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An Improved Energy Efficient Clustering Algorithm for Non Availability of Spectrum in Cognitive Radio Users

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ABSTRACT
The main function of Cognitive Radio Technology is to enable the Spectrum Utilization and detect the unused spectrum and sharing it without harmful interference to licensed users. Energy Consumption is a primary concern in the Wireless device Networks. The cognitive radio main function is to provide the channel to the user to enable the spectrum resources. The proposed solution is distributed Efficient Multi-Hop Clustering routing protocol which can consider not only for static mobile nodes but also in the Mobile Environment and used to reduce the packet loss during the cluster communication. The main function is to select the cluster head according to the energy level, Connectivity and Stability and transfer the information from the source to the destination. The nodes in the clusters should be advertised the cluster head to other nodes. It improves the Connectivity between the Cluster head and provides the active communication. The DEMC protocol function is to change according to the topology networks and the information stored in the radio networks. It mainly increase the chance of generating the communication link that leads to finds more reliable communication path for Data Transmission.

Keywords
Cognitive radio Technology, Distributed Multi Hop Clustering Protocol, Wireless Sensor Networks, Multiple channel sequence generation algorithm, Handoff Information.

1. INTRODUCTION

A mobile ad-hoc network (MANET) is a kind of wireless ad-hoc network and the main function of Ad hoc networks is to less dependence of the infrastructure and increase in speed and the ease of deployment. The associated hosts are connected by wireless links and the mobility of the node should help to cause the route changes in the network form an arbitrary topology [1]. It is a self-organizing and adaptive to any environments. The routers are free to move corresponding to the mobile nodes and organize themselves arbitrarily; thus, the network's wireless topology may change rapidly and updated according to the link breakages. These Kind of Networks may function in a Standalone fashion. The traffic

characteristics should be differs in different ad hoc networks corresponding to the bit rate, timeliness and reliability requirements. The proposed protocol is a source driven sensor network application. More number of users may be connected in these networks without any security. It may be connected to a large Internet. MANET main function in wireless sensor networks is to transfer the signal [2]. 802.11/Wi-Fi is used in the wireless networking became widespread in the mid to late 1990s [1]. Ad-hoc networks which function is to communicate with many number of users and provides less security. There is a temporary base station and the nodes formed as a topology. Analogous to traditional cellular networks, the partitioning in Ad Hoc networks, known as clustering, is used to solve the inefficient use of power and bandwidth for every node to communicate directly. Each cluster elects one cluster head, the upper layer node, to manage the cluster and coordinate with other clusters [3]. Link failures due to node mobility pose serious issues in routing of ad hoc networks [12].

Rapidly changing topology and frequent path failures make sensor network more challenging. Path breakage results in large packet delay and packet loss, hence more energy consumption. Mobile Ad Hoc routing protocols like Ad hoc On-Demand Distance Vector (AODV) Routing [14] and On Demand Multi path Distance Vector Routing (AOMDV) in Ad Hoc Networks [16] work well in conventional networks but perform poorly in sensor networks because of constrained resources. Secondly, frequent path failures drive recovery mechanism are energy consuming because the user not want to choose the new path. Some routing protocols assume that each sensor node can directly send data to base station [7, 10, 15], which is not a realistic assumption because it is restricted by limited energy, regulatory authorities, and scalability issues. Therefore, multi hop communication paradigm is used. But multi-hop strategy result in frequent path breakage in mobile environments. As a result packet delay and packet loss are larger as compared to static networks. Hierarchical routing has been widely investigated for ad hoc networks [2, 7, 13] due to their energy efficiency and scalability.

The essential operation in hierarchical routing is to select a set of cluster heads from a set of nodes in the network, and then group the remaining nodes with these cluster heads. Sensor field is divided into regions called clusters and each Cluster should have Cluster Head**.** The protocol constructs the clusters where every node in the network is no more than 1 hop away from the cluster head. The cluster head should be selected from the n number of the sensor nodes. The main aim of the proposed protocol is to forming the non-overlapping clusters. The boundary nodes should be act as the gateway of the inter-cluster heads [4]. The DEMC protocol which helps to organize the cluster Head and the sensor nodes that belongs to it. The bandwidth should be reused and the security should be enhanced in the network by using the clustering approach.

