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HYBRID MULTIHOP ROUTING IN WIRELESS NETWORK

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Abstract: This project is enhancement of many to one transmission with power aware routing protocol and efficient channel allocation. This work focuses on single sink based WSNs, in which a WSN is composed of a number of sensor nodes associated with a single sink node. The primary role of sensor nodes is to gather data of importance from its surroundings. In this work, we consider a WSN design that is practical, and low cost. We propose Advanced Hybrid Multi-hop routing (AHYMN) to mitigate the impact of sink node isolation. To our best knowledge, this is the first design that considers a hybrid multi-hop routing architecture1 given below. Although flat multi-hop routing algorithms enable routing of data in a fashion that minimizes the power consumption of the WSN, they fail to exploit the data aggregation opportunities by virtue of data collected from the WSN. In many WSN applications with the relatively high node density, the data collected by individual nodes are highly redundant, thus making data aggregation a very attractive scheme in WSNs. Hierarchical multi-hop routing algorithms aim to capitalize on the highly correlated nature of WSN's collected data. We describe the operation of the most notable example of hierarchical multi-hop routing algorithms, from that we can improve the routing efficiency and channel allocation in cluster networks. The cluster head selection is obtained based on energy level and routing efficiency of the network. We compare the various parameters like Cluster head size, energy, time, packet loss etc., with conventional methods.

Keywords- Hybrid Multi-hop routing (HYMN) ; Micro Electro-mechanical Systems (MEM); Cluster Head (CH); wireless sensor network (WSN) ;

I.INTRODUCTION

In the world of computers, Networking is the practice of linking two or more computing devices together for the purpose of sharing data. Networks are built with a mix of computer hardware and software. Networking includes communication with other users, centralization of software and account maintenance, and mobility of users. Whenever we have more than one computer being used at the same location, networking them together makes a lot of sense. Not only can we transfer files between them quickly and easily, but they can also share expensive resources like laser printers, hard disc arrays, backup tape drives, CD and DVD burners, scanners, internet connections and so on.

Sharing of files from source to the destination is often referred as "file sharing" in networking. The router is the primary component, which is used to transfer all such files. While transferring the files, these routers are compromised by the attackers and hence it becomes malicious in nature. Therefore there arrives a problem in the delivery of files, because of these malicious routers. So we aim in detecting the existence of compromised routers and isolate them from the routing fabric by using the mobile agents called as AntNets. The computers providing the service are called servers and the computers that request and use the service are called client computers. In a peer-to-peer network, various computers on the network can act both as clients and servers.

II. WIRELESS SENSOR NETWORK

A wireless sensor network **(WSN)** consists of spatially actually distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on.

The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source,

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usually a battery or an embedded form of energy harvesting. A sensor node might vary in size from that of a shoebox down to the size of a grain of dust, although functioning "motes" of genuine microscopic dimensions have yet to be created. The cost of sensor nodes is similarly variable, ranging from a few to hundreds of dollars, depending on the complexity of the individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding constraints on resources such as energy, memory, computational speed and communications bandwidth. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network. The propagation technique between the hops of the network can be routing or flooding.

Recent developments in digital circuitry, wireless communication, and Micro Electro-mechanical Systems (MEM), have made possible the integration of sensing, communication, and power supply into inch-scale sensor devices. Thus, the investigation for development of robust, easy deploying, micro sensor networks has attracted a great deal of attention. Wireless sensor networks are energy-limited and application-septic. These two characteristics pose new challenges in the network design. Inch-scale sensor devices are expected to operate over years with limited power supply.

Thus, the energy consumption becomes the foremost design consideration, while other constraints, such as throughput, latency, and fairness, become relatively less important. On the other hand, sensor networks are considered for a diverse range of civil and military applications, such as environmental Monitoring, home networking, medical vital signs monitoring and smart battlefield, among others. These requirements suggest that the classical Open System Interconnect (OSI) paradigm may not be suitable for sensor networks, but rather a methodology of cross layer communications network design may be more appropriate. The primary role of sensor nodes is to gather data of importance from its surroundings. in this work, we consider a WSN design that is practical, and low cost. We propose Hybrid Multi-hop routing (HYMN) to mitigate the impact of sink node isolation. To our best knowledge, this is the first design that considers a hybrid multi-hop routing architecture1 given below. Therefore, the energy efficiency of the wireless communication protocol largely affects the energy consumption and network lifetime of wireless sensor networks. Many researches concerning protocols for wireless sensor networks have been studied to improve the energy consumption and the network lifetime. Those protocols can be categorized into three classes: routing protocols, sleep-and awake scheduling protocols, and clustering protocols.

