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Cluster Based Energy Efficient Sensory Data Collection With Mobile Sink

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***Abstract*— Wireless sensor network energy efficiency is the important factor of the network lifetime, most of the sensor nodes are present in an isolated urban fields to sensing the data in particular area .These sensor nodes are working in typical condition. In this paper we address the problems of cluster node failure. When a cluster node fails because of energy depletion we need to choose alternative cluster for that particular region. In periodical time each sensor node in the cluster should possess the next cluster head re-election based on energy to avoid node failure**

***Index Terms*—cluster head, sensor node, rendezvous node, mobile sink**

I. Introduction

The main Reason of energy spending in wireless sensor network with communicating the sensor reading from the sensor nodes to remote sink. These reading are typically relayed using ad hoc multihop route in the wireless sensor network .A side effect of this approach is that the sensor node located close to the sink are heavily used to replay data from all network nodes, hence their energy is consumed faster leading to the non uniform depletion of energy in the wireless sensor network .This result in network lifetime can be extended if the energy spent in relaying data can be solved.

Recent research work has proved the applicability of mobile element for the retrieval of sensory data from smart dust mote in comparison with multihop transfer to a centralized element .A mobile sink moving through the network deployment region can collect data from the static sensor node over a single hop radio link when approaching within the radio range of the sensor node or with limited hop relaying and reduce the energy consumption at sensor node near the base station prolong network life time.

A large class of monitoring application involves a set of urban areas that need to be monitored with respect to environmental parameters surveillance, fire detection etc. In these environments individual monitored areas typically covered by isolated 'sensor islands' which makes data retrieval rather challenging since mobile nodes cannot move through but only approach the edge of an area of the sensor field can be used as rendezvous point wherein sensory data from neighbor node may be collected and finally delivered to an mobile sink when the latter approaches within radio range. In this context the specification of the appropriate number and location of rendezvous node is crucial. The number of rendezvous node should be equivalent to the deployment density of sensor nodes.

We investigate the use of mobile sink for efficient data collection from sensor island spread through urban environment .we argue that the ideal carriers of such ,mobile sinks are public surface transportation vehicles that repeatedly follow a periodic schedule that many pass along the perimeter of the isolated sensor fields. Mobicluster aims at minimizing the overall network overhead and energy expenditure associated with data retrieval process while also ensuring balanced energy consumption among sensor node and prolonged network life time .This is achieved through building cluster head consisted of member node that route their measured data to their assigned cluster head .The cluster head perform spatial temporal data redundancy and forward the filtered information to their assigned rendezvous node, typically located in proximity to the mobile sink trajectory. In this phase we address the problem of cluster node failure. When a cluster node fails because of energy depletion we need to choose alternative cluster for that particular region. we proposed In periodical time each sensor node in the cluster should possess the next cluster head re-election based on energy to avoid node failure

II. Methodology

Mobile sinks are mounted upon public buses circulating with urban environments on fixed trajectories and near-periodic schedule. Namely sinks motion is not controllable and their routes do not adapt upon specific wireless sensor network deployments. Our only assumption is that sensors are deployed in urban areas in proximity to public transportation vehicle routes. Also an adequate number of nodes are enrolled in their rapid energy depletion and a large number which results in reduced data throughput. Sensor

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node is grouped in separate cluster raw sensory data are filtered within individual cluster exploiting their inherent spatial temporal redundancy. Thus the overhead of multihop data relaying to the edge rendezvous nodes is minimized given that the communication cost is several order of magnitude higher than the computation cost, in-cluster data aggregation can achieve significant energy savings. A basic assumption in the design of Mobicluster protocol is that sensor nodes are location unaware not equipped with GPS capable antenna. Also we assumes that each node has a fixed number of transmission power level we assume the unit desk model, which is the most common assumption in sensor network literature. The underlying assumption in this model is that nodes which are closer than a certain distance can always communicate. However in practice a message sent by a node is received by the receiver with only certain probability even if the distance of the two nodes is smaller than the transmission range. The five phase of Mobicluster are describe the first three phase comprise the setup phase while last two comprise the steady phase the setup phase completes in a single mobile sink trip and during this trip the mobile sink periodically broadcasts beacon messages which are used by sensor nodes for determining a number of parameter import for the protocol operation in steady phase data from sensor nodes are routinely gathered to rendezvous nodes and then sent to mobile sink. During the steady phase reselection of rendezvous and or local reclustering is preformed in case of energy exhaustion of some critical nodes most important these operations take place in the background without disrupting the protocol normal operation.