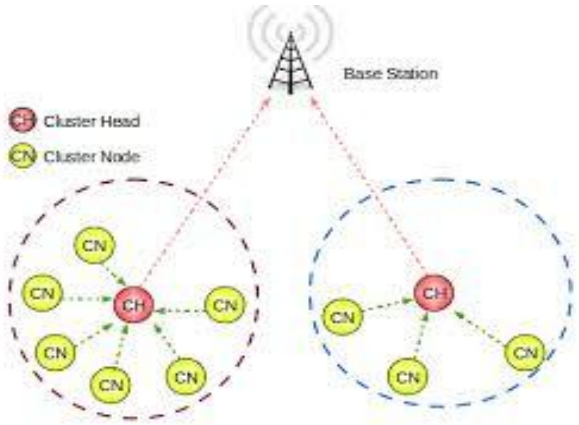

Fig 1 Establishment of Communication range between Cluster nodes and Base station

2. RELATED WORK

A wireless sensor network consists of a large number of sensor nodes and a Base Station (BS) and is used to monitor certain physical phenomenon. The BS typically acts as a gateway to other networks and is comparatively resourceful [3]. While small size sensor nodes are limited in power, processing, and memory [4]. Mobile Ad Hoc routing protocols like Ad hoc On-Demand Distance Vector (AODV) Routing [8], Location Aided Routing (LAR) [6], in Ad Hoc Networks (AOMDV) does not work well in wireless sensor networks because of limited resources [6].

Many types of algorithm are used for the Clustering process. In wireless Ad hoc Networks clustering can be differentiated into two types they are may be either Deterministic or Randomized. Deterministic process can be used when the nodes are selected by their weights and the result which leads to the cluster head. The weight can be calculated by the number of neighbouring sensor nodes, mobility rate, node Id [5]. In the process of randomized clustering approach algorithm the nodes elects themselves randomly their cluster heads. The probability of the node can be defined the secondary parameter. The probability functions can used to control the number of nodes in the cluster and the cluster nodes.

3. PROBLEM STATEMENT

The Distributed Multi-Hop Clustering protocol is proposed the multiple channel sequence generation algorithm which is used to increase the network lifetime. The function of the algorithm is to detect the available channel of the device and regularly check the interference in the group of the nodes. If any interference detected it should alternate the channel. It can also avoid the frequent election of the Cluster Head to improve the performance of sensor network. The cluster head

backup should be implemented in the proposed protocol. It is used when the nodes finished the communication within their own cluster the cluster head transmit the data to the specific base station [9]. Then the packet or data loss should be avoided. It follow the time driven scenario which should be helps the sensor nodes periodically sends a data to the Base Station. Each and every node follows the Residual Energy Index [REI] and Node Degree Index [NDI]. The REI used to calculate whether the energy should be sufficient to communicate with the many number of users. It should actively monitor the energy levels in the mobile nodes. It also used to avoid the collision which should lead to drop the system level low. The clustering nodes are indicated by the labels. The cluster head identifies by means of the labels should be given in the sensor nodes. The labels are indicated by the μ (log n). It also maintains the routing address. The routing tables generated by the nodes enable point to point routing. The DEMC protocol is responsible for maintaining the labels in the routing table. The routing table in the routing entry should be generated by the cluster nodes. The routing entry should be refreshed periodically according to the transfer of the packets to the destination.

The information should be maintained by the available channel in the required time slot. The n number of users involved in the message passing. Suppose the two user k1 and k2 should meet in the same time slot and exchange the information which should be defined as t. And the information should not be known to the third user k3 [1]. When the k2 and k3 meets and the information about the two users should be exchanged in t+1 time slot. It should merge the information about the three users.

