Improving Energy Efficient Scheme for Mobile Synchronized Wireless Sensor Networks with DVM Protocol

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Abstract: In routine sensor systems with versatile get to focuses (SENMA), the versatile get to focuses (MAs) navigate the system to gather data specifically from person sensors. While rearranging the steering procedure, a noteworthy constraint with SENMA is that information transmission is restricted by the physical speed of the MAs and their direction length, bringing about low throughput and vast postponement. In a push to determine this issue, we present the MCWSN design, for which a noteworthy component is that through dynamic system sending and topology outline, the quantity of hops from any sensor to the MA can be restricted to a pre indicated number Moreover, putting MC-WSN in the bigger picture of network design and development. Wireless sensor network (WSN) has been identified as a key technology in green communications, due to its indispensable role in both civilian and military applications, such as reconnaissance, surveillance, environmental monitoring, emergency response, smart transportation, and target tracking. Along with recent advances in remote control technologies, Unmanned Aerial Vehicles (UAVs) have been utilized in wireless sensor networks for data collection as well as for sensor management and network coordination. Network deployment through UAV has also been explored in literature. For efficient and reliable communication over largescale networks, sensor network with mobile access points (SENMA) was proposed. In SENMA, SENMA has been considered for military applications, where small low-altitude unmanned aerial vehicles (UAVs) serve as the mobile access points that collect sensing information for surveillance, reconnaissance and collaborative spectrum sensing. When the energy consumption at the MAs is not of a concern, SENMA improves the energy efficiency of the individual sensor nodes over ad-hoc networks by relieving sensors from complex and energy-consuming routing functions. While simplifying the routing process, a major limitation with SENMA is that a transmission is made only if an MA visits the corresponding source node; thus, data transmission is largely limited by the physical speed of the MAs and the length of their trajectory, resulting in low throughput and large delay. At the sensor layer, a distributed Dynamic load balanced clustering algorithm is proposed for sensors to self organize themselves into clusters. In contrast to existing clustering methods, the scheme generates multiple cluster heads in each cluster to balance the work load and facilitate dual data uploading.

***Index Terms* – Mobile ad hoc networks, query processing, routing, traffic, data replacement attack, node grouping.**

I. INTRODUCTION

A wireless sensor network is a group of the specialized network with a communication framework for monitoring and recording conditions at diverse locations. Potential applications of sensor networks include video surveillance, air traffic control, monitoring weather condition, traffic monitoring etc[2]. Wireless sensor nodes use access points to connect users with other users within the network and also can serve as the point of correlation between the WLAN and a fixed wired network. Each access point can able to serve multiple users within a defined network area as people move behind the range from one access point to other automatically. A small WLA N usually requires a single access point and increases its number depends on the network users and the physical size of the network. In the mobile access point, data transmission based on the physical speed of the access point which impacts the efficiency parameters throughput and delay [3][5]. In the existing system, it uses [4] LEACH protocol it is a TDMA based MAC protocol which is clustering and a basic routing protocol in wireless sensor networks. It is used mainly to lower the energy consumption required to improve the lifetime of a wireless sensor network. The issue of this approach is the overhead associated with sink location acquisition. In order to overcome this problem, Distance Vector Multicast Routing Protocol (DVM RP) is used. DVM RP protocol is based on the RIP protocol. The router creates a routing table with the multicast group of which it has the ability with corresponding distances. DVMRP serves via a reverse path flooding technique, sending a copy of a received packet through each interface except the one at which the packet arrived. DVM RP channels multicast transmission within unicast packets that are organized into multicast data when they reach their destination. In the mobile access point, data transmission based on the physical speed of the access point which impacts the efficiency parameters throughput and delay [3][5]. In the existing system, it uses [4] LEACH protocol it is a TDMA based MAC protocol which is clustering and a basic routing protocol in wireless sensor networks. It is used mainly to lower the energy consumption required to improve the lifetime of a wireless sensor network. The issue of this approach is the overhead associated with sink location acquisition. In order to overcome this problem, Distance Vector Multicast Routing Protocol (DVM RP) is used. DVM RP protocol is based on the RIP protocol. The router creates a routing table with the multicast group of which it has the ability with corresponding distances. DVMRP serves via a reverse path flooding technique, sending a copy of a received packet through each interface except the one at which the packet arrived. DVM RP channels multicast transmission within unicast packets that are organized into multicast data when they reach their destination

II. RELATED WORKS

In [2] Noufal.K.P discussed the issues arisen in wireless sensor networks. Routing in wireless sensor networks is limited because of the capabilities of the sensor nodes. The first algorithm was Location-Based Protocols in which sensor nodes are recognized by the location address of the specific nodes. It guarantees each sensor node send their data independently. The second algorithm was Hierarchical Protocols in which nodes are clustered and the transmission done through the cluster heads. It reduces the power consumption by each sensor nodes.

