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Performance Improve of Multipath Routing Protocols Using Wireless Sensor Networks

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ABSTRACT
A multipath routing protocol (MRP) is proposed, which reduces the manipulate overhead for course discovery and increases the throughput of the community. The proposed multipath routing protocol is designed to improve the lifetime, latency and reliability thru discovering more than one path from the supply node to the sink. MRP is a sink initiated direction discovery method, where source node vicinity is known. In MRP, one number one course and quantity of alternate paths are discovered. A cluster based multipath routing protocol (CMRP) is proposed, in which the clustering method reduces the information hint inside the community, and multipath approach affords the dependable direction. A clustered tree based totally routing protocol (CTRP) is designed to reduce the information site visitors in the network and successfully control the sink mobility. The traffic is reduced by way of the cluster head, which uses the aggregation technique. The mobile sink improves the lifetime of a community by way of avoiding excessive transmission overhead at the nodes which might be close to the sink.

Keywords:- MRP, CMRP, CTRP

I. INTRODUCTION

Routing approach plays a vital function in the wireless sensor community. it is extraordinarily difficult to assign the worldwide ids for a large number of deployed sensor nodes. for that reason, traditional protocols may not be relevant for WSN. Unlike traditional wi-fi verbal exchange networks (MANET, cellular network, and many others.), WSN has inherent characteristics. it's miles fantastically dynamic network and specific to the application, and additionally it has constrained power, garage, and processing functionality. Those traits make it a very hard assignment to increase a routing protocol. In most of the eventualities, multiple assets are required to ship their information to a specific base station. The nodes close to to the sink, depleted greater power and subsequently finally die. This reasons partitioning of the community; consequently, the life of the community receives to lessen. The principle constraint of the sensor node is electricity. The sensors are battery-powered computing devices. It's hard to update the batteries in many programs. Consequently, WSN calls for a strength-efficient routing protocol. Due to dense deployment, the sensor nodes generate the redundant records, and the bottom station can also receive multiple copies of the identical statistics. Therefore, it unnecessarily consumes the energy of the sensor nodes. WSN does not have any fixed infrastructure and is tremendously dynamic. There are mainly two reasons liable for the dynamic infrastructure. the primary cause is the energy; the sensor nodes have constrained energy inside the form of batteries. If the protocol is not able to balance the burden among the nodes, the sensor node could die. It leads to the dynamic network structure. the second motive is the mobility; in lots of eventualities after the deployment, sensor nodes are static but sink can flow in the community. It makes the community dynamic, and the protocol that works for static sink may not be applicable for mobile sink. In lots of packages, sensor nodes are required to recognize their vicinity facts. It is not feasible to enable all nodes with worldwide Positioning device (GPS). So the protocol ought to must take the help of the techniques like triangulation primarily based positioning play station - loose answers, and so forth. to get the approximate vicinity data.

1.1. Multipath Routing Protocol with Static Sink

The design of reliable routing protocols is resistant to frequent path disruptions caused by node failure and

collision. The routing path should be maintained while data transmission otherwise re-transmission of data increases energy consumption. Some protocols discover routing path but often fails while transmission, which decreases the reliability. The data should reach the base station (sink) through a reliable path. The solution to this problem is multipath routing. Multipath routing protocol allows numerous paths between the source and the sink. So if one path fails, data can still be sent through the different available path. This increases the reliability of the system. Due to the dense deployment of sensor nodes, it is possible to construct multiple routing paths. This motivated us to use the concept of multipath routing for reliable data transmission. A number of routing protocols maintain the multipath at the cost of energy consumption.

In this chapter, a Multipath Routing Protocol (MRP) is proposed which reduces the control overhead for route discovery and increases the throughput of the network. The proposed multipath routing protocol is designed to improve the lifetime, latency and reliability through discovering multiple paths from the source node to the sink. MRP is the sink initiated route discovery process with the known location information of the source node. In MRP, one primary path and many alternate paths are discovered.