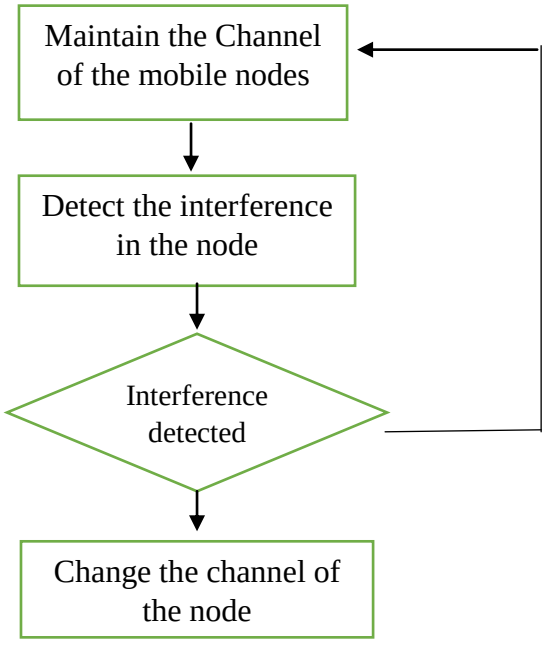

Fig 2. Flow chart of the multiple channel sequence generation algorithm

4. MODULES

4.1 Channel Formation

In a network node is mainly designed to maximize the efficiency and throughput of the communication. The node should be act as a connection point or a redistribution point or the end point for the Data Transmission. It is used to maintain the information of the signal strength, direction and information of the neighbour node, direction ID, resources, location etc. In a network the function of the node is to group as a network and formed as a cluster. The cluster of nodes should be elects the cluster head and the cluster head maintains the information about the nodes in the topology.

4.2 Cluster Head Election

The route should be maintained and the proper communication between the neighbour nodes and the cluster head should be maintained periodically. The probability of the node should be selected as the cluster head which the nodes are uniformly distributed over the network. The Cluster Head is also a type of the sensor node for organizing the other sensor nodes. The boundary node that belongs to two clusters and should be act as a gateway between these sensor nodes. It helps to provide the route and provide the way to communicate between clustering nodes ant the process is known as inter cluster Communication. These boundary sensor nodes help the cluster head when it does not work and does not have long range capabilities. The overlapped Clusters which used to boost the network robustness and used in the recovery process. The cluster head which should be possess equal number of clusters nodes and it helps to provide the balanced data processing and aggregation. The storage load should be mainly reduced according to the size of the clusters. The cluster head advertise itself as the cluster head to the other sensor nodes and the sensor nodes which once receives the advertisement which joins the clusters. If it had already received the advertisement message from other cluster it also considers the advertisement and decides according to the communication range.

4.3 Inter and Intra Cluster Communication

The Inter cluster communication which may possess the End-to-End Reliability, Message fragmentation and Multi point connection. The sender gateway which helps to receives the message from the sender when the sender is acknowledged. Thus the sender assumed that the packet reached the destination. The sequence number indicates the temporal ordering of the message and the acknowledgements. The proposed protocol can split the large message into the smaller one by using the message transfer unit. Large message are fragmented by means of the smaller one and transfer to the packet header.