III. SYSTEM ANALYSIS

3.1 Existing System

In Earlier, the channel allocation is obtained both static and dynamic approaches wise in wireless networks. They consider only routing path and number of sensor nodes (AP) with routing distance. The optimal channel allocation is obtained by dynamic routing via only.

3.2 Propose system

Energy efficient channel allocation in WSN obtained in Implementing the Flat and Hybrid multihop routing in static & Dynamic CH analysis with efficient channel allocation. CH selection based on Energy level, from that we implement Advanced HYMN approaches to enhance the energy and QOS through routing channel allocation in WSN.

Advantage:

- Efficient routing in dynamic channel allocation with CH selection
- Less routing time
- Efficient QOS in network

Here, they proposed Hybrid Multi-hop routing (HYMN) algorithm, which is a hybrid of the two contemporary multi-hop routing algorithm architectures, namely, flat multihop routing that utilizes efficient transmission distances, and hierarchical multi-hop routing algorithms that capitalizes on data aggregation. We provide rigorous mathematical analysis for HYMN–optimize it and model its power consumption. In addition, through extensive simulations,

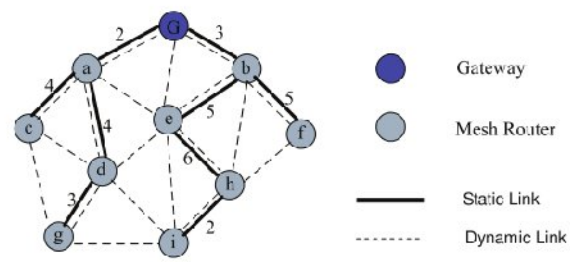

Fig. 1. The hybrid WMN architecture.

Wireless sensor networks are applied in many applications, such as office/home automation, robot control, and automatic manufacturing. It can be used in various outdoor places such as river, mountain, bridge, road, and even in harsh environments like the desert or battlefield. For example, wireless sensor networks can be used to detect a forest fire based on temperature information received from a large number of distributed sensor nodes.

The wireless sensor networks consist of hundreds or thousands of densely deployed sensor nodes that are used for sensing the target environment and transmitting data to the sink node. The sink node can be defined as a director,

And it is similar to the base station of mobile ad-hoc networks. Compared with mobile ad-hoc networks, the wireless sensor networks are considered less mobile, less hardware-capabilities, and more densely deployed on the target environment. Typically, a wireless sensor node is composed of low power CPU, tiny memory (RAM/ROM), R/F module, many kinds of sensing devices, and limited batteries. For instance, Berkeley's MICA motes only have 8-bit CPU, 4KB RAM, and only two AA alkaline batteries.

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The most energy-consuming component is the R/F module that provides wireless communications. The energy consumption when transmitting 1 bit of data on the wireless channel is similar to thousands of cycles of CPU instructions. Therefore, the energy efficiency of the wireless communication protocol largely affects the energy consumption and network lifetime of wireless sensor networks. Many researches concerning protocols for wireless sensor networks have been studied to improve the energy consumption and the network lifetime. Those protocols can be categorized into three classes: routing protocols, sleep-and awake scheduling protocols, and clustering protocols. The routing protocols determine the energy-efficient multi-hop paths from each node to the sink node. In sleep-and-awake scheduling protocols , every node in the schedule can sleep, in order to minimize energy consumption. In clustering protocols, data aggregation can be used for reducing energy consumption. Data aggregation, also known as data fusion, can combine multiple data packets received from different sensor nodes. It reduces the size of the data packet by eliminating the redundancy. Wireless communication cost is also decreased by the reduction in the data packets. Therefore, clustering protocols improve the energy consumption and the network lifetime of the wireless sensor networks. LEACH , PEGASIS , HEED , EEUC , and FLOC are representative clustering protocols of wireless sensor networks. However, the unsolved problem of considerable energy consumption on the cluster formation still exists. The cluster formation overhead of the clustering protocols includes packet transmission cost of the advertisement, announcement, joining, and scheduling messages from sensor nodes. Also, these protocols do not support adaptive multi-level clustering, in which the clustering level cannot be changed until the new configuration is made by the network director. Therefore, the existing protocols are not adaptable to the various node distributions or the various sensing area. If the sensing area is changed by dynamic circumstances of the networks, the fixed-level clustering protocols may operate inefficiently in terms of energy consumption.

