for IEEE 802.15.4 based wireless networks working under the influence of IEEE 802.11b network. The channel with best energy function is selected for data transmission. The work proposed in this paper is evaluated based on the comparison to the existing works. From the results obtained it is inferred as proposed work shows better performance in terms of packet error rate, packet delivery ratio, and energy consumed when compared to the existing algorithms.

Index terms: IEEE 802.15.4, IEEE 802.11b, Channel Scheduling, Coexistence, 2.4GHz ISM band, Packet Error Rate, Packet Delivery Ratio, Wireless Sensor Networks, Smart Grid.