In [4] Mohamed Lehsaini, Herve Guyennet, and Mohammed Feham introduced the Cluster-Based Energy Efficient Scheme (CES) to improve the lifetime of the network. The CES algorithm used to elect cluster-head to distribute energy across the nodes in the network, which will improve the lifetime of the network. In this algorithm, sensor nodes with the greatest weight will be elected as a cluster-head. The main protocol is LEA CH which supports single hop algorithm for homogenous WSNs. In LEA CH cluster-head role is rotated periodically among the sensors to equally distribute energy across the nodes in the network

In [8] Gokhan Mergen and Lang Tong discussed the maximum throughput of an opportunistic slotted ALOHA protocol. It is used to achieve throughput when the number of users gets increased. To find the throughput Signal-to-Interference-Rat io (SIR) threshold method is used. In the ALOHA protocol; nodes transmit its backlogged packets without a change in the message over the time . In A LOHA protocol, users can adjust their transmission.

In [13] Gokhan Mergen, Qing Zhao and Lang Tong introduced Sensor Network with Mobile Access point (SENMA) in which sensor nodes are grouped and each cluster contains a mobile Access Points (APs). SENMA offers energy efficient transmission and multihop ad hoc architecture. Mobile APs significantly reduces the timing recovery and synchronization. Each APs work independently.

The system performs sensor nodes are clustered and each cluster connected along with the mobile access points. The cluster also includes Cluster Head (CH), Center Cluster Head (CCH), and Ring Cluster Head (RCH). The sensor nodes send their data to the base station using the above cluster heads. In this system it limits the average number of hops from the sensor to mobile access points, which will increase throughput, reduce delay and using the energy efficiently.

III. THE PROPOSED ENERGY EFFICIENT TRANS MISSION SCHEME

To overcome the problems arise in the existing system, the following method is proposed. In the existing system, it uses Sensor Network with Mobile Access Point (SENMA) in which mobile access point traverse the network to collect information fro m the individual sensors. But the transmission of data is affected by the physical speed physical speed of the MAs and their length. To resolve this problem, Mobile Synchronized Wireless Sensor Network has been proposed. This method uses Distance Vector Multicast Routing Protocol (DVM RP), which imp roves the throughput, reduce delay and enhance the energy of the system.

A. Mobile Access Points (MAs)

In wireless sensor network (WSN), the access point is a station where transmits and receives data. Access Points connects users to other users within the framework. Data transmission is done via the access points in the wireless sensor network.