1.2. Cluster based Multipath Routing Protocol with Static Sink

The sensor node transmits the facts to the bottom station thru the intermediate sensor nodes in the multihop environment. within the sensor community with strength constraint surroundings, the community regularly calls for power-green routing protocol. The reliable path notably reduces the re-transmission of information, that can lower congestion and energy consumption. Commonly, sensor nodes are densely deployed inside the network, and a insurance region is probably overlapped by means of many sensor nodes, which generate duplicate information. In multipath routing protocol (MRP) as mentioned provides the reliability, however the sink receives redundant data. This hassle can be resolved by the usage of the clustering method. In clustering, the cluster heads combination the cluster contributors' information earlier than transmitting to the sink. The clustering reduces the statistics traffic within the network, and multipath technique offers the dependable route. these strategies inspire to endorse a hybrid protocol that has the advantage of both clustering and multipath.

In this chapter, Cluster primarily based Multipath Routing Protocol (CMRP) is proposed, which addresses the necessities as noted above. The predominant drawback of the present protocols is the manage packet overhead. To decrease the overhead, the CMRP reduces the burden at the sensor nodes and presents extra responsibility to the sink, as the sink is a resource-rich node.

1.3. Tree based Routing Protocol with Mobile Sink

In static sink environment, sensor nodes near sink constantly act as the relay nodes. Relay nodes supply the records to the sink and as a consequence, consume more power compared to different nodes that are a long way from the sink, consequently, they die. It creates hotspots within the sink place, and the community receives detached. although ultimate sensor nodes nevertheless have their electricity and operative. Such, state of affairs is called "crowded middle effect" [60] or "strength hole/hotspot problem". Sink mobility prolongs the community lifetime by diminishing the hotspot hassle. Aside from hotspot solution, the mobile sink has many blessings over the static sink which include load balancing, shorter information dissemination path and better managing of the sparse or disconnected community. frequent change of the neighboring nodes of the sink leads to balance the load of the network. Shorter facts dissemination direction presents longer network lifetime through increasing throughput and decreasing energy intake.

The mobile sink movements inside the community and collects facts from the sensor nodes. The motion of the sink may be a random, controlled or predefined and makes the community dynamic in nature. A cell sink is required to replace their location data inside the network. This system consumes extra strength of the network. So the routing protocols with the static sink aren't appropriate with the cell sink. but, green broadcasting and routing technique can lessen this energy consumption as much as a positive quantity. it is a completely challenging venture to control the sink mobility and increase an efficient routing approach. This task motivates to expand the routing protocol with cell sink, which makes use of less electricity to control the mobility of the sink.

The principle flaws within the current routing protocols with mobile sink are better routing overhead and shorter lifetime. in this chapter, a Tree primarily based information Dissemination protocol with mobile sink (TEDD) is proposed to conquer the above flaws. on this protocol, any sensor node can disseminate the data to the sink via a tree. The tree is impartial of the sink mobility. in the tree shape, the leaf node is known as non-relay, and the non-leaf node is called relay node. TEDD manages the mobility of the sink and balances the

burden the various sensor nodes to maximize the lifetime.

1.4. Clustered Tree based Routing Protocol with Mobile Sink

The formerly proposed tree-based totally protocols TEDD and DTRP manipulate the sink mobility. In DTRP, the average course duration is much less as compared to TEDD. but, in large-scale WSN surroundings, both protocols suffer from the redundant statistics transmission. In TEDD and DTRP, the relay node forwards the statistics from other sensor nodes. Relay nodes in such an environment waste their energy in moving the redundant data. as a result, it's far required to remove the redundancy inside the adequate level, to preserve strength. facts aggregation is a way in which every relay node can mixture the statistics, procedure them and transmit a unmarried packet.

