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Energy Efficient Approach for Real-Time Message Transfer through MC-WSN Design

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Abstract: ***In Rapid technologies, Energy Efficient is an important issue in Wireless Network, due to this we are discussing a novel energy efficient scheme for time-bound applications known as mobile access coordinated wireless sensor network (MC-WSN). In Sensor Networks with Mobile Access Points (SENMA), the Mobile Access points (MAs) will find the way to accumulate the message through individual sensor nodes. During the process of routing in SNEMA, a major limitation is that information transmission is reduced by the substantial speed of the MAs and their length of routing, which results is little throughput and great interruption. Due to this issue, we proposed the MC-WSN design, through this optimal topology design that minimizes the average number of hops from sensor to MA and improve the throughput analysis under both single and multipath directs. From this general framework, it can be seen that MC-WSN reflects the incorporation of structure ensured reliability and ad hoc enabled flexibility.***

Keywords: WSN, Mobile Access Points, N-hop network, Throughput, Delay, Energy Efficiency.

1. INTRODUCTION

A wireless sensor network is an infrastructure comprised of sensing, computing and communication elements that gives an administrator the ability to instrument, observe, and react to events and phenomena in a specified environment. The administrator typically is a civil, governmental, commercial, or industrial entity. Typical applications include data collection, Monitoring, surveillance, and medical telemetry. In addition to sensing, one is often also interested in control and activation.

A key novelty in green correspondences has been agreed as Remote sensor organizes i.e. WSN (wireless sensor network), as it has its extremely rare part in both usual citizen and military applications, for example: - Monitoring undesirable forces

- Monitoring friendly forces and equipment
- Military-theatre or battlefield surveillance
- Targeting
- Battle break review
- Nuclear, biological, and chemical attack detection etc.

A wireless sensor network includes sensor nodes that have been deployed on geographical area for monitoring the substantial phenomena like temperature, humidity, vibrations, seismic events, and so on.

There are four basic components in a sensor network: (1) an assembly of distributed or Localized sensors; (2) an interconnecting network (3) A central point of message clustering; and (4) a set of computing resources at the Central point (or beyond) to handle data correlation, event trending, status querying, and data Mining. Nowadays, it's been the trend of wireless communication systems where the low cost and least power wireless micro sensors has been conscious, deployed and broadly used in wireless and itinerant background [5],[6],[7],[8].

The sensors in some different networks that to in particular area shows the same characteristics to achieve the energy stability. In the sense, during this process if one sensor dies, it can be expected the neighbors of this sensor nodes to run out of energy in a high speed , as they take over the responsibilities of that particular sensor and they think of gaining the lifetime of several months to be several years. Thus, energy saving is vital in designing life time WSN.

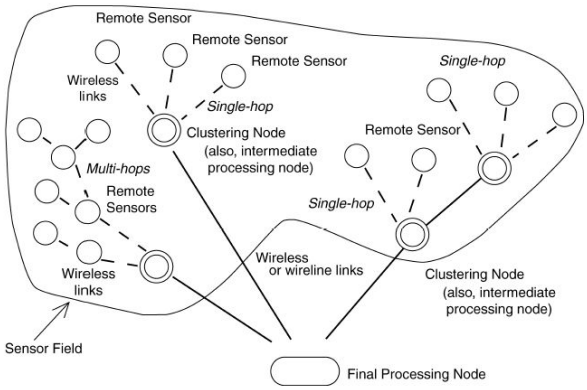

Figure 1: A sensor network arrangements.

In SENMA (sensor networks with mobile access points) the adaptable get to focuses on the mobile access points (MAs) which navigate the system to gather the detecting data straightforwardly from the sensor hubs. SENMA has been considered for military applications where the major limitation with SENMA is it depends on the physical speed of the mobile access points and the length of the trajectory

i.e. the path which has been traversed, which is not suitable for time-sensitive applications.

SENMA increases the energy competence of the individual sensor nodes over the ad-hoc networks by getting rid of energy–consuming and critical routing functions, yet it has its own drawback which cannot be achieved to satisfy the throughput and delay through SENMA.

