High Potential Centralized Access Point (CAP)

In Wireless Sensor Networks

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Abstract - This paper explores the idea of implementing centralized access point in the Wireless Sensor Networks.The information from the sensor nodes are collected by the access points that are transferred to the sink node. In chain based structure model, each sensor in the coverage area sends information to the neighbouring node by forming the chain. The main disadvantage in chain structure network is latency. In order to overcome this latency, we are implementing both chain and cluster by forming groups. Information from each sensor is transferred to the head sensor in the form of chain. Information from the group head sensor is send to the access point which is centralized to all the groups. Access point means a sensor with high potential i.e., high battery. By the way, it receives data from all the group heads. On comparing to the previous models, our approach proposes the minimum latency while transferring information from sensor to the sink node.

Index Terms-Group Head, Latency, Centralized Access Point, Sink Nodes, Chain Architecture, Sensors, Potential.

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1 INTRODUCTION

Wireless Sensor Network is used in many fields nowadays. In WSN, the sensors used to collect the information and sent it to the base station for further processing. Sensors are used to collect information within a specific coverage area, this is based on the efficiency of the sensor. Sink nodes collect all the information from the sensor nodes.A sink node is also a sensor which collects information and sends to the base station. These sensors can be used in many fields, such as military, hospitals and in many other areas.For example if a fire accident occurs in huge building we can sprinkle few sensors into the building to know the temperature and condition.So that we can make further steps to put off the fire.

The main issue in the WSN is that hot spot issue, which means the traffic between the sensor nodes to the sink node. The sensor nodes nearer to the sink node require high potential to transfer the information to the sink node. After sensing the information, the main thing to consider is efficiently transferring the information from the group head to the sink node. The efficient data transfer is achieved by placing the sensor on the right place, to transfer information to the sink node. Further discussions will be on related works, proposal of the model, phases involved in the prototype, features.

2 RELATED WORKS

In [1], Cluster architecture is used to transfer information from the group head to sink node. The mobility sink node to forward the information to the base station. Each cluster in the wireless sensor network has the cluster head which contains all the collected information from the sensor nodes in the clusters. In this model we find more latency and also less energy efficient. The circle based wireless sensor network with mobile sink [2] tells that there

is a hot spot issue in the WSN, which means the data load in the sensors nearer to the sink node. To overcome this issue the circle based architecture is used to collect data from the sensor nodes nearer to the sink node.

On referring the concept of PEGASIS algorithm [4] the sensors transfer the information in the form of chain. In chain architecture, the chain node directs the information directly to the sink node. In a chain if one sensor fails then the information is bypassed through the nearby sensor. The disadvantage in chain architecture is that there is the problem of transferring the data by sensors with low potential rate. The double cluster concept tells that a sensor which can transfer information to the other sensor with less energy is the cluster head . The cluster head transfer the information from the nodes to the sink node. To overcome this, we implemented the centralized access point in our proposed model.

3 PROPOSED MODEL

In our proposal, the main concept is to reduce the latency and to increase the life time of the sensor. To achieve this, the spreaded sensors are made into group, each group has group head. Group head is used to send information to the access point. Sensors in the group send information to the group head in the chain structure. In this proposal, we use both chain and cluster structure for the information transfer. The diagram (a) represents the architecture of implementing centralized access point in WSN.

Sensors are formed into groups, each group has a head node. Head node is a node which is nearer to the access point. The node which act as access point is elected based on its potential (i.e., high battery backup) since it is needed to receive information from all the group head nodes and send it to the sink node. The access point and sink used here is static. A group may even contain 50 or more and it may be even less. Within a group each node collects information and the collected information has to be transferred to the group head .This is done by chain structure. A node that collects information sends it to the neighbour node, this is done still it reaches the group head. And finally group head sends these information to the access point.

By this proposal, life time is increased to the some extend. Sensors send information to the neighbour node, so the energy consumed is very less and also with minimum latency.

