A REVIEW ON DIFFERENT ROUTING PROTOCOL FOR WIRELESS SENSOR NETWORK

Er. Kirandeep Kaur
M.Tech Scholar
Department of Computer Science& Engineering
Guru Kashi University,Talwandi Sabo, Bathinda.

Dr. Dinesh Kumar
Associate Professor
Department of Computer Science & Engineering
Guru Kashi University,Talwandi Sabo, Bathinda.

ABSTRACT:-WSN is wireless sensor network having randomly place sensor nodes in the network area. Each node in the network called as sensor node whose work is to the sense the physical environment and collects the data. After certain change in the value of the critical parameters it will send that data to the cluster head. And then finally to the base station for further processing. Each sensor node has major source of energy as battery. Battery energy is limited, so after the certain interval node power may be lost and node becomes dead. The objective of the protocols can be to build a scheme for enhance the life time of the node. It can be possible by making protocol level changes. Various protocol have been defined which works in the context of the energy savings. Various techniques are also been followed to save the energy and in result enhance the life time of the node.

Key Term: TEEN, APTEEN, SENSOR NODE.

I. INTRODUCTION

WSN is the network having various sensor nodes distributed randomly in the area where network is required. These nodes are being localized in the area alter on. Once they are distributed randomly in the area. These sensor nodes are having capacity to senses the environmental factor like humidity, temperature etc.

These nodes are distributed randomly in the area of the network. These nodes can be either placed carefully in the area of may be dropped from certain aircraft randomly. These sensor nodes are either stationary or may be moving in nature [11].

Sensor nodes inter communicates to each other. So they can interchange data amongst each other. This information is related to the physical environment. Each sensor node understands its own power its computing power and the energy they will be containing. Each sensor node communicates to the base station either directly or by keeping cluster head in between. These sensor nodes have routing protocols. These routing protocols help in routing the information from one sensor node to other node finally to the base station in energy efficient way [3].

Base station is the main node which will collect the whole data send by the sensor nodes. These sensor nodes collect the data from its environment. Base station processes the data items. This sensor node is having less power. But the base station is energy harvested and has higher processing power. It will process the data sent by the sensor node and later communicated to the remote station using internet or some satellite etc [3][4][5].

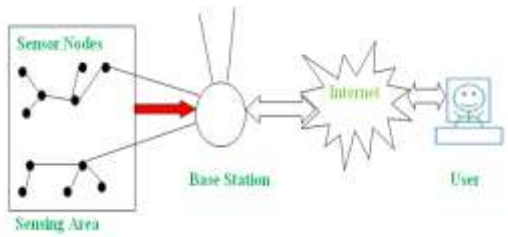

Fig. 1 A general layout of a wireless sensor network [11]

1.1 CLUSTERING IN NETWORK

Sensor nodes sense the data from the physical environment continuously. But the data transmission is done to the base station or to the cluster head with lower frequency. When data from the sensor node is transmitted to the cluster head, and then by using either soft threshold or hard threshold transfers the data from cluster head to the base station. In hard threshold the data will be transmitted after fixed interval of time. But if the soft threshold is used then the data will be transmitted less regularly. There can be a fluctuation in the time of threshold. After the change in small threshold the data will be transmitted by conversion in transmission mode from the sensor node to the cluster head and then cluster head to the base station. So Hard threshold is some time useful because it enforce the sender to stop till the data in range of certain threshold value [4][3][2].

Contrary to TEEN is based on hard threshold. After the fixed time period sensor nodes shifts or transfer the data to the cluster head or to the base station. But it may be inefficient approach if there is a random change in the value. For it soft threshold will be more efficient.

APTEEN is a hybrid approach. This approach periodically changes the threshold value of time. So the time can be adjusted according to the requirement of the application. As the application change the small fluctuation in the time can make application to be more relevant in the current context. APTEEN uses the hybrid type of TDMA technique [2][11]. There they each node send the data to the cluster head with a flexible time. So that data can be sent to the cluster head with varying time. It will be transferred when useful data will be collected at the source. It uses the mix of proactive and reactive technique. In proactive technique previous table based mechanism of time is used. In reactive category at run time

it will be decided which time should be adopted for transferring the data. Once this data will be transferred then usefulness will be check if some useful data will be found then immediately the data will be transferred. Else wait for useful data o be collected at the cluster head [12].