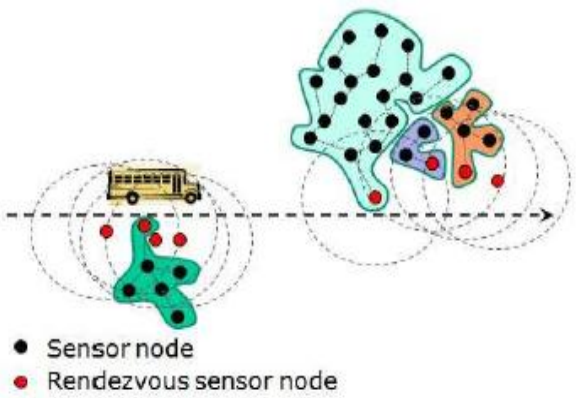

Fig:1 Rendezvous sensor nodes, cluster structures, and data Forwarding paths in MobiCluster

A. Clustering

The large scale deployment of wireless sensor network 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 organization the network in the above context besides achieving energy efficiency, clustering also reduce channel contention and packet collisions algorithm in construct s a throughput under high load. The clustering algorithm in constructs a multisized cluster structure, where the size of each cluster decrease on the distance of its cluster head from the base station increases. We slightly modify the approach oh to build cluster of two different sizes depending on the distance of the cluster head from the mobile sink trajectory. Specifically sensor nodes located near to the mobile sink trajectory are grouped in small sized the cluster head near the mobile sink trajectory are usually burdened with heavy relay traffic coming from other parts of the network by maintain the cluster of these cluster head small, cluster head near the mobile sink trajectory are relative relieved from intracluster processing and communication tasks and thus they can afford to spent more energy for relaying intercluster traffic rendezvous node.

B. Rendezvous node selection

Rendezvous guarantee connectivity of sensor island within mobile sink hence, their selection largely determines network life time .Rendezvous node lie within the range of traveling sinks and their location depends on the position of the cluster head and the sensor field within the mobile sink range for relatively long time ,in relatively short distance from the sink trajectory and have sufficient energy supplies in practical deployments the number of designated rendezvous node introduces an interesting trade-off. A large number of rendezvous implies that the latter will compete for the wireless channel contention as soon the mobile robot appears range thereby resulting in low data throughput and frequent outage. A small number of rendezvous implies that each rendezvous is associated with a large group of sensors, hence rendezvous node will be heavily used during data relays their energy will be consumed fast and they likely to experience buffer overflow.

C. Cluster Head Attachment to Rendezvous

Cluster heads located far from the mobile sink trajectories do not have any rendezvous within transmission range. An important condition for building intercluster overlay graphs is that cluster heads with no attached rendezvous node attach themselves to a cluster head u with nonempty Ru set so as to address their clusters' data to u. It is noted that our approach typically requires a single mobile sink trip to collect the information needed to execute the setup phase. Clustering starts upon the completion of the first mobile sink trip. The rendezvous nodes' selection process commences immediately afterward. All these phases complete in reasonably short period of time, typically within the time interval between two successive bus trips. As soon as the setup phase finalizes, sensory data collected at cluster heads from their attached cluster members are forwarded toward the rendezvous s following an intercluster overlay graph. The selected transmission range among CHs may vary to ensure a certain degree of connectivity and to control interference.

D. Data Aggregation and Forwarding the Rendezvous

The delivery of data buffered to rendezvous nodes to mobile sink. Data delivery occurs along an intermittently available link; hence, a key requirement is to determine when the connectivity between an rendezvous node and the mobile sink is available. Communication should start when the connection is available and stop when the connection no longer exists, so that the rendezvous node does not continue to transmit data when the mobile sink is no longer receiving it.

To address this issue, we use an acknowledgment-based protocol between rendezvous nodes and mobile sinks.

The mobile sink, in all subsequent path traversals after the setup phase, periodically broadcasts a sample packet, announcing its presence and soliciting data as it proceeds along the path. The sample is transmitted at fixed intervals Tpoll. This sample packet is used by rendezvous nodes to detect when the mobile sink is within connectivity range. The rendezvous node receiving the sample will start transmitting data packets to the mobile sink. The mobile sink acknowledges each received data packet to the rendezvous node so that the rendezvous realizes that the connection is active and the data were reliably delivered. The acknowledged data packet can then be cleared from the rendezvous nodes cache.

E. Cluster re-election and Forwarding data rendezvous node

In sensor node it elect cluster head based on the centralized based that means which sensor node is communicate height sensor node in that particular region that sensor node elect the cluster. some time cluster node is failure because of the energy depletion, we need to chose alternative cluster node in particular region. In periodical time each sensor node in the cluster should possess the next cluster head re-election based on energy to avoid node failure.