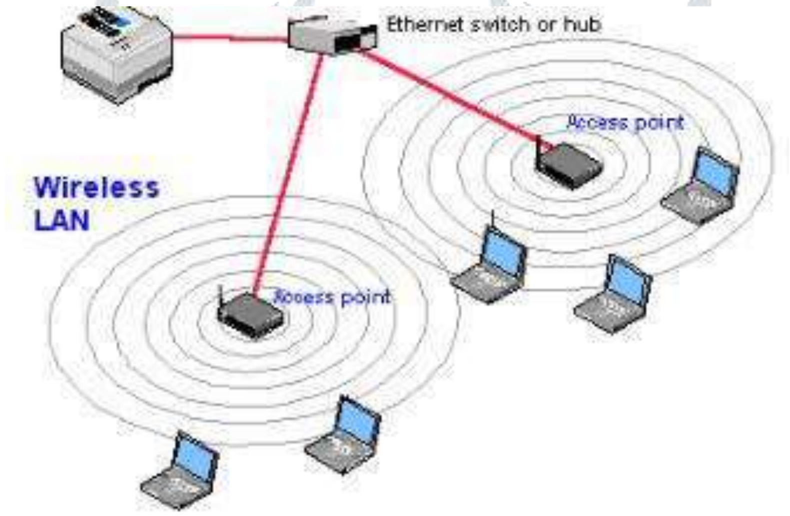


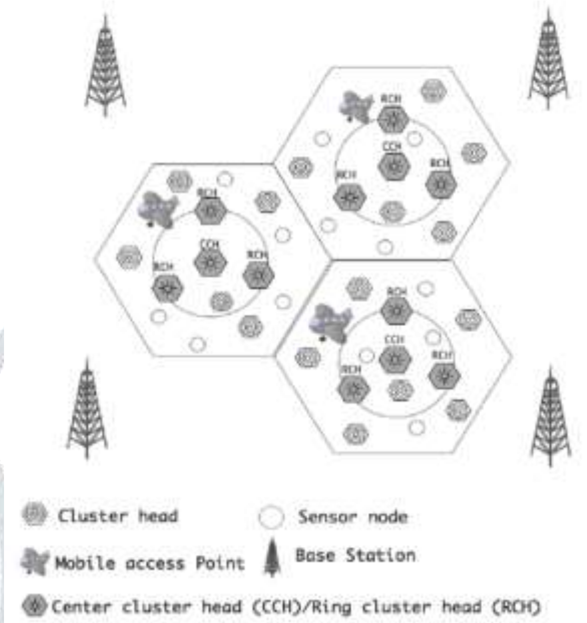
FIGURE.1. MOBILE ACCESS POINTS

Figure.1. shows the access points [14] which give wireless network services to their surrounding users.

B. GENERAL DESCRIPTION

In the proposed method, the network is split into cells of radius d. Each cell includes single Mobile Access Points (MAs) attached to it. Each cluster is controlled by the cluster Head (CH), who is responsible for getting data from all the cluster members. Additionally, Center Cluster Head (CCH) is deployed in the middle of each cell, and K ring cluster head (RCH) are added on the ring of radius Rt. The CCH and RCH can initialize direct communication with the MA or with other RCH which is closer to the MA. All the nodes within a distance R0 from CCH route its data to the MA through CCH. Remaining nodes route its data to the MA through the nearest RCH. Once the sensor node is within MAs coverage then direct communication take place when required. After receiving all the data fro m the sensor nodes, the MA delivers it to a Base station (BS). This method common ly analyzes the throughput of the system under both single path and multipath routing is used. This proposed system is independent of the speed of the MA, which has a higher advantage than SENMA. This method proposes that the average number of hops between the sensor and its nearest CH is minimized. Figure 2 describes the system architecture of the proposed method.

Deploying the nodes from SENMA, it delivers sensor nodes to the system. Then elect the cluster head based on the Local Energy Estimation algorithm. Using these algorithm sensor nodes with the highest energy can be elected as the Cluster Head (CH). This algorithm can be used to elect the CCH and RCH. If the sensor node within the distance R0, route the data to MA through CH. All the other nodes send their data to the nearest RCH. MA collects data from all the sensors. Then MA forwards the data to the Base Station (BS).



FIGUR E. 2. S YSTEM ARCHITECTURE

C. Data Collection

Data collect ion fro m individual sensors can be event based or periodic. Data transmissions from the sensor node to CHs, between CHs, and from CCH/ RCH to the MA are done on different channels to avoid intrusion between different communication links. Let the communication range of every sensor node and CH be rc and Rc respectively. CH have larger storage capacity and longer communication range than SNs which is denoted as Rc>rc. But sensors are not involved in inter-cluster routing method in order to minimize its energy consumption. To improve the throughput and minimize the delay, a number of hops in routing should be minimized. MA moves physically for data collect ion only when the routing paths do not work.

D. Distance Vector Multicast Routing Protocol (DVMRP)

DVM RP is an Internet-based routing protocol which provides an energetic mechanism for connection-less datagram delivery to a group of hosts across an internetwork. DVMRP uses a distance vector distributed routing algorithm which builds per-source-group multicast delivery. DVM RP routing decision depends on the source address of the packet. This protocol based on the RIP protocol. It generates a routing table with the multicast group with an idea of the corresponding distances.

IV. NETWORK TOPOLOGY DES IGN

To investigate the network topology design of the system, it needs to calculate the optimal radius R0 and the ring radius Rt which minimizes the average number of hops from any CH to the MA[1]. Minimizing the number of hops directly improve the throughput. A number of hops are proportional to the distance between the source and their corresponding sink [8].

