ADAPTIVE CLUSTERING IN WIRELESS SENSOR NETWORK

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Abstract: Sensor networks present unique opportunities for a broad spectrum of applications such as industrial automation, situation awareness, tactical surveillance for military application and environmental monitoring, chemical/biological detection etc. Sensor Network can monitor ambient condition such as temperature, sound, light and others. Information is collected from many sensor devices for further consumer application in the Sensor Network. For selecting a cluster head, k-means algorithm will be used to find the cluster centre. For hop to hop packet forwarding, AODV protocol has been used at network layer. All the simulations of the proposed idea will be simulated on Berkeley's ns2 network simulator and the performance of the proposed scheme has been evaluated. Due to wireless nature of sensor network, secure data transmission is a major issue for wireless sensor network. Clustering is a technique which increases network lifetime and reduces power consumption of sensor nodes in WSN. In this paper, we study an authenticated way to data transmission for cluster based WSN. Our result show that performance of proposed protocols are better than existing secure protocols.

Index Terms - Wireless Sensor Network, Residual Energy, Clustering & Neighbour Weight.
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I. INTRODUCTION

1.1 overview

Wireless sensor network (WSN) is a network that consists of several sensor nodes that are randomly distributed on a geographical area. These sensor nodes are used to monitor the physical and environmental conditions like temperature, pressure, humidity etc. WSN consist of hundreds or even thousands of sensor devices. Each node is capable of data sensing, processing and communicating [1]. Sensor nodes relay the sensed data to the Base station (BS).BS transmits that data to the users as shown in figure 1. Users can get the information from base station through satellite or internet. BS in WSN acts as an interface between sensor nodes and user [2]. WSN are used in many applications like health care monitoring, industrial monitoring, military applications, environmental and earth sensing.

. Organization of big multi-hop wireless network keen on cluster is necessary meant for achieve necessary system presentation. In wireless antenna network (WSN), the cluster is mainly branded by information aggregation by every group skull, which consider ably reduces the transfer rate. The hierarchical model requires two main methods:

(1) Periodic selection of cluster heads (CHs); and

(2) Assignment of each node to one or multiple clusters.

Clustering is a significant instrument in big multi-hop wireless antenna network for obtain scalability, dropping power utilization and achieve improved system presentation. Mainly of the investigate in this region have determined lying on energy-efficient solution, but has not carefully analyse the system presentation, e.g. in conditions of facts set speed and occasion. There are many application areas benefited from WSN, e.g., habitat monitoring, disaster relief, target tracking and so on. Many of these applications require simply an aggregate value to be reported to the "information sink". In these cases, sensors in different regions of the field can collaborate to aggregate the information they gathered. For instance, in habitat monitoring applications the sink may require the average of temperature; in military applications the existence or not of high levels of radiation may be the target information that is being sought. It is evident that by organizing the sensor nodes in groups i.e., clusters of nodes, we can reap significant network performance gains. Clustering not only allows aggregation, but limits data transmission primarily within the cluster, thereby reducing both the network trace and the contention for the channel. Grouping sensor nodes keen on cluster have be broadly pursue by the investigate neighbourhood in order to achieve the network scalability objective. In order to hold up

information aggregation during capable system group; nodes be able to be partition keen on a digit of little group call cluster.
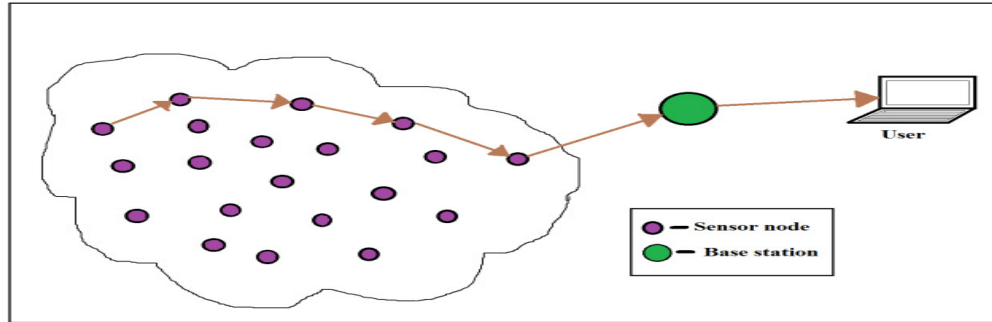

