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DYNAMIC ROUTE CONNECTION TO DEVELOP ENERGY PERFORMANCE IN COGNITIVE RADIO SENSOR NETWORKS

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Abstract – *Wireless Sensor Networks consisting of spatially distributed autonomous devices using sensors to co-operatively monitor physical or environmental conditions such as temperature, sound, pressure at different locations. Wireless sensor networks operating in the license free spectrum suffer from uncontrolled interference as those spectrum bands become increased. To overcome from this issue a cognitive radio sensor networks provide a solution by enabling sensor nodes to opportunistically access licensed channels. Since sensor nodes have to consume energy to support cognitive radio functionalities, such as channel sensing and switching the opportunistic channel accessing should be carefully considered for improving the energy efficiency in cognitive radio sensor network. This end, the dynamic channel accessing problem to improve the energy efficiency for a clustered CRSN is investigated. Resource allocation issues, determination the condition when sensor nodes should sense and switch to a licensed channel for improving the energy efficiency are studied respectively. The simulation is by NS2 simulator*.

Key Words : **CRCN, clustering, energy efficiency, dynamic channel access.**

1. INTRODUCTION

Wireless sensor network (WSN), as a promising event monitoring and data gathering technique, has been widely applied to various fields including environment monitoring, military surveillance and other industrial applications [1], [2]. Cognitive Radio (CR) has emerged as a promising technology to improve the spectrum utilization by enabling opportunistic access to the licensed spectrum bands [3]. This technology can also be applied to WSNs, which leads to Cognitive Radio Sensor Networks (CRSNs) [4]. Sensor nodes in CRSNs can sense the availability of licensed channels and adjust the operation parameters to access the idle ones, when the condition of the licensed-free channel degrades. However, since the energy consumption for supporting the CR functionalities, e.g., channel sensing and switching, is considerable for battery-powered sensor nodes [5], [6], the opportunistic channel access should be carefully studied to improve the energy efficiency in CRSNs. In order to enhance energy efficiency, the key issue is to determine when the energy consumption of transmitting a fixed amount of data can be reduced by sensing and accessing a licensed channel, compared with the energy consumption when only using the default license-free channel. It is very challenging since the decision depends on different factors, including the packet loss rate of the license-free channel, the probabilities for accessing licensed channels, as well as the protection for primary users (PUs). Moreover, due to the dynamic availability of licensed channels, when sensor nodes decide to sense and access a licensed channel, another challenge lies in identifying the best licensed channel to sense and access to optimize the energy efficiency for data transmission.

Inter-cluster Routing: Inter-cluster routing describes the communication mode of the different cluster. It can be of two types: Single hop and multi hop. Single hop is that type in which the source node communicates with the destination node directly. In multi hop clustering the source node communicates with the destination node through various intermediate nodes.

Intra-cluster Routing: It describes the mode of communication between the member nodes and the CH. It can be of two types: single hop and multi hop. In single hop the MN directly with the CH whereas in the multi hop the MN don't directly deal with the CH.

2. PROPOSED SYSTEM

I . For both intra-cluster and inter-cluster data transmission, the condition when sensor nodes should sense and switch to a licensed channel for potential energy consumption reduction are determined.

II .A dynamic channel accessing scheme to reduce the energy consumption for intra-cluster data transmission, which identifies the sensing and accessing sequence of the licensed channels within each cluster is proposed.

III .Based on the analysis of intra-cluster data transmission, a joint power allocation and channel accessing scheme is developed for inter-cluster data transmission, which can dynamically adjust the transmission power of cluster heads and determine the channel sensing and accessing sequence to reduce energy consumption.

3. METHODOLOGY

1. There are six clusters(cluster means group of nodes) as shown in the fig(2), first step is need to find the highest energy.

2. Sort the energy and choose the highest energy node that node is considered as a source node and remaining nodes are considered as a destination.

3. In this step source node is going to communicate with destination nodes through the neighbour nodes this stage we call as a primary user and neighbour node is determined by

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

4. After this stage is completed the primary node is in sleep mode, next we find out the source and destination for secondary user by finding next highest energy.

5. Source node is communicating with destination node if in case neighbor node has low bandwidth while transmitting the data, primary user will activate and recover the low bandwidth node. After recovery the source and destination will continue their communication without any interrupt.