1.2 WIRELESS SENSOR NETWORK DESIGN OBJECTIVES

Most sensor systems are application based. There is diverse number of application lies in the field of networks. This type of network has wide and diverse number of applications, like

1. Little node size: Each node has small size. This small size enables the node to be placed in any type of topology. Due to the smaller size the network can be put into various numbers in the network. So that these nodes can be used for both transmissions and receiving of the data.

2. Low node cost: Each node has smaller cost to incur. So this network is of lower cost. So these nodes can be distributed in large number in those areas. Where there is very harsh environment. Low cost also provides the advantage in terms of distribution in large area.

3. Low power utilization: Because this network consists of various small sized nodes. Each node can work for both transmission and receiving of the data. These nodes are power backed up. This power can be either direct current or alternate current. Normally the nodes are battery operated. That means these nodes use the battery power for small interval of time. After the elapse of the time the battery has to be changed so that new life can be given to the node.

4. Adaptability: This type of network can be used due to its versatility in any type of application. So that system configuration can be used in any field.

5. Dependability: this sensor nodes part of the sensor network has being highly reliable source of information and will provide the reliable information from source area.

6. Self-configurability: this type of network is so cost effective that the nodes in the network can configure them self automatically. Because initially the nodes are place randomly and then later on these nodes are configured and localized according to the requirements.

7. Flexibility: This type of network has higher amount of flexibility. Because of it is automatically adjustable network where various nodes can adjust them self. According to the requirements, this type of network has the ability to configure the network according to the requirements.

8. Channel usage: Since this network has lower capacity nodes. These nodes only collects the data and transfer that data to the cluster head and then to the base station. So the lower level of band width will be used for transfer of the data.

9. Adaptation to non-critical failure: This type of network is highly adaptable to the newer level of failures. Because of the occasion of any failure the system requirements can be established and the current coverage of the system requirements can be established.

10. Security: In this type of network there is a automatic configuration of the network resources. So that system automatically configures and there will be less chances of the system failure [13].

1.3 CLASSIFICATION OF WIRELESS SENSOR NETWORKS

WSN is based on specific application. The sensor nodes are deployed in the region with different capacities. There requirement is to collect and transmit the signal from itself to the base station. So the data from the physical environment can be collected. It is the network which can be categorized into various segments.

Static and Mobile Network: On the basis of mobility of the nodes the network can be categorized on the basis of mobility. When the nodes are moving or mobile in nature then that network can be called as mobile network. But when the nodes are stationary in nature then the network can be called as stationary network.

Deterministic & Non-deterministic Network: When the nodes are placed in the network they have two types on the basis of their work. One is deterministic and other is non deterministic. In deterministic there is sure type of data to be collected. But the non deterministic then they can collect any type of data from its environment. And send that data to the base station [14].

Static Sink and Mobile Sink Network: In this type of network there can be static sink. That means the base station where whole data will be collected at will remain stationary. But if the sink node is mobile in nature then the node is moving from one position to the other position. That means the nodes are being kept to move from here to there. Depend upon the purpose so that node mobility.

Single - Sink and Multi-sink Network: there is a chance of sink node number. As the network size grows. There is a need of more number of sink nodes. Because single sink cannot collect whole data. As low range node has to consider various other nodes as the intermediate nodes. This will halt them to transfer the data to the base station [3][10].

Single Hop and Multi-hop Network: In various network size is the major contribution factor. Sometimes it is possible that one node either directly transfers the data to the base station. And sometimes possible that due to the size of the network it considers other node as intermediate node and sends the data to the base station [15].