Figure1: WSN Overview

II.REVIEW OF LITERATURE

Clustering has been at length studied in the information meting out and hyper network literatures. a lot of study project in the previous few existence have explore clustering in WSN from dissimilar perspective. Some of the papers have been careful that has been in use as a incentive towards my learn.

1)   **A Data Transfer in Wireless Sensor Networks Using AODV ProtocolB.Manimekala1, M.Kayalvizhi2**

This study implements the proposed management protocols including Clustering Mechanism for constructing cluster headers to solve the problems of clustering and broadcast storm, the suitable protocol to provide low cost communications between clusters. The Location information of the sensor nodes will be collected from source and the cluster heads were elected/selected based on the locations of the active sensor nodes in network. For selecting a cluster head, k-means algorithm will be used to find the cluster center. The nearby sensor nodes of a cluster- head then will forward their data to sink only via the cluster-head. For hop to hop packet forwarding, AODV or DSDV protocol may be used at Network Layer Protocol. That is to forward a packet from a sensor node to a cluster-head or cluster head to sink; normal routing protocols may be used.

2)   **Optimal Design on Clustering Routing Protocol for Wireless Sensor Network by Rui WU, Kewen XIA, Yanjun ZHANG, Guodong LI (2013)**

owing to the incomplete power for antenna nodes in wireless antenna system (WSN), the cluster used for nodes become an successful system to keep power, but it is early to come into view the occurrence of sightless nodes since of ignoring the condition in sequence for national nodes in formative cluster-head, for that cause lead to squander power. So a narrative cluster procedure base on evolutionary calculation is deliberate in agreement by means of the end of power economy optimization, which include the building of health purpose by means of the in order of national nodes inside the come together power and the sharing, and formative cluster-head

3)   **Adaptive Cluster Into Wireless Antenna System: Allowing meant for Nodes through lowly power in Amir Achaean Kharazian1, Kamal Jamshidiwith Mohammad Reza Khayyam bashi (2012)**

Within this text main subject in wireless system contain exist explain. It has been describe that feeble nodes make a decision which swelling turn into cluster head. Feeble swelling choice bunch head based on node's weight. This heaviness is joint of residual control plus cold. Finally, the imitation penalty demonstrate thus because near our prospect distinct group go to be extra competent in delay the system being evaluate by LEACH. These texts explain to Hierarchical cluster algorithms be very significant into growing the network's time example. Every cluster algorithm is quiet of two phase, the schemes age with steady stage. The mass important tilt in this algorithm is group skull compilation. Bunch leader variety is major because, good quality quality groups guarantee control ability as well as mass balancing in the scheme. Calculated used for mass matching in WSNs, system surplus be there theoretical to exist removed because of the feeble nodes (nodes by means ofless   residual authority) and transmit to the entrain fluential nodes.

4)   **Power Capable Cluster Algorithms Into Wireless Antenna Network: A study through Vinay Kumar, Sanjeev Jain and Sudarshan Tiwari (2011)**

The entity of this text is toward present a state of the drawing evaluation lying on cluster algorithms account inside the book of WSNs. This text there categorization of power capable cluster algorithms in WSNs. And as well present timeline as well as elucidation of LEACH by Its descendant within WSNs. The text condition to make the majority of system time in Wireless antenna network (WSNs) the pathway meant for facts go be select inside such a means to the sum power extreme down the pathway is minimize. toward support elevated scalability and improved information aggregation, antenna nodes be repeatedly

group keen on move, non-overlapping subsets call cluster. cluster make hierarchical WSNs which slit within order utilize of incomplete income of antenna nodes with therefore expand scheme life.

