Address Allocation Algorithm with Cooperative Communication in MANET

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Abstract- *Wireless sensor network (WSN) has devices with radio transceivers that cooperate to form and continue a fully connected network of sensor nodes. In existing systems, topology control algorithms allow each node in a wireless multi-hop network to adjust the power. It generates the transmission and decides neighbors where it communicates while preserving goals like connectivity or coverage. When a node drains its inadequate energy, it does not reach neighboring nodes resulting in a disjointed network and stopping important communications. With the limited energy, the node does not able to continue the environmental monitoring performance that is important to the efficient operation of the system. In proposed system, MANETs controlled the provision of pre-registered or approved nodes and it has the opportunity for pre-deployed exchange of security parameters like public keys, session keys. Each node in a MANET moves in any direction and changes its links frequently. A low-overhead identity based distributed dynamic address configuration scheme for secure allocation of IP addresses is used to allow the nodes of a managed mobile ad hoc network. MANET reduces the power usage for each packet transmission and mobile node movement. MANET also improves the security of transmission in mobile networks. Finally, this process conduct the performance metrics are: network overhead, delay time and security level.*

Keywords- MANET, low-overhead identity, Wireless Sensor Network (WSN), Topology Control algorithm, IP Address.

I. INTRODUCTION

Wireless sensor network (WSN) has devices with radio transceivers that cooperate to form and continue a fully connected network of sensor nodes.A wireless sensor network (WSN) comprises spatially distributed autonomous sensors to examine physical or environmental conditions to pass data through the network to main location.

The growth of wireless sensor networks was encouraged by military applications. Wireless Sensor Networks (WSNs) is a class of wireless ad hoc networks where sensor nodes gather, process and communicate data attained from the physical environment to Base-Station (BS).

II. LITERATURE SURVEY

In [1], a distributed algorithm is presented for creating minimum weight directed spanning trees with root node in connected directed graph. A processor presents at each node. With weights and origins of edges incoming to nodes, the processors follow the algorithm and exchange messages with their neighbors until all arborescence are built.

Neighbor discovery protocols (NDPs) survey is made in [2]. Generally, protocol is divided using four principles. They are: randomness, over half Occupation, rotation resistant intersection, and co prime cycles. The birthday protocols functions as Agents of NDPs by change where the node listen NDP used to find the future information.

Cone Based Distributed topology control (CBTC) algorithm is designed in [3]. The algorithm fails to consider the nodes with GPS information and it depends on directional information. Roughly speaking is important design of the algorithm where the node sends with minimum power to guarantee in all cone of quantity around.

R3E increases the packet delivery ratio when preserving the high energy efficiency and low delivery latency. In [4], two localized topology control algorithms are designed for heterogeneous networks. They are: Directed Relative Neighborhood Graph (DRNG) and Directed Local Spanning Sub graph. Each node builds its neighbor set by changing the transmission power and describes the network topology with local information.

A protocol optimized in [5] for less energy usage in mobile wireless networks which support peer-to-peer communications. An easy local optimization scheme is used at all nodes to guarantee link of network and attains the global less energy solution for stationary networks. In [6], distributed channel access protocol joins the channel reservation and the iterative/global transmission power control techniques in ad hoc networks. The designed protocol solves the convergence problem of global power control in ad hoc networks. The designed access criteria use the local admission control

depending on the adequate criteria for admissibility and global power control for balancing the SIR of the links. In [7], a minimum spanning tree (MST)-based algorithm termed as local minimum spanning tree (LMST) is designed for topology control in wireless multi hop networks. In algorithm, each node creates LMST separately and preserves on-tree nodes that are one-hop away in final topology.

2.1 Related Works

In [8] to develop the benefits of user cooperation in cooperative WANETs, distributed energy-efficient selective diversity (EESD) topology control is planned to enhance the energy efficiency. It equally considers the network capacity and energy consumption using bits per Joule. EESD creates the transmission coalitions via cooperative manner selection by considering the cost of channel information exchange. Game theory is briefed in [9] to solve the power control issue in a CDMA-based distributed sensor network. A non-cooperative game with incomplete information is designed by Nash equilibrium. With this equilibrium, a distributed algorithm is planned for optimal power control and verified the system is power stable when the nodes observe with the transmit power thresholds.