FLOW DIAGRAM

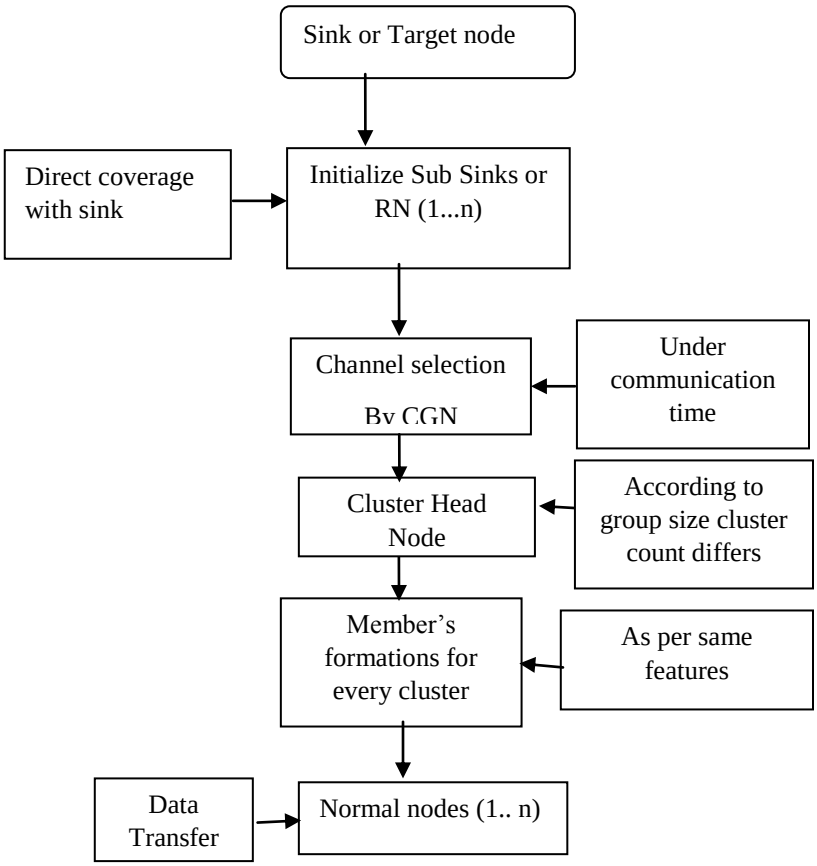

Fig 3. Overall process of Sending packets to Destination

The receiver has the protocol stack which is responsible for the reassembling of these fragments before passing the information to the next clusters. Therefore there is any packet loss should be occurs it should immediately transfer the message and the packet which is retransmitted again from the sender. The DEMC protocol maintains the routing table periodically. The Protocol stores the possible routes from source to destination pairs and maintains the point-to-point routing information for the medium sized clusters. It can also address all nodes at least once to save the sensor nodes energy. It should also communicate in the critical path and under complicated issues. A node need to communicate more than one remote node it should use the different gateway for all the data flows.

4.4 Destination Throughput

On receiving the message the behaviour of the node depend on the other cluster node. In the clustering process the current cluster head losses the energy and force to resign and the highest node which could possess more energy and weight

will become the cluster head. Therefore the new link should be established. The nodes with same levels of energy should be considered as the neighbour. It should calculate the number of the level message and the transmission range. The destination throughput should be generated according to the traffic patterns.

5. RESULT

The network lifetime should be evaluated by the mobile nodes. The proposed protocol is performed over the different topologies should be represent the network sizes and the random placing of the sensor nodes. The topology follows the uniform distribution to avoid unnecessary travelling time. The proposed protocol avoids the Unnecessary travelling time by minimizing the transmission range between the nodes. It should be find the multiple routes should be finds out by the mobile nodes in mobile collector and travel along the path with less hop transmission. The average node degree should be calculated. The Cluster Head probability (P) should be varied from 0.01 to 0.10. The Communication Overhead should be increased by varying the range and for all the topology changes the constant energy should be maintained by the sensor nodes. The DEMC protocol mainly avoids the overlapping of the clusters and maximum provides the equal sized clusters and constant energy to the mobile nodes. The node death rate should be very low. Therefore the overall throughput should be increased and avoid the transmission of the redundant information. The performance and the bandwidth should high by using the multiple channels sequence algorithm.