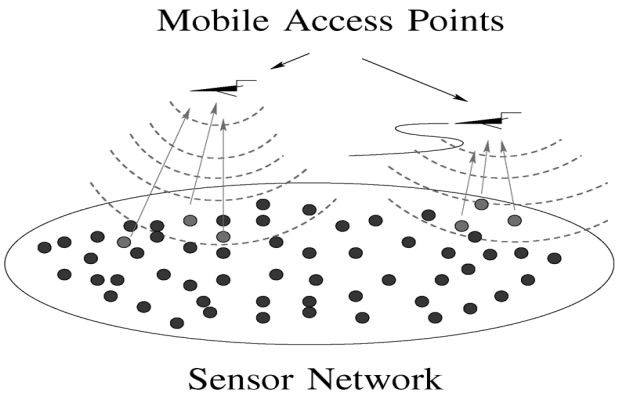

Figure 2: Sensor network with Mobile access points

A different network design i.e. MC-WSN Architecture is been implemented in this paper along with the mobile sink to overcome the concept of SENMA ,where the whole network is divided into 3 cells each is covered by one MA in order to increase the throughput as well to reduce the delay. It consists of centre cluster head or ring cluster head at the centre of the cell, with mobile access points to transfer the data to the base station which satisfies the energy efficiency method. This architecture doesn't depend on the physical speed of the MA.

In this paper we describe the concept of achieving throughput through single-path as well the multi-path routing process then we calculate the average of each node throughput and then compare it with that of SENMA.

The most important characteristics of this paper are:

- MC-WSN is reliable and efficient architecture for time-sensitive applications.
- Ensures the performance of throughput as well delay.
- An optimal topology design which reduces the hops count b/w a sensor nodes and its near-by sink node.
- The throughput is calculated through single path as well as the multi path routing process.
- This provides a graph which describes the result, as the number of hops increases the throughput decreases exponentially.
- This paper demonstrates through numerical results which show that has achieved the higher throughput and energy efficiency through SENMA.

2. RELATED WORK

G. Mergen et al., 2006 [1], discuss about Sensor networks with mobile access: considering Energy and capacity. The major advantage of this paper is SENMA used for Efficient and reliable communication over large scale network and its drawback is Data transmission depends on physical speed of the access point.

H.C. Chen et al., 2011 [2], explains the Collaborative compressive spectrum sensing in a UAV environment .the major advantage of this paper is Small low-altitude unmanned aerial vehicles (UAV) serve as mobile access points for data collection and its drawback is Either under remote control by humans or fully onboard computers which is complex and energy-consuming routing functions.

W. Liu et al., 2012 [3], describes On the throughput capacity of wireless sensor networks with mobile relays .The major advantage of this paper is Mobile relays utilized for data collection and its disadvantage is More energy consumption and increased delay.

C. Tunca et al., 2015 [4], introduces the Ring routing: An energy efficient routing protocol for wireless sensor networks with a mobile sink. The major advantage of this paper is efficient data transmission using ring routing and its drawback is Lower throughput, large delay and less energy efficiency due to overhead associated with sink location acquisition.

M. Grossglauser and D. Tse [12], explained the concept of Mobility increases the capacity of An ad hoc wireless network which describes the same work as that of SENMA hence it has a drawback of data transmission that depends on the physical speed of the MAs.

M. Nekoui and H. Pishro-Nik [13], worked on the analysis of "Throughput scaling laws for Vehicular ad hoc networks," that helped to understand the performance of throughput. They worked on the concepts same as that of SENMA which has an advantage where the MAs traverse the complete network and collect the data from each and every nodes where as that has a drawback of low throughput and large delay.

3. PROPOSED WORK

The architectural system is separated into number of cells where each cell of radius b, contains a portable get to point (MA) mobile access point. Each cell consists of number of cluster heads (CH) where it sends the data to centre cluster head (CCH), to which all the individuals send their message to the CCH. CHs then course the message to the MA [9], [10], [11]. Intense ring cluster heads (RCH) are placed on a ring of span Rt. The CCH and RCHs coordinates with correspondence to MA or with different RCHs that are placed nearby to MA. All hubs within a division Rd from the CCH course their data to the MA through the CCH. After accepting the message from each of the sensors, the MA sends the data to a Base Station (BS).