Considerable research efforts have been made to minimize the energy consumption of the wireless sensor networks. Bandyopadhyay and Coyle proposed the randomized clustering algorithm to organize sensors into clusters in a wireless sensor network. Computation of the optimal probability of becoming a cluster head was presented. Moscibroda and Wattenhofer defined the maximum cluster-lifetime problem, and they proposed distributed, randomized algorithms that approximate the optimal solution to maximize the lifetime of dominating sets on wireless sensor networks. Pemmaraju and Pirwani considered the k-domatic partition problem, and they proposed three deterministic, distributed algorithms for finding large k-domatic partitions.

IV.ROUTING

The proposed approach in this paper says that we can improve the network lifetime and the throughput of the network by reducing the time, power, and energy value of the nodes. We implement the efficient channel allocation using efficient routing scheme in wireless networks like sensor, mesh etc., These things will be happening by interconnecting Flat multi-hop routing algorithms, Hierarchical multi-hop routing algorithms.

Flat multi-hop routing algorithms aim to select paths that minimize the total power consumption used for sending data to sink node. Each node is able to establish communication with sensor nodes that lie within its maximum transmission range, and the individual link utilization differs depending on which routing algorithm is applied. For example, the authors in have proposed algorithms aiming to minimize the total power consumption while routing data from individual sensor nodes to the sink node. According to, the following equations quantify link costs between each pair of nodes.

4.1 Hybrid Multi-hop Routing:

Although flat multi-hop routing algorithms enable routing of data in a fashion that minimizes the power consumption of the WSN, they fail to exploit the data aggregation opportunities by virtue of data collected from the WSN. In many WSN applications with the relatively high node density, the data collected by individual nodes are highly redundant, thus making data aggregation a very attractive scheme in WSNs. Hierarchical multi-hop routing algorithms aim to capitalize on the highly correlated nature of WSN's collected data. We describe the operation of the most notable example of hierarchical multi-hop routing algorithms, dubbed Low-Energy Adaptive Clustering Hierarchy (LEACH), for illustrative purposes. In LEACH, nodes are organized in a two-level hierarchy, where their roles differ according to which level they belong to. That is, a node can be a Cluster Head (CH) or a Cluster Member (CM), and these roles are changeable in a unit of time referred to as a round.

4.2 Advanced Hybrid Multi-hop Routing protocol:

This protocol is interconnecting the Flat multi-hop and hybrid multi-hop. Where in this approach the next next cluster head is search and found in the same range of height in the plane. In the flat multi-hop the source to destination the distance is fixed and the time is more. In the hybrid multi-hop finding the cluster head in zic-zac manner and the distance is unknown and time is also unknown. So when we combine both approaches the time, distance are known and the searching is happening in a certain height and certain range, so we are saving the energy and power consumption. Hence we are saving the life time of the network.

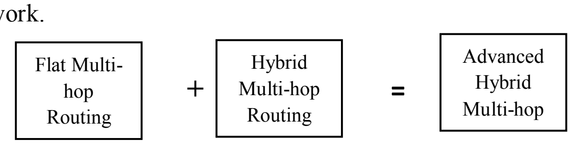

Fig 2: Block Diagram of Advanced Hybrid Multi-hop Routing protocol

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4.3 Flat multi-hop routing algorithms

Figer. 1 shows an example of how flat multi-hop routing is used to send data. In the figure, an arrow's thickness is proportional to the amount of data being sent over the corresponding link. Each sensor node has the ability to communicate over a bounded area with other sensor nodes. Link utilization differs greatly among different algorithms. For example, algorithms proposed in [2], [3] have been designed to minimize the total Power consumption of the network as the objective; in this kind of algorithms, the cost of using a communication channel is defined by the following equations 1,2,3. Here, linkcost(i,j) is defined as the amount of energy consumed for sending a unit of data from node *i* to *j*. *es*(*i*) is the energy consumed by node *i* while sending a unit of data to node *j*; this value is proportional to the square of *di,j* , which is the distance between nodes *i* and *j*. *er*(*j*) is the energy consumed by node *j* in receiving a unit of data. _1, _2, and _3 are constants dependent on the sensor node communication circuits. By using the route where the sum of all link costs is minimized, the WSN's total power consumption can be minimized. From a different perspective, these algorithms pose an inherent problem, i.e., certain nodes are over-burdened, and thus consume their energy in a rapid manner. An effective algorithm [4], which uniformly distributes power consumption over each node, aims to address this problem. The following equation is used to define the link cost.

$$linkcost(i,j) = e_s(i) + e_r(j) \quad (1)$$

$$e_s(i) = \epsilon_1 . d_{i,j}^2 + \epsilon_2 \quad (2)$$

$$e_r(j) = \epsilon_3 . \quad (3)$$

By using the residual power of the sending node, *Ei*, as the denominator of the link cost, the possibility of it being selected as a relay node decreases as its remaining energy decreases. Toh [4], set *n* to be 2. It is possible to uniformly distribute power consumption over individual nodes and at the same time to minimize overall power consumption. Besides the previously mentioned algorithm, others such as *zPmin* [5] and max–min T [6]–[9] have also been proposed