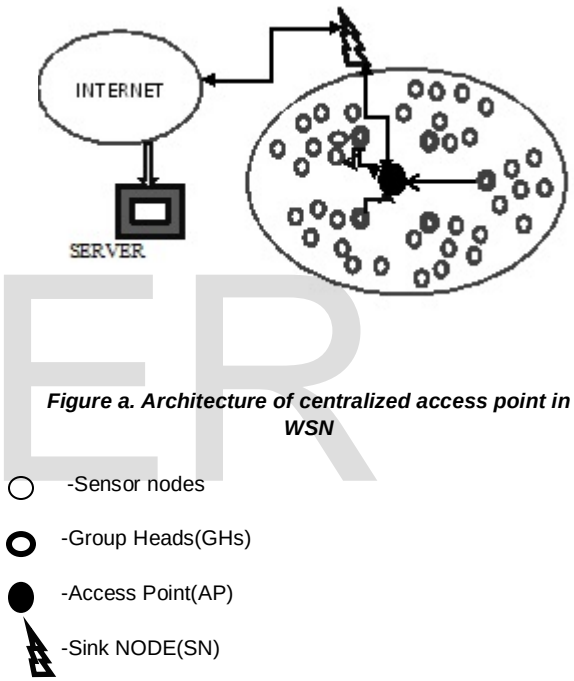

Figure a. Architecture of centralized access point in WSN

4 PHASES INVOLVED

4.1 Grouping of sensors

In Wireless Sensor Network, placing the sensors at the right place plays a major role. Sensors are grouped based on their positions in the coverage area. Assume that there are around 200 sensors in a coverage area, we can group them into 50 in each. By grouping like this the information transfer speed is made high. Each group has the group head (GH).

4.2 Choosing access point and group head

Group head is also a sensor that holds the information that is collected by its group nodes. Group head is choosed based on its position nearer to the access point. Hence information can be transferred easily and faster. Access point is also a sensor which is chosen with high potential (i.e., with high battery backup and high bandwidth)[5]. Since it acts as the main node between group head and sink node. It is used only to receive and transfer information from group head and sink node. If we use this for the sensing purposes like the other nodes its life time will get reduced[6]. These are the main things considered while choosing the access point and the group head.

4.3 Group Head(GH) to Access Point(AP)

GH is used to receive information from the group nodes and send it to the access point. Let us discuss how the information is send from the group nodes to the group heads. Sensor that collects information sends it to the neighbour node. Then that information is transferred to its neighbour node by forming a chain structure. The chain structured architecture improves the lifetime of the sensor. Because ,the information is transferred only to its neighbouring node. This process is done still the information is transferred to the group head. The group head collects the information from its group nodes. Access point(AP) receives the information from GHs.

The information is received by the access point from all the group heads(GH) . The information is effectively received because the access point is high potential and high bandwidth. After receiving all the information from the group heads then that information is transferred to the sink node which is closure to the coverage area.

If we want to transfer an information from sensor 'A' to server it transfers in a chain architecture by choosing their neighbour nodes.

i.e.;

A=>B=>C=>D=>E=>GH

Only GH can transfer information to AP

GH=>AP

The AP transfer that information to sink and to the server.

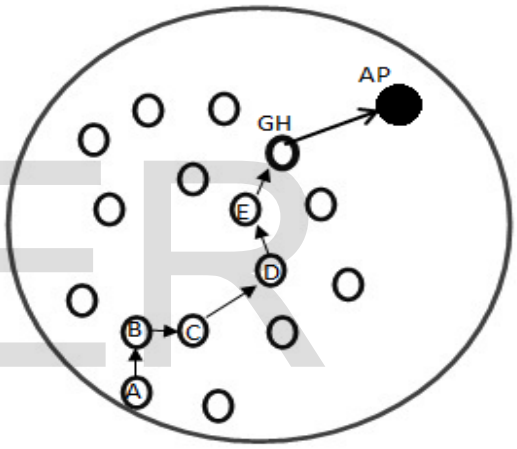

Figure (b) Data transfer from a sensor in a group to AP

5 FEATURES

In our Centralized Access Point (CAP), the information transfer is made faster with high efficiency. Data loss is also reduced to the maximum extends by using Access Point (AP). This is because the information is transferred by both chain and cluster architecture. The access point is capable of collecting and transmitting the information to the sink node with high energy.

The sensor nodes in the group forms the chain, so that the data transfer between the nodes in the group requires less energy to transfer the information and also the collision between the nodes are reduced.

PEGASIS algorithm deals only with the chain architecture. To improve its efficiency we have grouped the sensors within the coverage area and the data is transferred in the chain architecture within the group. This also reduces the latency and data traffic.

In Chain Based Routing Protocol ,it increases only the life time of the sensor. But our CAP model increases the lifetime of the sensor as well as the data transfer bit rate[7]. This is done by placing the AP in the centre of the of groups.

6 CONCLUSION

In this paper we have proposed a model by using the Centralized Access Point (CAP). The AP is chosen with high potential, we achieve the data rate efficiently. By implementing this CAP model we can increase the data rate and reduce the data loss .As we use chain architecture inside a group and only Group Head (GH) can communicate with AP latency is reduced. The server will receive all the transferred information from the sensor without any collision through the sink node

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