In this architectural system pattern, the magnitude of hops from any sensor to the MA can be constrained to a pre-defined quantity through the organization of CCH.

The MAs are in charge of: (i) turning over hubs, (ii) supplanting besides, inspiring hubs, (iii) identifying toxic sensors (iv) gathering the data from sensors and passing it on the BS.

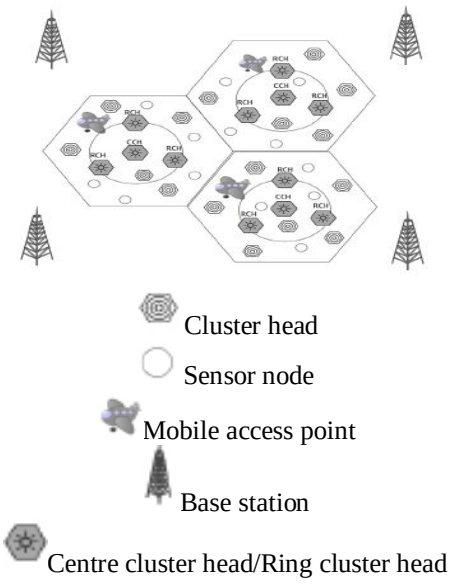

Figure 3: Proposed MC-WSN Architecture

4. RESULTS AND DISCUSSION

Numerous simulations were performed with NS2 network simulator. NS2 generates a trace files. The performance comparisons matrixes are throughput and energy efficiency.