DTRP contains a lesser relay node than TEDD, but each cannot restriction the wide variety of relay nodes inside the community. As relay nodes have extra duty than the non-relay nodes, it consumes more energy. If any method can limit the variety of relay nodes, then it could be possible to reduce the energy intake. This difficulty motivates to expand a routing protocol which can aggregate the records and restrict the wide variety of relay nodes inside the community.

in this bankruptcy, a Clustered Tree based totally Routing Protocol (CTRP) is advanced. in the CTRP, the community is split into digital grids, and clusters are shaped in every grid with a cluster head. The cluster head is chosen based on its residual strength and the gap from the centroid of the grid. once a cluster head is chosen, a tree is formed using those cluster heads, i.e., all cluster heads are dealt with because the vertices of the tree. Cluster heads combination the statistics and transmit it to the sink thru this tree. The quantity of cluster heads is limited to the range of grids gift inside the community. further, the sink management technique can efficiently deal with the sink mobility. The proposed load balancing technique balances the burden most of the sensor nodes to decorate the life of the community.

II. ISSUES AND CHALLENGES FOR ROUTING IN WIRELESS SENSOR NETWORKS

The highly dynamic and energy constraint network, it is a challenging task to develop a routing protocol. The design of the routing protocol can be affected by many characteristics possessed by the WSN. A few issues and challenges for routing in WSN are discussed below:

Energy constraint: The sensor nodes are battery-powered devices, hence have limited energy. A large amount of energy is consumed during data transmission. Furthermore, a significant amount of energy is consumed during the route discovery and its maintenance phase. The lifetime of the network directly depends on the total energy consumption by each node. If a sensor node's energy reaches below a certain level, it will become nonfunctional and affects the performance of the network. Therefore, it is a big challenge for a routing protocol designer to manage the energy of the sensor nodes to maximize the network lifetime.

Bandwidth constraint: Generally, WSN consists of a large number of sensor nodes, which makes the bandwidth allocation for each link very challenging. Moreover, in the process of route discovery and maintenance, an enormous amount of control packets has to be broadcasted among the sensor nodes. Thus, the network bandwidth allocation process depends on the number of links and the amount of data they can communicate.

Limited hardware constraint: Sensor nodes are tiny embedded devices having limited processing and storage capacity. Therefore, the researchers have to design a light-weight routing protocol that does not have complicated computing procedures and functions. Hence, the sensor nodes can process and store the data efficiently.

Crowded center effect: The data communication from source nodes to a sink in WSN is the many-to-one relationship. In the multi-hop environment, each sensor node forwards the data to the sink through intermediate sensor nodes. The sensor nodes near the sink always relay a large number of data. Therefore, they consume more energy than the remaining nodes and finally die. This issue is named as crowded center effector energy hole problem .This leads to a partitioning between the sink and the source node in the network.

Node deployment: The sensor node deployment entirely depends upon the applications. In some applications, structured deployment is required whereas, in some scenarios, random deployment is needed. In the random deployment, the node location is not predefined and generally, thrown from an aircraft in the hostile or unattended area. The node deployment highly affects the network performance .

Mobile node information: After the sensor node deployment generally, the nodes are static. However, in some applications, the nodes are mobile. There should be a proper way to locate those mobile nodes to communicate with the static node. In some applications, the sink is moving within the network for data collection.

So the routing protocol should be able to inform the sink location to the nodes within the network.

Sensor node location: The geographical location information of the sensor nodes is required in many applications like tracking, monitoring, event detection, etc. It is not possible to enable the GPS in every single node . Instead; unknown nodes can find the location using the methods like triangulation based positioning and GPS-free solutions. The routing protocol should be able to locate the sensor nodes using the location finding techniques .

Scalability: A large number of sensors are deployed in the interested area. Further, during the operation, the network size may increase. The protocol has to be designed in such a way that the node scalability does not affect the performance .
In addition to the above challenges, two significant aspects of WSN have to be addressed such as energy constraint and mobile node information. The detail about energy management and mobile sink management and the necessary factors that need to consider are described below.