5)   **Node Clustering in Wireless Sensor Networks: Recent Developments and Deployment Challenges** by Ossama Younis, Marwan Krunz, and Sri nivasan Ramasubramanian (2006)

In this paper, the challenges in clustering a WSN have been highlighted and the design rationale of the different clustering approaches has been discussed along with the classification of the proposed approaches based on their objectives and design principles. Several key issues that affect the practical deployment of clustering techniques in sensor network applications have also been discussed. This paper states that large-scale deployment of wireless sensor networks (WSNs) and the need for data aggregation necessitate efficient organization of the network topology for the purpose of balancing the load and prolonging the network lifetime. Clustering has proven to be an effective approach for organizing the network into a connected hierarchy.

III.PRESENT WORK

3.1 Scope of Work

Clustering has frequent compensation and the top single is apply optimized organization strategy to additional improve the system process and delay the series living of the person sensors with the system life. A CH be able to plan actions inside the group so to nodes be able to button near the low-power snooze style nearly all of the occasion with decrease the speed of power utilization .Sensors be able to be real busy in a round-robin arrange and the occasion used for their broadcast with greeting be able to be strong-minded as a result to the sensors reties be avoid, joblessness in treatment be able to exist partial and average admission crash is banned. also, a CH be able to total the information composed through the sensors in its group and as a result reduce the digit of relay packet. Each group would contain a head, frequently referred toward because the cluster-head (CH). A CH can exist chosen in the sensors into a group or pre-assigned in the system stylish. A CH might too be now single of the sensors before a bump to be wealthier in income

3.1 Problem Formulation

Group communication in wireless sensor networks (WSNs) is emerging as an important communication paradigm. A WSN is typically organized as a hierarchical tree network, with leaf sensor nodes sending data to a root base station collection point via a multi-hop wireless routing network. Each micro sensor node is resource-constrained, with severe limitations on its energy lifetime, memory, CPU, and radio bandwidth. It is often important for the base station to communicate to groups of resource-constrained sensor nodes.

To reduce energy consumption, most sensor nodes send their sensing data to their aggregator. Aggregators will use data fusion function and transmit fused data to BS. Obviously, aggregators have more energy since, normally, the distance between BS and anaggregator is farther than the distance between an aggregator and a sensor node. Thus, for balancing energy consumption in a whole network, aggregators are randomly selected in each round. Sensor nodes select a node as an aggregator. An aggregator broadcasts to ask neighbours to join their cluster. Other sensor nodes select their aggregator by measuring signal strength from aggregators.

One of the most important challenges of WSNs design is develop a method or protocol so that the randomly deployed numerous sensor nodes behave in a collaborative and organized way. Each sensor node wants to maximize its own utility function. In addition, the entire network needs balance in resource assignments to perform in a way that is useful and efficient. Network routing protocol design becomes far more critical to WSNs performance than that of from conventional communication networks. Among numerous proposed network routing protocols in past years, hierarchical routing protocols greatly contribute to system scalability, lifetime, and energy efficiency. The algorithm presented in this paper considers nodes with lowest-energy.

3.2 Objective

The main goal of cluster-based routing protocols is to improve energy efficiency in network nodes and increase network lifetime. Network organization to be more efficient with clustering and energy consumption is distributed in entire network. Clustering has been shown to improve network lifetime, a primary metric for evaluating the performance of a sensor network. Although there is no unified definition of "network lifetime," as this concept depends on the objective of an application, common definitions include the time until the first/last node in the network depletes its energy and the time until a node is disconnected from the base station.

There are mainly three routing categories, namely data-centric, hierarchical and location based. Important considerations for these routing protocols are energy efficiency and traffic flows. Achieving a good trade-off between energy efficiency and QoS is one of the main issues in WSNs. The most effective way to reduce energy consumption is to have a low duty-cycle which in turn causes increase in delay. In order to improve network lifetime, suitable cluster-based approaches have been proposed in the literature.