V. SIMULATION PARAMETERS:

In each simulation run, we generate a certain number of nodes and randomly place them on a square area. There is a link between two nodes if and only if their Euclidean distance is not greater than transmission range R. The source which initiates a flooding message is randomly picked from nodes in the network. Only one flooding occurs at any one time (except for the experiments on deliverability ratio). Three flooding schemes and the theoretical lower bound that are mentioned above are simulated and compared with our scheme under the same environment. We study how the ratio of forwarding nodes, the number of collisions, and the deliverability ratio are affected by four parameters: the number of nodes, transmission range, network size, and network load, respectively. The results presented in the following figures are the means of 100 separate runs. Any case where the network is not connected is discarded.

The AODV implemented have the features such as Storing Only the Needed Routes, Minimized Need for Broadcast, Reduced Memory Requirements and Needless Duplications, Quick Response to Link Breakage in Active Routes, Loop-Free Routes Maintained by Use of Destination Sequence Numbers and Scalable to Large Populations of Nodes.

The steps consists of

- Initialization and termination aspects of ns simulator,
- Definition of network nodes, links, queues and topology,
- Definition of agents and of applications,
- The NAM visualization tool,
- Tracing and
- Random variables.

When a new simulator object is created in Tcl the initialization procedure performs the following operations.

- Initializing the packet format.
- Creating the scheduler.
- Creating a null agent.

The packet format initialization sets up field offsets within packets used by the entire simulation. The scheduler runs the simulation in an event driven manner and may be replaced by alternative schedulers. The null agent is created as given bellow.

Set Null Agent_ [New Agent/Null]

This agent is generally useful as a sink for dropped packets or a destination for packets that were not counted or recorded.

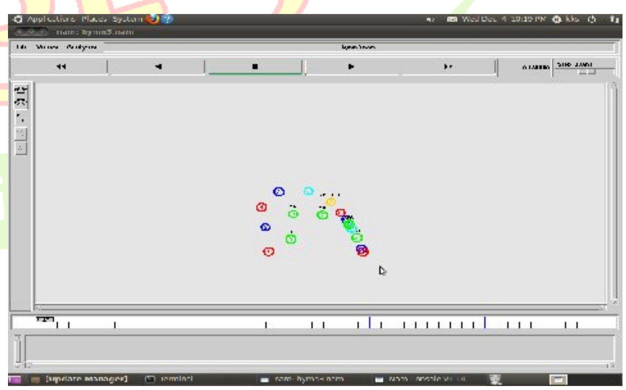

Fig 3: Network Creation with HYMN Model

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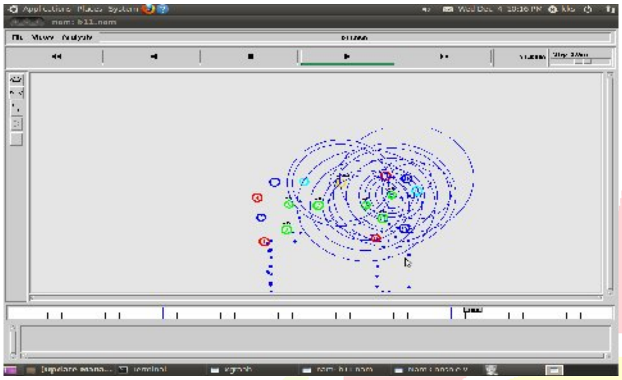

Fig 4: Packet Transition between Accessing points with CH (Static)

Fig: 5 Packet Transition between accessing points with CH (Static)

VI.CONCLUSION

Wireless sensor network routing algorithms are widely classified into two categories, flat multihop routing algorithms, which are excellent in their ability in minimizing the total power consumption of the network by efficient transmission distances, and hierarchical multihop routing algorithms, which decrease the volume of data flow in the network by capitalizing on the highly correlated nature of the collected data by applying data aggregation. In both categories, sink node isolation limits the longevity of the wireless sensor network. Advanced HYMN and shown through mathematical analysis the power consumption and the conditions for optimality of HYMN. Finally, through extensive simulations, we have shown that Advanced HYMN considerably improves the longevity of wireless sensor networks. We implement efficient channel allocation in dynamic channel head selection in network clusters. In Phase II, we propose advanced HYMN is promising in terms of its ability to improve the longevity of wireless mesh networks with dynamic cluster Head selection with efficient channel allocation in wireless networks.

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