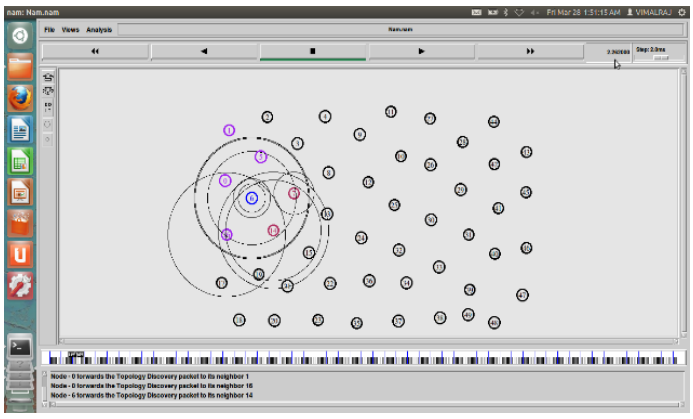

Fig 4 Establishment of connection between the neighbouring nodes

From fig (4) The Location of the mobile nodes should be changed periodically. Neighbour nodes should be discovered by detect the mobile nodes in a communication range. The information of the node should be updated regularly to find the channel availability. The multiple numbers of nodes should find the destination for the transfer of message [5]. So it should lead to avoid the packet

loss. The location information also changed according to the behaviour of the mobile nodes.

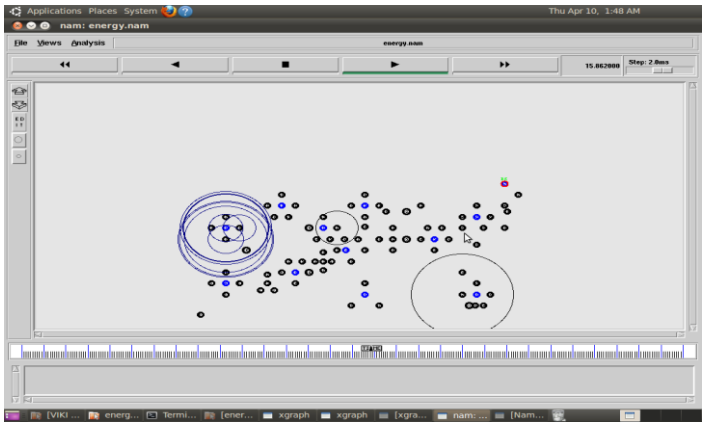

Fig 5 Process of Cluster Head Election

The probability of the node P should elect the cluster head and the node which should have the limited energy provides the communication to other node. The proposed protocol should select the cluster head according to the area and size of the network which should be measured by node degree index value. It results in the lower delay and provides higher bandwidth in the network. In fig (5) from this model result, we have a tendency to improved energy state and that we reduced the energy consumption and the time delay should be reduced.

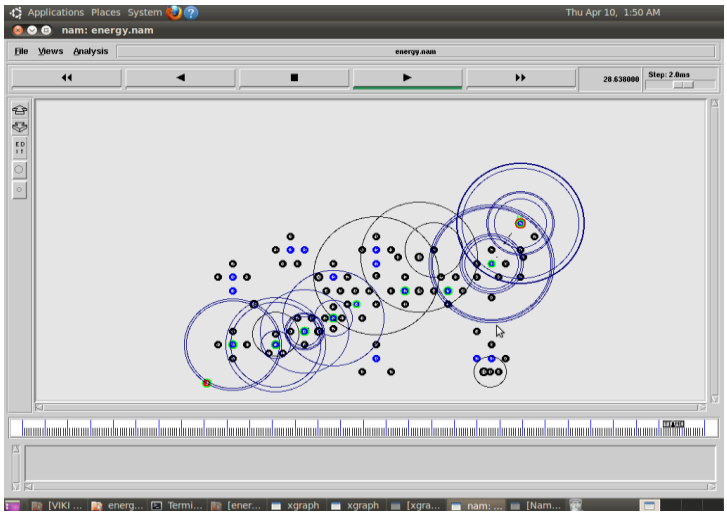

Fig 6 Efficient Routing formed by DEMC protocol

From fig (6) Nam window result we are able to see the method of our planned model (data transmission, mobile collector movement). The efficient routing formed by selecting the multiple channel at different time slots which should

used by different users. Many message passing protocols should not provide the sequence guarantee message to the different users. The proposed protocol used the multiple channel sequence generation algorithm to provide the periodic messages to the available channels.