III. OBJECTIVES OF THE RESEARCH

To enhance the network lifetime and manage the mobile sink, energy-efficient techniques are required in routing protocol. The objectives of the thesis are listed as follows:

- Designing of a multipath routing protocol to enhance the reliability and energy-efficiency.
- Proposing a cluster based multipath routing technique to improve energy- efficiency and reliability.
- Developing a tree-based routing technique in the mobile sink environment.
- Designing of a dense tree based routing technique with mobile sink to efficiency manage the sink mobility.
- Developing a clustered tree based routing technique with the mobile sink environment.
- Developing a rendezvous based routing with mobile sink to reduce the latency and increase the network lifetime.

IV. CONCLUSION

Sensor nodes are pushed by way of the battery and in lots of programs, these batteries cannot be replaced. They die while the battery exhaust and the community capability are effected. as a result, a routing method could be very plenty vital to enhance the existence span and manages the battery efficiently. This function motivates to layout electricity-efficient routing techniques.wi-fi sensor network is a multi-hop network where data are transmitted thru the intermediate sensor nodes. The links among sensor nodes are exceedingly prone to failure. The frequency of link failure immediately effects the information shipping ratio and reduces the reliability of the network. This issue motivates to design reliable routing techniques.

The electricity complete problem may be solved using the mobile sink. but, the mobile sink management is a tedious project. Many routing protocols are working in the cellular sink environment however own flaws like; ineffective control, elevated strength consumption, and reduced information delivery ratio. it's miles vital to efficiently control the mobile sink to extend the lifetime of the network. in many packages, the generated statistics must attain the base station on the earliest. however, the unavailability of the routing path, sink region and frequency of node failure will increase the end-to-cease latency. therefore, it is required to contain techniques to reduce latency.

REFERENCES

[1] D. Zhang, G. Li, K. Zheng, X. Ming, and Z. H. Pan, "An Energy-Balanced Routing Method Based on Forward-Aware Factor for Wireless Sensor Networks," IEEE Transactions on Industrial Informatics, Vol. 10, No. 1, Pages 766 – 773, February 2014.

[2] J. I. Bangash, A. H. Abdullah, M. H. Anisi, and A. W. Khan, "A Survey of Routing Protocols in Wireless Body Sensor Networks," Sensors, Vol. 14, No. 1, Pages 1322 – 1357, January 2014.

[3] T. Rault, A. Bouabdallah, and Y. Challal, "Energy Efficiency in Wireless Sensor Networks: A Top-Down Survey," Computer Networks, Vol. 67, No. 1, Pages 104 – 122, July 2014.

[4] L. Xie, Y. Shi, Y. T. Hou, W. Lou, H. D. Sheral, and S. F. Midkiff, "Multi-Node Wireless Energy Charging in Sensor Networks," IEEE/ACM Transactions on Networking, Vol. 23, No. 2, Pages 437 – 450, April 2015.

[5] T. K. Jain, D. S. Saini, and S. V. Bhooshan, "Lifetime Optimization of a Multiple Sink Wireless Sensor Network through Energy Balancing," Journal of Sensors, Vol. 2015, Pages 1 – 6, 2015.

[6] M. Gholipour, A. T. Haghighat, and M. R. Meybodi, "Hop-by-Hop Traffic-Aware Routing to Congestion Control in Wireless Sensor Networks," EURASIP Journal on Wireless Communications and Networking, Vol. 2015, No. 15, Pages 1 – 13, January 2015.

[7] M. Azharuddin and P. K. Jana, "A Distributed Algorithm for Energy Efficient and Fault Tolerant Routing in Wireless Sensor Networks," Wireless Networks, Vol. 21, No. 1, Pages 251 – 267, January 2015.

[8] B. Cheng, R. Du, B. Yang, W. Yu, C. Chen, and X. Guan, "An Accurate GPS-based Localization in Wireless Sensor Networks: A GM-WLS Method," In Parallel Processing Workshops (ICPPW '11), Pages 33 – 41, September 2011.