The main research issue regarding such protocols is how to form the clusters so that the energy consumption and contemporary communication metrics such as latency is optimized. The factors affecting cluster formation and cluster-head communication are open issues for future research. Moreover, the process of data aggregation and fusion among clusters is also an interesting problem to explore. The problem of intelligent utilization of the location information in order to help energy efficient routing is the main research issue.

Clustering has been extensively studied in the data processing and wired network literatures. The clustering approaches developed in these areas cannot be applied directly to WSNs due to the unique deployment and operational characteristics of these networks. Specifically, WSNs are deployed in an ad hoc manner and have a large number of nodes. The nodes are typically unaware of their locations. Hence, distributed clustering protocols that rely only on neighbourhood information are preferred for WSNs.

3.4 Research Methodology
3.4.1 Methodology
Gathering sensed information in an energy efficient manner is critical to operate the sensor network for a long period of time. In wireless sensor networks, data fusion helps to reduce the amount of data transmitted between sensor nodes and the base station.

The basic idea of clustering routing is to use the information aggregation mechanism in the cluster head to reduce the amount of data transmission, thereby, reduce the energy dissipation in communication and in turn achieve the purpose of saving energy of the sensor nodes. In the clustering routing algorithms for wireless networks, LEACH (low-energy adaptive clustering hierarchy) is well-known because it is simple and efficient. LEACH divides the whole network into several clusters, and the run time of network is broken into many rounds. In each round, the nodes in a cluster contend to be cluster head according to a predefined criterion. In LEACH protocol, all the sensor nodes have the same probability to be a cluster head, which makes the nodes in the network consume energy in a relatively balanced way so as to prolong network lifetime.

The proposed work is an extension to the algorithms presented in the literature. In the original leach, the CH is always on receiving data from cluster members, aggregate these data and then send it to the BS that might be located far away from it. The CH will be spending more energy in sending data to the distant base station. It may result in death of CH because of its operation of receiving, sending and overhearing. When the CH die, the cluster will become useless because the data gathered by cluster nodes will never reach the base station. In our protocol, distant CH will first look for CH which is near to BS. Once the CH is found, data will be transmitted to BS via newly found CH. So this will significantly reduce the load on the CH as it will have to spend energy to send the data to the nearest CH instead of distant BS. This approach will show an improvement in the performance of the protocol in WSN. Therefore, the new version of LEACH outperforms the original version of LEACH protocol.

3.4.2 Tool Used for Simulation
These days, there are numerous system network simulators that can mimic the WSNs. Ns2 is an open-source event-driven test system designed particularly for research in computer communication networks. Network Simulator Ns-2 is a discrete event simulator that is focused at network research. It furnishes underpin for simulation of TCP, steering and multicast protocols over wired and remote sensor networks.NS-2 fully simulates a layered network from physical radio transmission channel to high level applications.

NS-2 simulator has several features that make it suitable for our simulation.
- A network environment for ad-hoc networks
- Wireless channel modules
- Routing along multiple paths