V. SYSTEM MODULES

The proposed system contains the following modules to achieve the target of the system. Deploying Nodes to from SENMA SENMA consists of two different types of nodes; they are Sensor nodes and Mobile Access Points. Sensor nodes are low power and low-cost nodes, but it limits processing and communication capability. But in contrast, mobile access points are equipped with powerful processors and well-equipped transceivers.

Cluster Formation

The network is split into cells of radius d. Each cell contains single powerful Mobile Access Points(MA) with its. These clusters are controlled by the Cluster Head(CH). CH, RCH, CCH are elected based on the sensor nodes.

Center/Ring Cluster Head Selection

Center/Ring Cluster Head is selected by Center Cluster Head Election Algorithm using Local Energy Estimation(CCHEA) that uses energy levels of neighboring sensor nodes as well as local energy level to restrict the decrease of the CH probability of the sensor nodes.

Data Collection by Center/Ring Cluster Head

Data collection fro m the sensors can be event based or periodic. Data transmissions from SNs to CHs, between CHs, and from CCH/ RCHs to the MA are made over different channels to avoid interference between different communication links. The communication range of each sensor node and CH is rc and Rc, respectively. CHs have larger storage capacity and longer communication range than SNs, i.e.,Rc >rc. Assume shortest path routing between the CHs and the CCH/RCHs.

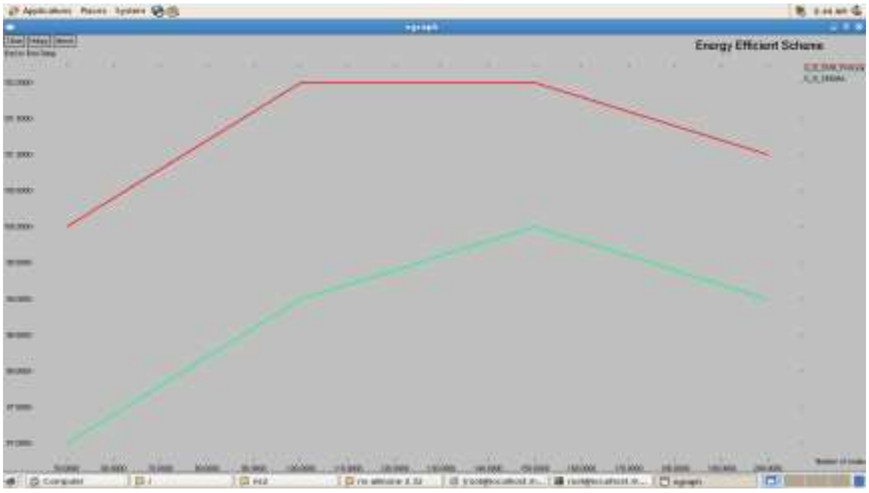
Data Delivery to Base Station

Data collected fro m the center/ring cluster head is transmitted to Mobile Access Point. This data collection can be event based or periodic. The mobile access point delivers the data to base station.