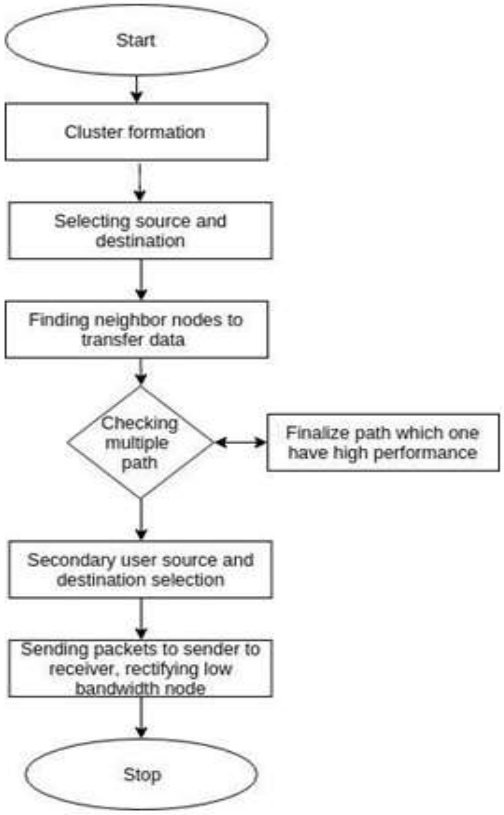

Fig-1: Flow diagram

4. COLLISION AVOIDANCE

In CWSNs, one of the most important challenge is to handle the collision during data transmission by multiple sensor nodes at the same point of time. The collision during data transmission is handled by proper MAC protocol. The MAC protocols for WSN are broadly categorized into 3 types, i.e. schedule, random, and hybrid. Among these 3 types of MAC protocols, the hybrid MAC protocols try to combine the advantage of both schedule and random based MAC protocols. In this paper, a distributed slot scheduling algorithm for hybrid MAC algorithm are proposed. This algorithm mainly focuses on preparing a schedule which bridges the gap between a feasible and an optimal schedule to handle the collision during the data transmission. In this proposed approach, first we find out the neighbours node, then a particular slot is allotted to each node in order to prepare a feasible schedule using the RD-TDMA algorithm. Finally, the feasible schedule is fine tuned in a way to improve the efficiency in handling the collision by reducing the number of allotted slots. The figure below shows two or more nodes are transmitting a data simultaneously.

Fig-2: Collision diagram

5. RESULTS

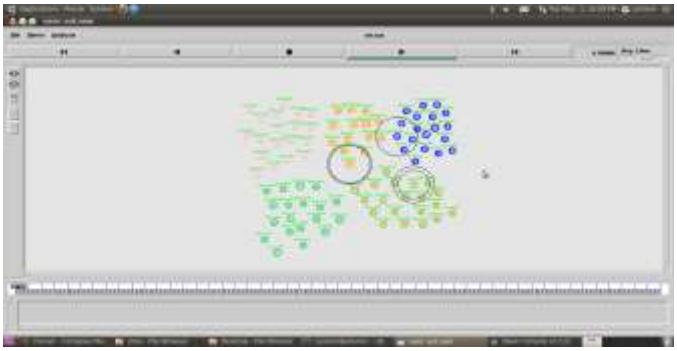

Fig-3: Cluster formation

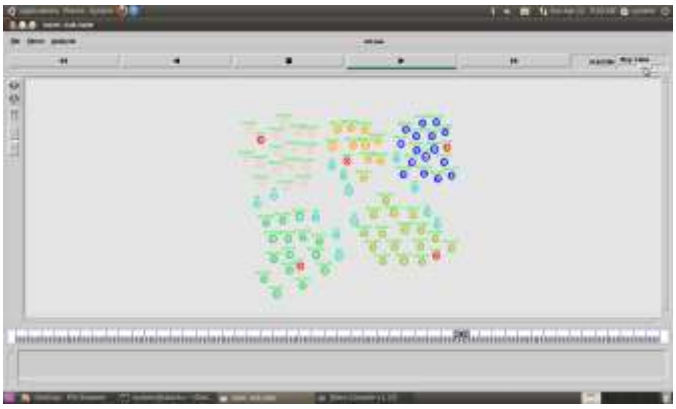

Fig-4: Source and destination

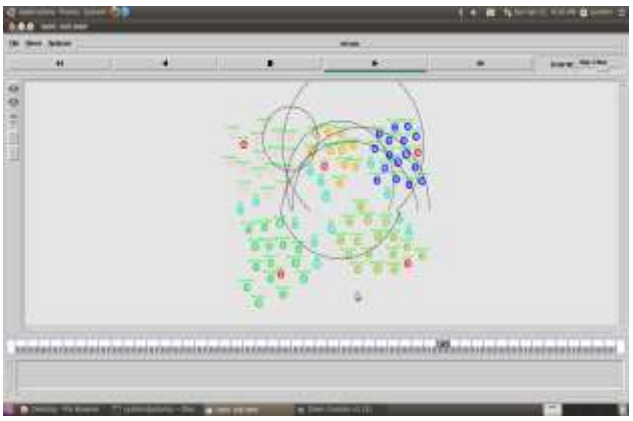

Fig-5: Source to destination data transmission

6.CONCLUSION

In this paper, the dynamic channel accessing problem to improve the energy efficiency in clustered CRSNs is studied. By considering the energy consumption in channel sensing and switching, we have determined the conditions of sensing and accessing licensed channels for potential energy consumption reduction. Moreover, two sequential channel sensing and accessing schemes have been proposed for intra- and inter-cluster data transmission, respectively, which form a comprehensive solution to control the dynamic channel access in clustered CRSNs for achieving optimal energy efficiency, and also proposed collision avoidance using distributed TDMA algorithm.

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