The energy efficiency problem is addressed and designed a comprehensive study of topology control techniques in [10] for increasing the lifetime of battery powered WSNs. Initially, a topology control algorithms are designed to present insights into how energy efficiency is attained using the design. In addition, algorithms are derived from the energy preservation approach that implemented and computed using the trade-offs they provide to help the designers in choosing a method that suits the applications.

III. ADDRESS ALLOCATION ALGORITHM IN MANET

Nodes are within the each other's radio range that communicate where the nodes are not in each other's radio range communicate via intermediate nodes where the packets are transmitted from source to destination. Number of nodes is increased in the network and the time taken to attain an IP address, number of packet replaces in less address allocation. The existing node in the network creates distinctive IP addresses from its own IP address for new authorized nodes. Mobile ad hoc networks are divided into stateless allocation and state full allocation methods. It is evident in many existing dynamic address allocation methods for MANET based on DAD.

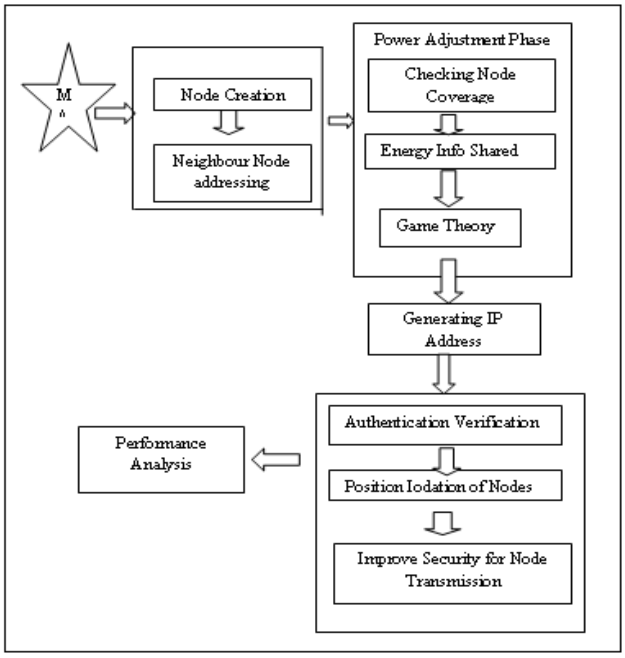

Figure 1 Architecture Diagram

From figure 1, in initialization phase creates the node and address the neighbor node. From the initialization phase, it is send to the power adjustment phase. In power adjustment phase, it checks for the network coverage. The energy is shared through the node using the game theory. Then, it sends for generating IP address. After generating the address, communication takes place through mobile. In mobile communication, authentication verification takes place. After authentication, nodes update the position and increase the security of the node transmission. After that, the performance is analysed.

3.1 MODULES

1. Nodes deployed and create source and destination nodes
2. Node searching neighbor node for cooperative communication
3. Game theory for minimize the energy consumption
4. Generate IP address for each mobile node in network
5. Updated position of mobile nodes provide secured communication
6. Performance Analysis

3.1.1 Nodes Deployed and Create Source and Destination Nodes

The nodes are deployed in the network with the help of NS2. It also creates the source and destination node with higher efficient.

3.1.2 Node Searching Neighbor Node for Cooperative Communication

Based on the location of a node with respect to others, some nodes end up with a larger communication radius. By taking that all nodes initiates with the same energy supply and make transmissions at the same rate. Node A has the largest energy cost and the shortest lifetime. For the cooperative communication, Cooperative topology control algorithm is designed. Initially, it is separated into two types. They are: topology construction and topology maintenance. Topology construction is the charge of initial reduction and the topology maintenance is the charge of maintenance of the reduced topology where the features such as connectivity and coverage are protected. The initial topology is employed when the location of nodes is chance where the administrator without the control over the design of the network.