II. LITERATURE SURVEY

Wang Ke (2016) *et al* represented hierarchical cluster based NEACH which is an energy aware routing protocol for wireless sensor network. The main focus in this paper was to enhance the energy efficiency i.e. by minimizing the energy consumption and maximizing the lifetime of the wireless network. In NEACH, energy consumption of WSN and fairness of sending data among sensor nodes had modified by using convex function and an optimal solution was obtained. User grouping algorithm was used to modify LEACH protocol which had three states: setup phase, sleep mechanism implementation, steady state phase. A new protocol M-LEACH is obtained having better simulation results as compared to LEACH [2].

Rupali Rohankar (2015) *et al* review of advances in data collection techniques in wireless sensor network had given in which classification of techniques used to collect data had proposed. Based on energy saving, these techniques were categorized and comparison of these techniques had done on the basis of better energy efficiency. Mainly data aggregation method was implemented to avoid correlation among data packets. Tree based, cluster, flat, cover or CDS topologies were used to perform data aggregation method which results in energy saving. By comparison it was concluded that for energy efficiency, connectivity, latency and coverage, cover sets were more suitable [3].

Shio Kumar Singh (2010) *et al* proposed the routing protocols' study and comparison for WSN. In comparison pros and cons of the protocols had compared. The main objective to design routing protocols was to increase energy efficiency and lifetime. This paper defined the survey of

routing protocols based on information of location, layering in network, centricity of data, dynamics of network, redundancy in path etc. Two main things should keep in mind while designing a routing protocol was: duty cycle WSN and 3D sensor field. 3D sensor field design had more accuracy in results as compared to 2D field [4].

Anjali(2015) *et al* DAPTEEN (Distance Adaptive Threshold Sensitive Energy Efficient Sensor Network) which is basically derived from TEEN and APTEEN. These are hierarchical protocols. DAPTEEN was proposed to remove redundancy of data and to increase the energy efficiency of the wireless sensor network. In DAPTEEN distance among the node was calculated from the cluster head and the nearest nodes communicate with CH which overcame the energy consumption among nodes. DAPTEEN was more effective in aggregating the data due to which lifetime of nodes increases as compared to TEEN and APTEEN [1].

Rani and S.H. Ahmed (2016) two types of energy efficient protocols that are: Chain based energy efficient protocol, heterogeneity based energy efficient protocol. Different types of energy aware scheme had discussed and comparison of many energy efficient techniques had been done in this paper. The interest in sparse architecture network can be seen in this paper. The use of energy efficient protocols was required so that connectivity of the network can be maintained. To increase the performance of network, new protocols are required having longer lifetime, lesser delay and high connectivity.

III. COMPARATIVE STUDY

Year	Author name	Technique Followed	Constraints
2017	Syed Akhtar Imam [6]	This paper represented dynamic selection of CH which is based on multiple characteristics of node like node distance from BS, network lifetime, residual energy etc. to increase the network lifetime.	It will take more energy consumption while calculating the residual energy and distance of nodes each time if nodes are movable.
2017	H. Oudani [7]	In this paper hierarchical protocol had developed to increase energy efficiency and network lifetime by selection of CH based on residual energy.	Security issues had not been resolved.
2016	Yuan Zhou[8]	This paper proposed the increase in network lifetime by using PSO i.e. Particle Swarm Optimization technique. Both energy efficiency and transmission distance had taken into account. PSO technique based on shortest distance that means the clusters near base station can communicate more effectively than clusters placed at some distance from BS.	Clusters placed at some distance from base station can't communicate effectively than placed near BS.
2016	M. Shanmukhi [9]	This paper represented research on WSN and data aggregation results. A survey on routing protocols by taking some parameters like mobility, QoS, layering in networks, data centricity etc. had been done.	Duplicate data can be aggregated which can increase the transmission energy consumption.
2015	Vipin Pala[10]	This paper proposed the selection of cluster head based on genetic algorithm which resulted in better load balanced network than traditional network.	Energy consumption is more during selection of the fittest.