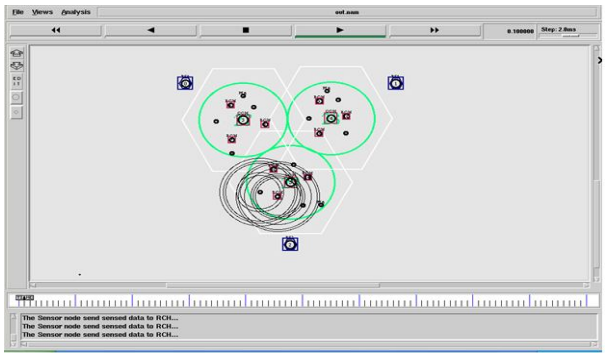

Figure 4: Sensor nodes transmitting the data to RCH

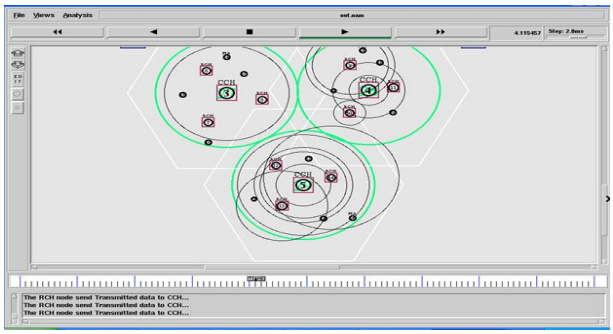

Figure 5: RCH send the received data to CCH

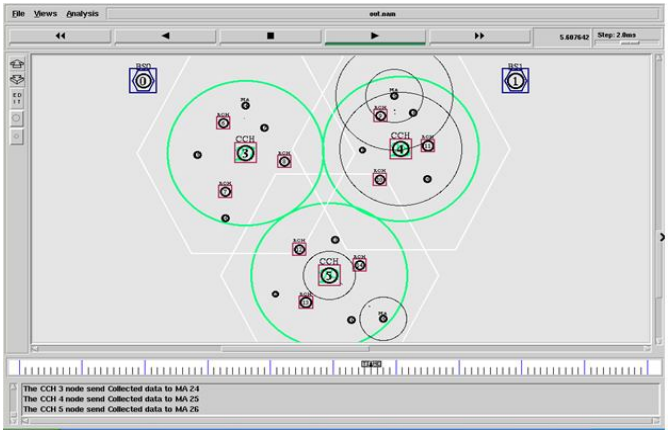

Figure 6: CCH transmit the collected data to MA

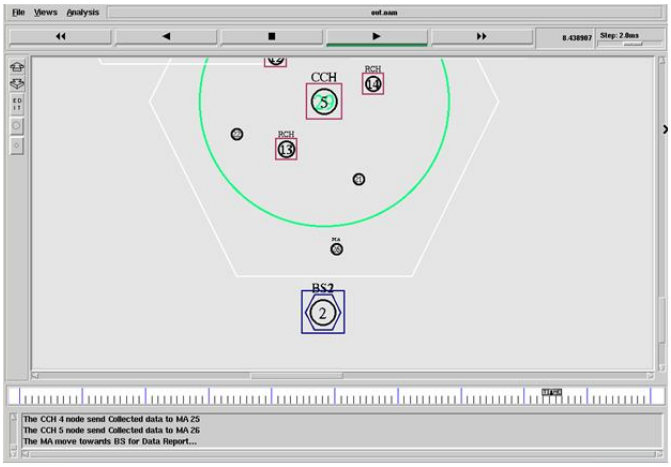

Figure 7: MA moving towards the BS for Data Report.

4.1 Throughput Analysis

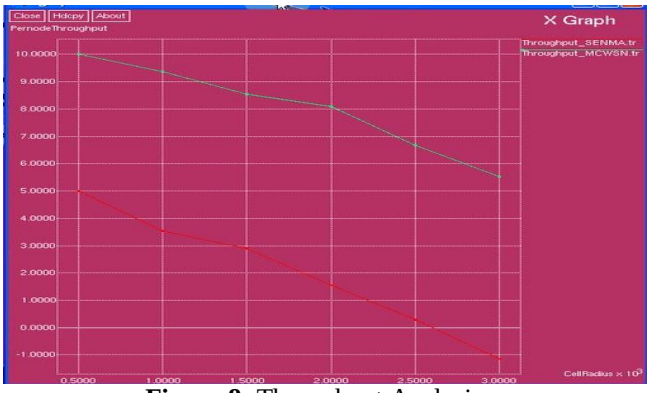

Figure 8: Throughput Analysis.

The above graph represents the throughput analysis, where the MC-WSN throughput is in the green line which overcomes the SENMA throughput that is in red line by increasing its value as shown in the above graph.

4.2 Energy Efficiency

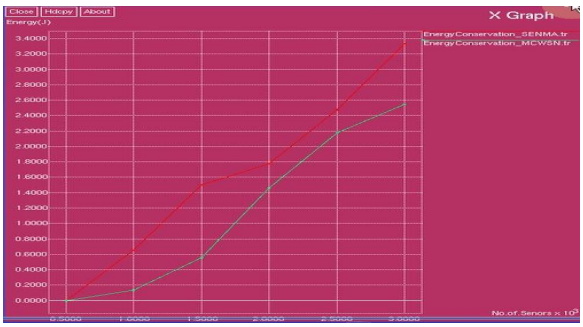

Figure 9: Energy Efficiency Analysis.

The above graph represents the energy efficiency analysis, where the MC-WSN energy efficiency in the green line has overcome the energy efficiency of SENMA process in red line by consuming the less energy by sensor nodes when compared to SENMA as shown in the above graph.

5. CONCLUSION

In this paper, a flexible remote sensor systems MC-WSN design has been projected for consistent, capable, and time required data job. MC-WSN design uses the Mobile agents which help for organizing the system through transmission, supplanting and energizing hubs; additionally it identifies the malicious hubs and supplanting them. MC-WSN has an feature of exceedingly flexible, reliable, and adjustable engineering which is been possible through progressive and different structure that is been composed. This paper has given the best through providing all the finest work by giving an ideal design as MC-WSN, in order to maintain the normal hops count from sensor to Mobile access point ,that too in an limited manner. As well the execution of MC-WSN is verified as far as throughput. MC-WSN accomplishes very large throughput and effectiveness compared to traditional Sensor network mobile access points by experimenting with the dynamic system sending and the number of hop count. Moreover, describing the MC-WSN design represented in the greater image of system draw, it's been presented together structure for remote system indicating and representation. Beneath this general structural design, MC-WSN incorporated the design guaranteed Quality/effectiveness and specially selected empowered flexibility.

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