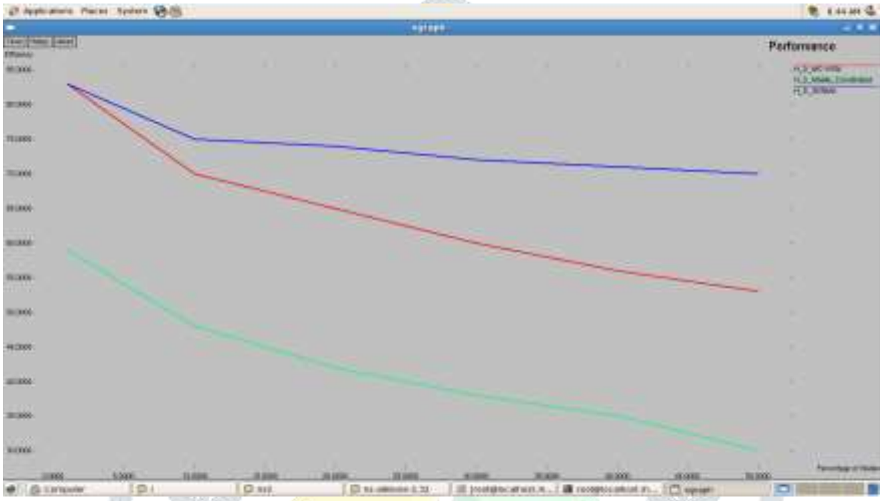
VI. RESULTS

This system describes the performance of Mobile synchronized wireless sensor network through simu lation values and comparison values. Here the system assumes that SNs and CHs are distributed in each and every cell, and TDMA/FDMA is used for scheduling. It considers the following parameters. The range of cluster heads is Rc=30 m and that of sensors is rc=15 m, the assumed values for R0 and Rt are set according to the proposition I, the path loss exponent is β=2. And threshold value is γ=5 dB, and the bandwidth reuse measure is Nintf=2. Take the packet size is 16 bytes and rate of data is 5 Kbps, then the packet duration is 25.6 ms. In this simu lation, the collision effect or interference among clusters use the same channel or frequency band is take into account. The neighboring CHs with adistance smaller than Nintfx Rc fro m active CH is participating in the system performance.

Energy efficiency



Performance



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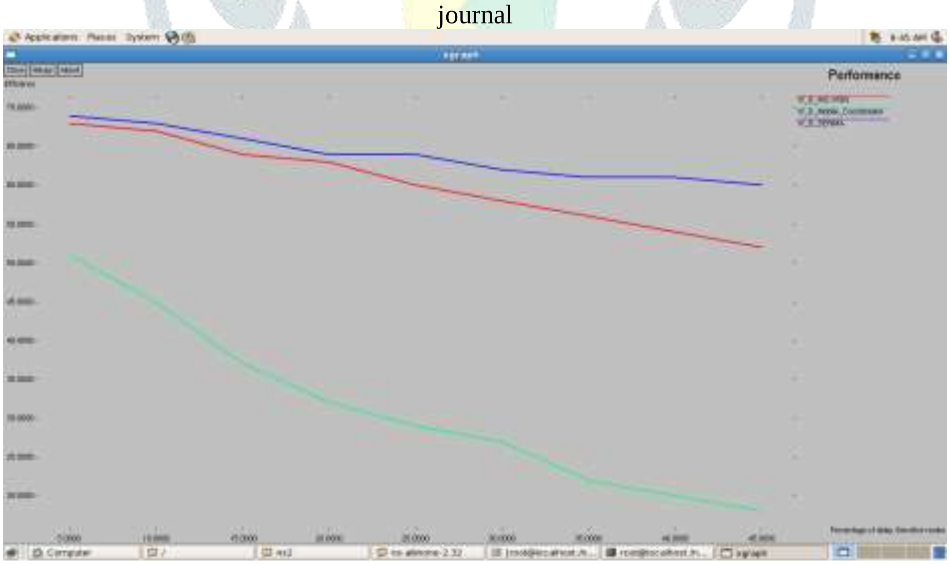

CONCLUSION

The proposed method achieves better performance, which improves the throughput of the system, reduces delay, efficient usage of energy and very low packet loss. The Mobile Access Points (MAs) coordinate the sensor nodes and its data transmission; this proposed methodology achieves a highly resilient, reliable, and scalable system. This methodology reduces the average number of hops from any sensor to the MA. Throughput analysis is done in both single-path and mu lti-path system. The Future work related to the suggestion that, the problem arises in MAs. Sometimes MAs needs to be recharged or reloaded. If possible, exchange the defect MAs with the new MAs which is only done by the Base Station (BS). To resolve the above problem, Base Station (BS) needs high energy and efficient management functionalities.

Future Work

The architecture developed in the framework of the AWARE project for the autonomous distributed cooperation between unmanned aerial vehicles (UAVs), wireless sensor/actuator networks, and ground camera networks. One of the main goals was the demonstration of useful actuation capabilities involving multiple ground and aerial robots in the context of civil applications. A novel characteristic is the demonstration in field experiments of the transportation and deployment of the same load with single/multiple autonomous aerial vehicles. The architecture is endowed with different modules that solve the usual problems that arise during the execution of multipurpose missions, such as task allocation, conflict resolution, task decomposition, and sensor data fusion. The approach had to satisfy two main requirements: robustness for operation in disaster management scenarios and easy integration of different autonomous vehicles. The former specification led to a distributed design, and the latter was tackled by imposing several requirements on the execution capabilities of the vehicles to be integrated in the platform. The full approach was validated in field experiments with different autonomous helicopters equipped with heterogeneous devices onboard, such as visual/infrared cameras and instruments to transport loads and to deploy sensors.

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