Simultaneously, the topology is reduced and the network starts allocation in the selected nodes by spending the energy. Topology control is executed in following steps to protect the desired properties like connectivity, coverage, density.

Step 1: Change the transmission range of the nodes
Step 2: Turn off nodes from the network
Step 3: Create a communication backbone
Step 4: Clustering
Step 5: Add new nodes to the network to preserve connectivity (Federated Wireless sensor networks)

3.1.3 Game Theory for Minimize the Energy Consumption

Each node updates its transmission power periodically, the algorithm functions in rounds. At staring of each round, each node broadcasts its remaining energy. If it not broadcasted before, it is denoted by the EnergyInfoShared Flag. Game theory is an ordinal potential game looking for the optimal global potential function yield Nash equilibrium.

3.1.4 Generate IP Address for Each Mobile Node in Network

The network initiates from a single node and develops as more nodes by adding one by one. These nodes are free to move around and it joins or leaves the network at any point of time. A node has to inform its parent before departing the network. In case of graceless departure, a node moves away from the network inadvertently or even deliberately. As IPv6 provides a large address space, it is also not that necessary for an address to be reused.

3.1.5 Updated Position of Mobile Nodes Provide Secured Communication

When authentication is successful, the parent node modernizes and transmits OK message to the children. On getting the OK message, the child node confirms the authentication of parent. If authentication is successful, it sends CONFIRM message and then switches-off. On receiving CONFIRM message, the parent node verifies the authentication of the said children.

IV. PERFORMANCE ANALYSIS

The performance quality is analysed for cooperative communication using the cooperative topology control algorithm. The metrics of parameters is given below:

- Network overhead.
- Security
- Delay time.

4.1 Number of nodes vs. Network overhead

Network overhead is the metadata and network routing information sent by an application that uses a portion of the available bandwidth of a communications protocol. The additional data creating the protocol headers and application-specific information is denoted as overhead. Network overhead is the ratio of non-application bytes divided to the total number of bytes in the message. Network overhead is measured in terms of percentage (%).

$$Network\ overhead\ (\%) = \frac{Non-application\ bytes\ in\ messages}{Total\ number\ of\ bytes\ in\ messages}$$

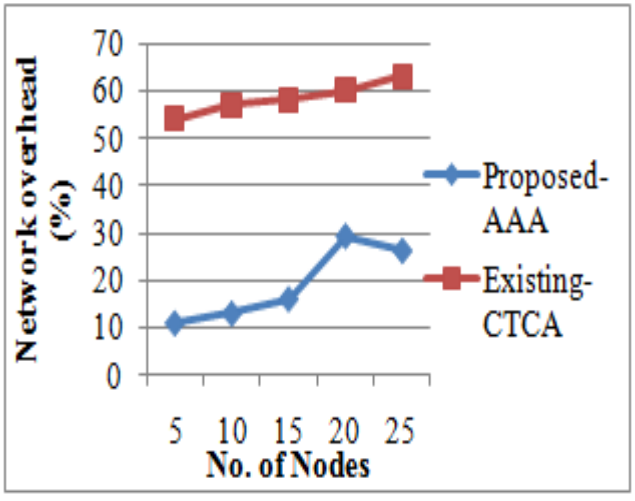

Figure 4.1 Number of nodes vs. Network overhead

Figure 4.1 demonstrates the network overhead of cooperative communication and dynamic address allocation algorithm. X axis represents the no. of nodes whereas Y axis denotes network overhead of the cooperative topology control and dynamic address allocation algorithm. When the no. of nodes is increased, the performance of network overhead gets automatically increases accordingly.