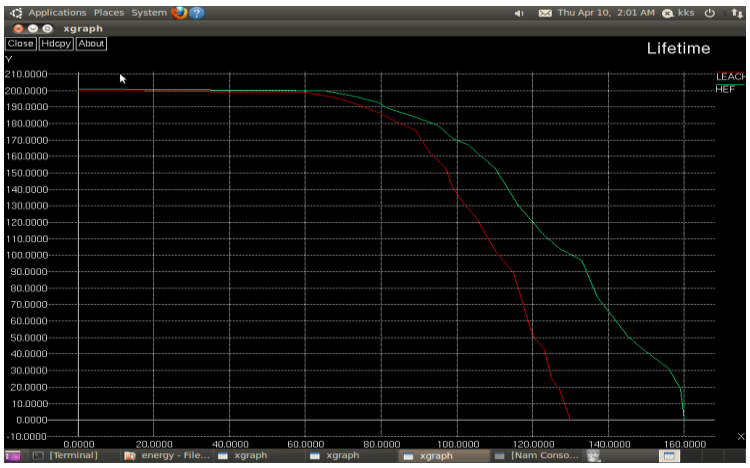

Fig 7 Lifetime of the message passing process

Therefore the sensor network should maintain the routing table and information about the intermediate nodes. From fig (7) the multiple number of RREQ message generated for the same channel should be discarded. The RREP message which sends back to the source node and the same path should be followed by the proposed protocol.

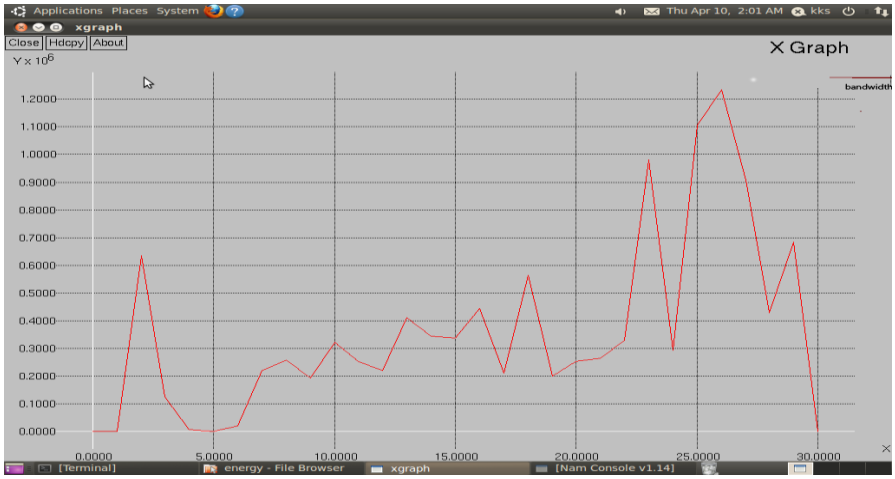

Fig 8 Bandwidth by the Proposed Protocol

The X graph (Fig 8) shows the bandwidth in the proposed system. The Y coordinate should represent the energy levels measured in joules and the X

Coordinate represents the distance of the packet reaches the destination. The lifetime of the packet should be increased should be shown in Fig 7.

6. CONCLUSION

In this paper, we have a tendency to study of mobile information about the different users used the same channel and the merging of the information in the same time slots. The proposed algorithm makes it possible that multiple neighbouring users able to switch to the same channel [1]. The implementation of multiple channel sequence generation algorithm gives tremendous result when compared to the multiple switching algorithms. The Lifetime of the packet information and bandwidth get increased and also provides the active communication for longer time. The Auto Reconfiguration and Implementation of the Central Coordinator should be taken for the future analysis of the problem. The Central coordinator used to coordinate the intermediate nodes. If any intermediate node fails it should check the configuration of the nodes and correct the nodes and provides the way to the packet send to the destination without any loss and average end to end delay should be reduced.

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