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CERTAIN INVESTIGATIONS ON PERFORMANCE ANALYSIS BASED ON CLUSTER TOPOLOGIES USING ZIGBEE

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***Abstract*- Routing algorithm is proposed to enhances throughput and reduce end-to-end delay in a network. The throughput is reduced by interrupt from primary networks. The proposed routing algorithm is aimed at large-scale networks where information is transmitted through different clusters on their path to the sink. By analyzing the most throughput for every path, the information will be transmitted through the best path. Clustered network approach brings about minimum energy consumption. Simulation results show that our scheme will enhance throughput and reduce end-to-end delay in a network.**

***Index terms*- Throughput, End-to-end delay, Cluster, Network.**

I. INTRODUCTION

Wireless network play an important role in the society. Spectrum resource and regulation of radio transmission are coordinated by government agencies. Spectrums are allocated to authorized users known as primary user to exploit. However, a huge part of the allocated spectrum is not being used. By exploitation cognitive radio technology, licensed band can be used by the secondary user without affecting the primary networks. There are 2 main challenges in cognitive radio networks:

• Spectrum sensing and analysis;

• Dynamic spectrum access.

Four sensing techniques are explained that may be applied to cognitive radio networks. The four sensing techniques are: feature detection, energy detection, matched filter, and interference temperature techniques. Feature detection is used when primary user's transmission features are known earlier. However, it's too difficult to be applied to wireless sensor networks (WSNs). The energy detection technique needs hardware, however an extended sensing time that causes inefficient energy dissipation. The matched filter technique facilitates fast and accurate sensing; but, it needs previous information about primary users and synchronization with them is difficult to achieve in environments. The interference temperature technique permits a node to estimate the interference causes at the primary user. After sensing channels, the sensed data are shared by the nodes in the network to support estimation characterization and also the channel selection method.

The reasons for applying cognitive radio into wireless sensor networks are as follows.

1) The ISM band becomes too crowded. Various types of wireless technologies share the Industrial, Scientific, and Medical (ISM) band: IEEE 802.11 WLANs, Bluetooth/IEEE 802.15.1, or IEEE 802.15.4.

2) The unused duration from primary users are used by the sensor node because it does not generate data continuously.

3) Energy efficiency and efficient communication can be achieved by the sensor nodes when cognitive radio sensor nodes operate on lower frequency bands.

II. PROPOSED CONCEPT

High level energy detection and Dijkstra's algorithm are proposed. Dijkstra's algorithm finds the shortest paths from a single source to all other nodes of a weighted digraph with positive weights. High level energy detection has high sensing and sharing option. Beacon technique is used for connection establishment. Cognitive network require sensing and

communication to ensure licensed channel. In energy detection technique a hierarchical structure is used. Cluster Head (CH) is responsible for sensing and allocating the channel to another node. CH can estimate the status of the channel, this leads to energy consumption.

In hierarchical structure the network is divided into different regions and a router for a particular region knows only about its own domain and other routers. However, the interfaces need to store information about: All nodes in its region which are at one level below it, its peer interfaces, at least one interface at a level above it, for outgoing packages. Networks can be organized in hierarchies of many levels.

Cluster groups two or more element together that behave likes a single element and is used for parallel processing, load balancing and fault tolerance. Clustering is one of the important methods for prolonging the network lifetime in wireless sensor networks (WSNs). It involves grouping of sensor nodes into clusters and electing cluster heads (CHs) for all the clusters.

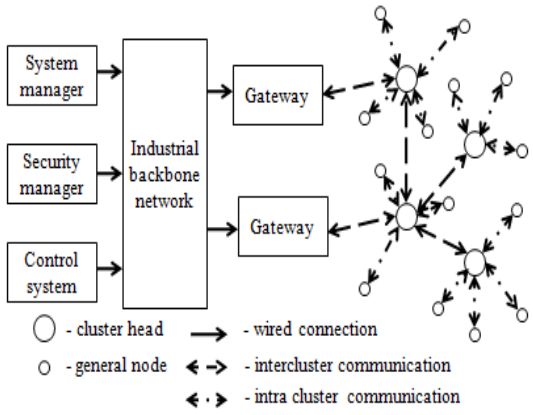

Fig.1 Cluster communication

CHs collect the data from respective cluster's nodes and forward the aggregated data to base station. A major challenge in WSNs is to select appropriate cluster heads. In this paper, we present a fuzzy decision-making approach for the selection of cluster heads. Fuzzy multiple attribute decision-making (MADM) approach is used to select CHs using three criteria including residual energy, number of neighbors, and the distance from the base station of the nodes. Every cluster is managed by a fixed CH equipped with an external energy resource, whereas different nodes, referred to as general nodes (GNs), have energy constraints.

BEACON FRAME:

Beacon frame is one of the management frames in IEEE 802.11 based WLANs. It contains all the information about the network. Beacon frames are transmitted periodically to announce the presence of a wireless LAN. Frames are transmitted by the Access Point (AP) in an infrastructure BSS. Beacon technique is used for connection establishment.

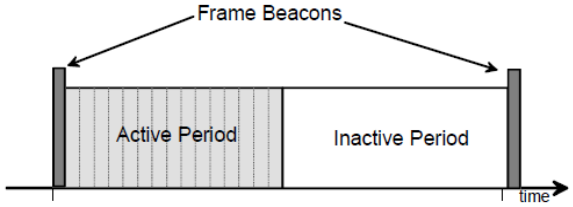

Fig.2 Beacon frame structure

The superframe format is defined by the network coordinator. The beacons are used to synchronize the attached devices.

III. SYSTEM MODEL

DATA EXCHANGING AND CONTROL INFORMATION:

The system mangers of networks will manage, configure, and coordinate the networks through management channels. The fixed networks are considered, planning for exchanging management information between system managers and CHs similarly as adjacent CHs. The system managers will manage a sensing element node within the management channels.