4.2 Number of nodes vs. Security

Network security involves the approval of access to data in a network that are controlled by the network administrator. Network security includes the large number of computer networks both public and private information in businesses, government agencies and individuals. It secures the network and also protects the operations carried out. Network security comprises the policies implemented to avoid and examine authorized access, misuse, alteration or denial of a computer network and network-accessible resources. The simple way of protecting a network resource is by assigning a unique name and a password. It is also measured in terms of percentage (%).

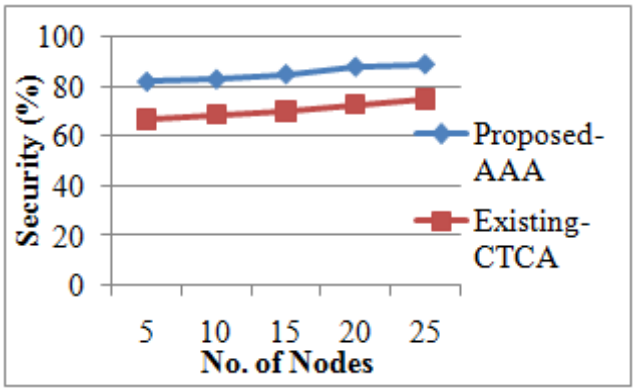

Figure 4.2 Number of nodes vs. Security

Figure 4.2 illustrates the security of cooperative communication and dynamic address allocation algorithm. X axis represents the no. of nodes whereas Y axis denotes security of the cooperative topology control and dynamic address allocation algorithm. When the no. of nodes is increased, the performance of network security gets automatically increases accordingly. In the proposed algorithm, the network security is high.

4.3 Number of nodes vs. Delay time

Delay time is an essential design and performance feature of the processed computer network or telecommunications network. The delay of a network denotes the time required for a bit of data to travel across the network from one node or end point to another. It is measured in terms of milliseconds (ms). Delay changes based on the location of the exact pair of communicating nodes. Processing delay is defined as time taken by the routers to process the packet header. Queuing delay is defined as time taken by the packet for routing queues. Transmission delay is defined as time taken to push the packet's bits onto the link. Propagation delay is defined as time taken for a signal to reach its destination.

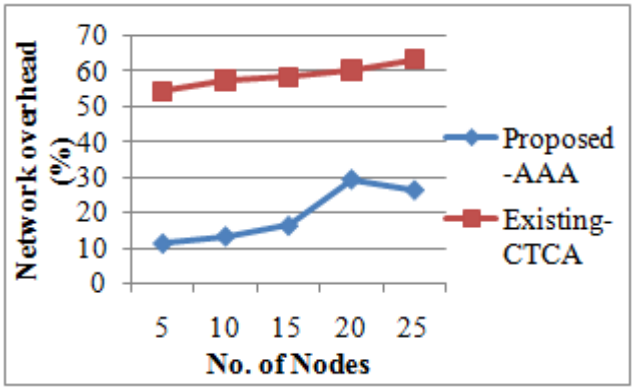

Figure 4.3Number of nodes vs. Delay Time

Figure 4.3 demonstrates the delay time of cooperative communication and dynamic address allocation algorithm. X axis represents the no. of nodes whereas Y axis denotes delay time of the cooperative topology control and dynamic address allocation algorithm. When the no. of nodes is increased, the performance of delay time gets automatically increases accordingly. For an effective cooperative communication, the delay time should be as low as possible.

V. CONCLUSION

Cooperative communication provides the communication directly or indirectly using neighbor nodes, the Neighbor searching technique is used for neighbor selection. Quality of topology by CTCA algorithm to optimal solution attained with centralized algorithm. A distributed algorithm called Cooperative Topology Control with Adaptation (CTCA) executes more information or options presented at each node. The Cooperative Topology Control with Adaptation (CTCA) algorithm executes better than other distributed algorithms. Game theory is implemented to minimize the energy consumption.

5.1 FUTURE ENHANCEMENT

Planned to improve the security and reduce the Network overhead, delay time in MANET, it updates the position and provide efficient communication between nodes in the network depending on network coverage. Use secure address allocation algorithm for packet transmission to reduce the energy consumption of nodes.

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