IV. CONCLUSION

Various research paper has been studied specially those papers which are related to the hierarchical routing protocol. These types of protocols sub divide the network into small clusters. Each cluster will be having small number of sensor nodes. Based on residual energy a cluster head will be selected. All the sensor node will sends the data to the cluster head. From cluster head data will be transferred to the base station. TEEN and hard time threshold based prouting protocol. Each sensor node aggregates the data for fixed time interval. At the elapse of the time data will be transferred to the base station. But later on APTEEN which is based soft threshold. Flexibility of the time will be taken place. Data will be aggregated at the sensor node. When certain real change in the parameters value then only transmit the data to the base station. Till then no data will be transferred to the base station.

V. FUTURE WORK

Hierarchical routing protocol sub divide the network area in small clusters. Few variable or fixed number of sensor nodes are being distributed into the cluster. Soft or hard threshold of time will be adopted for each sensor node to transfer the data to the cluster head. But in same cluster some critical parameters like temp. Value will remain same. In future we can stop the each sensor node to transfer the data to cluster head. Because the data collected by each sensor node in same cluster will be similar nature. In result it will save the energy of transfer and receive.

VI. REFERENCES

[1] Anjali, Anshul Garg and Suhali, "Distance Adaptive Threshold Sensitive Energy Efficient Sensor Network (DAPTEEN) Protocol in WSN" conference (ISPCC), vol. 3, pp: 67-77, 2015.
[2] Wang Ke, Ajay K Sharma, "Performance Evaluation of HEED and H-HEED Protocol for Realistic Models in WSN", IEEE, Vol. 4, pp: 90-97, 2016.
[3] Rupali Rohankar and S.S. Iyengar, "Localization in Cooperative Wireless Sensor Networks: A Review", IEEE, Vol. 6, pp: 56-66, 2015.
[4] Shio Kumar Singh, "Angle of Arrival Localization for Wireless Sensor Networks", IJCS, Vol. 9, pp: 190-197, 2010.
[5] S. Rani and S.H. Ahmed, "Received Signal Strength Based Mobile Positioning via Constrained Weighted Least Squares", IEEE, vol. 5, pp: 678-686, 2016.
[6] Syed Akhtar Imam, Amit Choudhary, Aijaz Mehdi Zaidi, Manish Kumar Singh and Vaibhav Kumar Sachan, "Global Positioning System: Theory and Practice", Springer, Vol.1, pp: 78-85, 2017.
[7] H. Oudani, S.Krit, M. kabrane, K. Karimi, M.Elasikri, K. Bendaoud, H. EI Bousty, L. Elmaimouni, "Anchor Free Distributed Localization in Sensor Networks," Tech Report, Vol. 10, pp:178-188, 2017.
[8] Yuan Zhou, Ning Wang, and Wei Xiang, "Designing a positioning system for finding things and people indoors," IEEE, Vol.35(9),pp:71-78, 2016.
[9] M. Shanmukhi1 and O. B. V. Ramanaiah, "A distributed location system for the active office," IEEE Network, Vol. 8(1), pp: 62-70, 2016.
[10] Vipin Pala, Yogita, Girdhari Singh, R P Yadav, "RADAR: An in-building RF-based user location and tracking system" INFOCOM, Vol.8, pp. 775–784, 2015.
[11] S. Alireza Motevallian, A. Chakraborthy, and H. Balakrishnan, "The cricket location support system",ACM,vol.15,pp:156-166, 2013.
[12] Mostafa Mofarreh-Bonab, J. Heidemann, and D. Estrin. "GPS-less Low Cost Outdoor Localization for Very Small Devices," IEEE, Vol. 7(5), pp: 28-34, 2013.
[13] Liang Yuan, H. Shrobe and J. Bachrach, "Organizing a Global Coordinate System from Local Information on an Ad Hoc Sensor Network", IEEE, Vol. 3, pp: 453-464, 2015.
[14] Bin Li, H. Park and M.B. Srivastava, "The n-Hop Multilateration Primitive for Node Localization Problems," IEEE, Vol. 8, pp: 443-451, 2013.
[15] Sol Lederer, Chu Du, Li Shu, Gerhard Hancke, Jianwei Niu , and Huansheng Ning, "An Energy-Balanced Heuristic for Mobile Sink Scheduling in Hybrid WSNs", IEEE, Vol. 4,pp:1-12,2015.