MECHANISM OF CHANNEL HOPPING: A channel-hopping mechanism is employed to avoid collisions on specific channels. There are 3 types of channel-hopping: slotted channel hopping, slow channel hopping, and a hybrid operation. Within the slotted channel-hopping method, every timeslot uses a unique channel to communicate. The slow channel-hopping method teams variety of timeslots using identical channel. Usually, the amount of slow hopping is approximately 100-400ms. The length of a superframe varies from device to device.

IV. RESULT AND DISCUSSION

A network setup of nodes is created. There is one base station node, one channel media node and one destination node.

While data transferred from source node to destination node the drop occurred and data drop is recovered from the point of drop and retransmitted. The packet loss and delay are reduced.

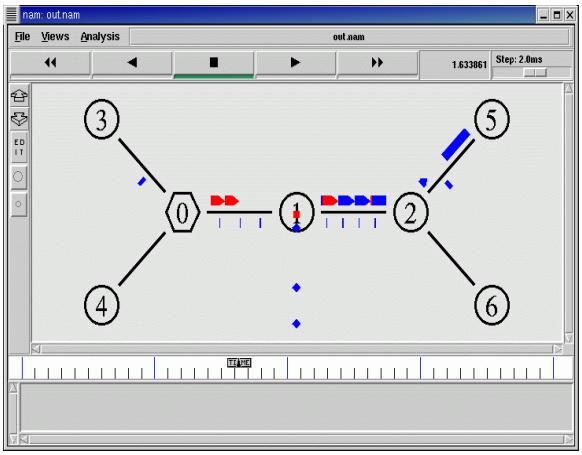

Fig.3 Data drop while data transfer

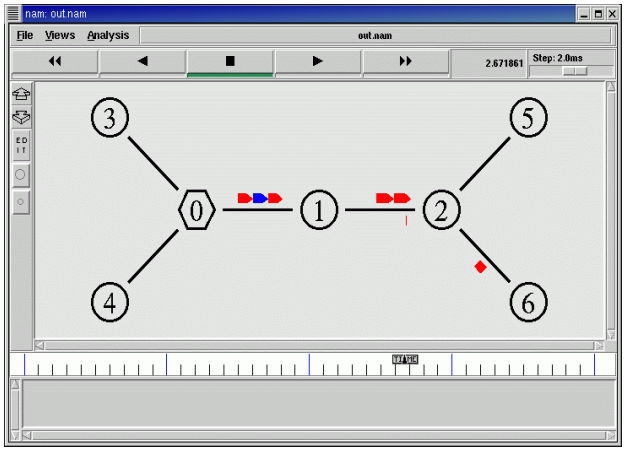

Fig.4 Data transferred to the destination node

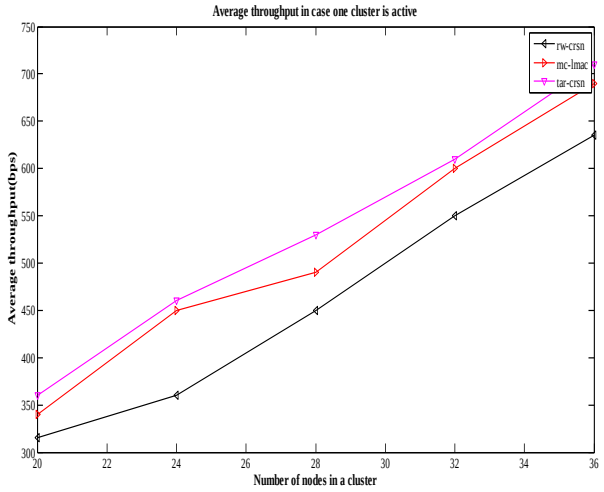

Fig.5 Average throughput in case of one cluster is active

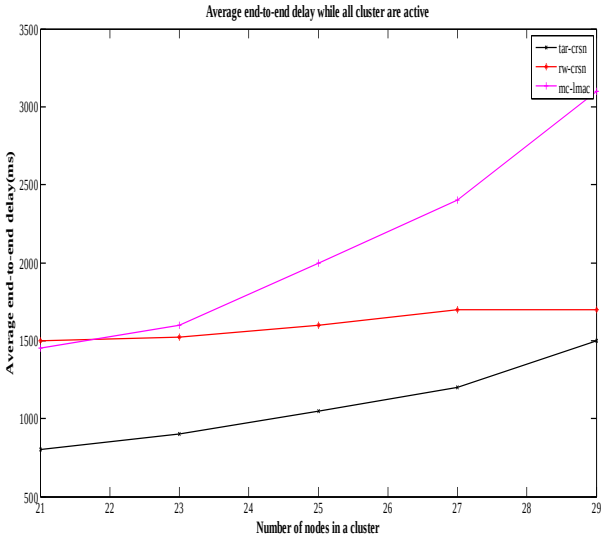

Fig.6 Average end-to-end delay while all cluster are active

V.CONCLUSION

Routing algorithm to enhance throughput and end-to-end delay in network is proposed. On the basis of the stochastic characteristics of primary channels, the proposed algorithm can select the optimal path to forward packets to sinks. Beacon techniques establish the node connection and reduce power consumption. Moreover, the proposed scheme does not require synchronization between the sinks and every node in the network, which is practically difficult to achieve in a large-scale network, where the data are transferred from one cluster to another cluster without delay. Lost data will be retrieved from the node where it has been lost.

As a future work, it is planned to enhance the energy efficiency. The fixed packet size is used instead of adaptive packet size due to synchronization between nodes. However, our optimization strategy can be used for adaptive packet size. Hence, the effect of adaptive packet size to energy efficiency can be evaluated.

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