III. SIMULATION RESULTS

Mobile sink for the retrieval of sensor information from the respective sensor node, mobile sink movies towards the nearby sensor node and gather the information . In single hop data transfer it sends data to mobile element when the mobile sink approach to the sensor node these mobile element approach the each and every sensor node and sensing the data in this process energy expenditure is more see fig:1 the energy expenditure of single hop data transfer .

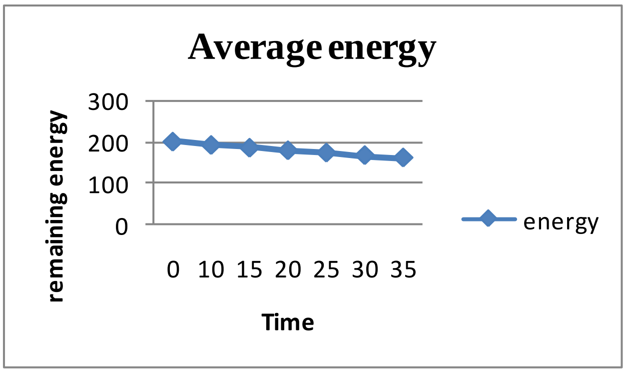

Fig:1 Average energy of single hope data Transfer.

In multihop data transfer multiple of data information sent at a time to the mobile sink. These multihop data transfer all the sensor nodes elected cluster head based on centralized and which sensor node are communicate height sensor node in the network that sensor node elect cluster. These cluster head gathering all information to the respective sensor node and sends the data to the rendezvous in the mainly rendezvous collect the all information and filtering forwarding to mobile sink in this process energy expenditure is low compare to the single hop data transfer see the fig:2 we observing that the average energy comparison of the single hope and multihope data transfer the energy expenditure compare to the single little bit conserving the energy.

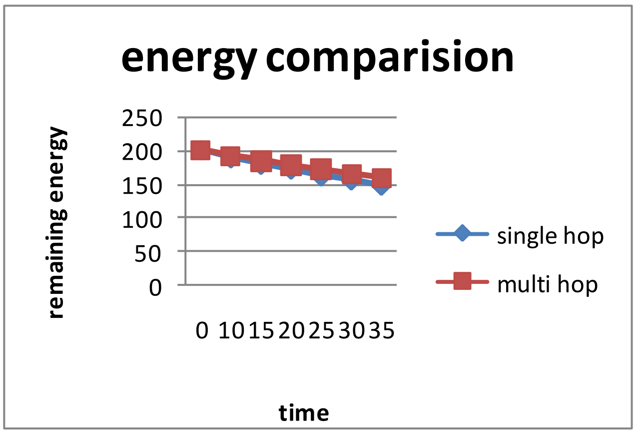

Fig:2 average energy comparisons of single and multi hop.

Some time cluster node is fail because of energy depletion we need to choose alternative cluster head based on which sensor node have highest energy efficiency that sensor node elect cluster head in periodic time to avoid the cluster head failure. See fig:3 average energy comparisons of of single hop and multihop and cluster head re-election based.

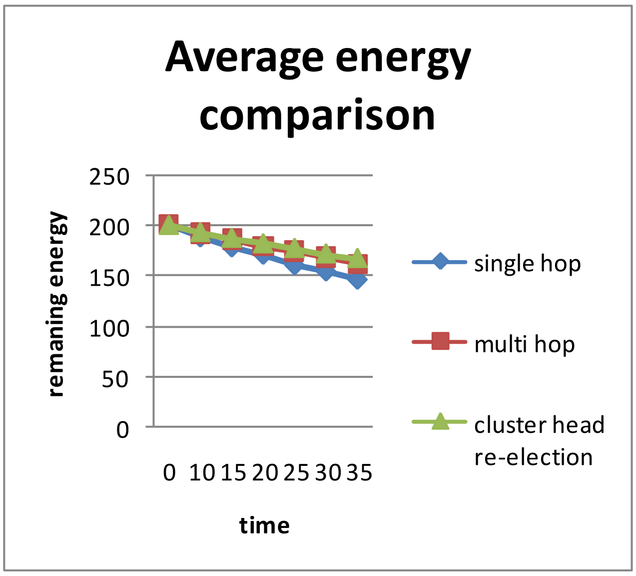

Fig:3 Average energy of single hop and multihop cluster head re-election

IV. CONCLUSION

Cluster head based energy efficient data collection with mobile sink maximizes energy efficiency in wireless sensor network. In this paper cluster head re-election scheme is proposed. Here, an urban vehicle is used to carry mobile sinks to retrieve information from isolated areas of wireless sensor network. The cluster head re-election scheme maximizes the energy efficiency among sensor nodes. The failure of cluster node is because of energy depletion for which we chose an alternative cluster head based on the sensor node energy consumption that sensor node elect cluster head.

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