IV. RESULTS AND DISCUSSION:
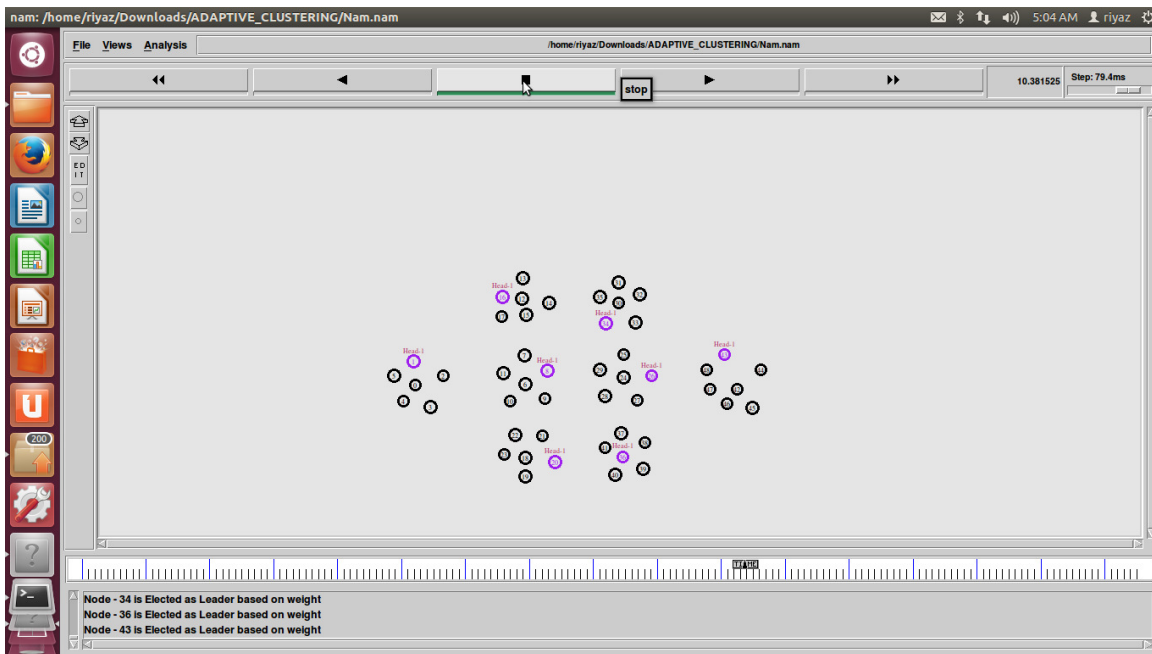
In LEACH route protocol, data transmission between the BS (base station) and cluster-head nodes is implemented by means of single hop. Because cluster-head nodes in wireless sensor networks may be far away from the base station, or there exists many obstacles in deployment environments of wireless sensor networks to affect the data transmission performance, they would consume excessive energy in the process of the massive data transmission, which may lead to their earlier death and even shorten network lifetime. So, we should reduce single hop communication between the base station and cluster-head nodes

V.CONCLUSION AND FUTURE WORK

I. The first and foremost work is to choose the Domain of interest and finalize the name of the research topic to work on.In the month of September- October 2016, I had finalized my Domain and the name of the research topic on which I was supposed to work. I have read the research papers and gone through various web articles to find the "Problem Definition" and to develop the approach to be proposed. The most important part is the selection of the tool that will be needed for the realization of the proposal.

II. In November 2016, I decided my problem definition. November onwards the simulation work will be started. Since I have already gone a long way in studying the theoretical algorithms, I am in process to simulate the proposed solution in NS-2.

III.In addition to this, I began to make the documentation of my proposal. The main scope of this research is to device a new clustering based data transfer protocol for sensor network for efficient data transfer in sensor network. The proposed clustering based data transfer protocol has been successfully implemented and evaluated under Network Simulator ns2. The performance of the network was tested with different simulation parameters and the simulation was repeated for different number of sensor nodes in the network. According to the trace analysis, the arrived results were significant and more comparable. While comparing the proposed method with a normal method, the proposed data transfer mechanism provided very good packet delivery ratio with very low routing load. The graphs and tables shows the enhancement in performance while using the proposed method. But in future works, one may address the possibility of deciding the number of clusters by some indirect means. In the proposed algorithm, for getting the location information, the same old flooding was used and for further message passing, the proposed clustering based method was used. Future works may address the possibilities of removing the classical flooding phase which is used to discover location information. The whole experiments were done on Network Simulator. The future works may address the issues for real implementation which may involve real GPS for resolving location information. Sensor networks present unprecedented opportunities for a broad spectrum of applications such as industrial automation, situation awareness, tactical surveillance for military applications, environmental monitoring, chemical/biological detection etc. So the future works may address the possibilities of enhancements of the proposed data transfer protocol for specific application.

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