Scientific Journal Impact Factor (SJIF): 1.711

e-ISSN: 2349-9745
p-ISSN: 2393-8161

International Journal of Modern Trends in Engineering and Research
www.ijmter.com

IMPROVING THE PERFORMACE OF DATA AGGREGATION IN WIRELESS SENSOR NETWORK

Kalaivani.M[1] and Rohini.R[2]
[1,2]*Department of CSE, Vivekanandha College of Engineering for Women*

Abstract— In this paper data aggregation using multipath routing is proposed. In existing system, under hybrid scheme, it each sensor nodes generates information by sensing its physical environment and transmit to sink by multi hop communication. In network aggregation computation intermediate forwarding nodes can substantially increase the network life time but amount of data contained in single packet and make the system vulnerability to packet loss. Instead of retransmission it takes the additional time. Ad hoc On Demand Distance Vector routing protocol is used to improving the performance of data aggregation due to avoiding these problems.

Keywords- Data aggregation, Multipath routing, Greedy shortest Path, Frequent connection, Throughput.

I. INTRODUCTION

Wireless sensor network consist of a large number of sensor node with limited resource of energy, transmission power, network power, network bandwidth, and computation power. Each sensor node is able to perform some processing and sensing task independently. Each sensor node is able to communicate with each others to forward the sensing information. Sensor network can be consist of three subsystem namely sensor subsystem, processing subsystem, and communication subsystem. Sensor subsystem is sense the information by its physical environment. Processing subsystem is the performing the some process. Communication subsystem is the each node communicates with each other to forward the data. Components of wireless sensor node are transceiver, memory, processor, sensor, and power supply.

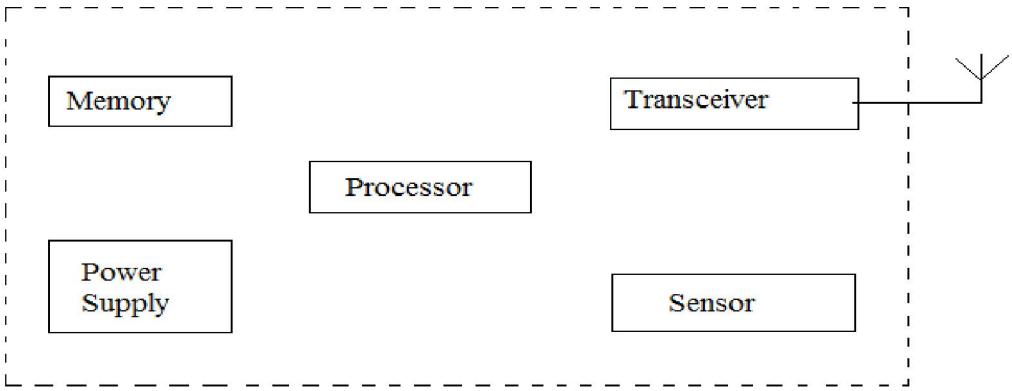

Figure 1. Components of wireless sensor node

In hybrid scheme that blends unicast and multicast. Under hybrid scheme, the information obtained by an individual sensor is collected by some special nodes called collecting nodes, and these collecting nodes are responsible for data aggregation and information transmitted to sink. In Aggregation with unicast is a point to point communication system with a tree topology. In aggregation with broadcast is to simultaneously send the message to multiple receivers. In this paper we are using routing methodology to reliable transmission. In routing data transmission from target areas toward to sink node is the main task of wireless sensor network, utilize the method of to forward data packets between each pair of source to sink. Routing protocols specifies how routers communicate with each other dissemination information that enables them to select routes between any two nodes. There are many routing protocols such as link state routing protocols, distance vector routing protocols.

II. DATA AGGREGATION: AN OVERVIEW

Data aggregation is the process of gathering the sensor data from sensor node using aggregation approach. The aggregations are centralized approach, in network aggregation, tree based approach, and cluster based approach. In-network aggregation is the process of gathering and routing information through a multi hop communication. Hop contains the multiple ports, when receive the message is in one port it copied to other ports. In-network aggregations there are two types of aggregation. In aggregation with size reduction, the process of combining and compressing the data packets received by a node from its neighbors and reduce the packet length to be transmitted to sink. In without size reduction process of merging data packets received from different neighbor node in to single data packet.

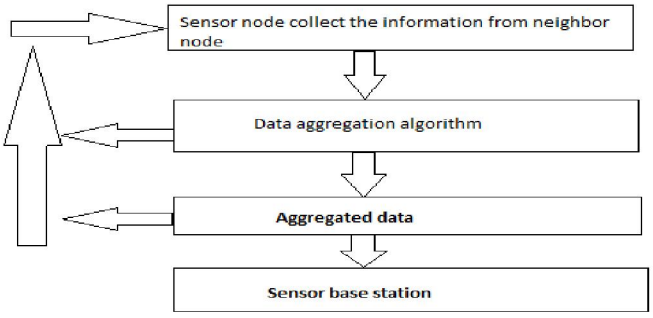

Figure 2. Architecture of data aggregation

(i) Centralized Approach:

Each source independently sends data along the shortest path to sink is called the address centric routing. The sources send data to sink but routing nodes enroute look at the content of the data and perform some aggregation function.

(ii) In-Network Aggregation:

In network aggregation is the global process of gathering and routing information through a multi hop communication. There are two types of network aggregation: with size reduction and without size reduction.

In network aggregation with size reduction refers to the process of combining and compressing the data packets received by a node from its neighbor node and reduces the packet length to be transmitted to sink.

In network aggregation without size reduction is process of merging data packets received from different neighbor in to single data packet.

(iii) Tree Based Approach:

It perform aggregation by constructing an aggregation by constructing an aggregation tree, which could be a minimum spanning tree, rooted at sink and source nodes are leaves node.

(iv) Cluster based approach:

Cluster based approach is divided in to several cluster. Each cluster has cluster head. The cluster head aggregate the information and send the data packets to sink node.

III. MULTIPATH ROUTING TECHNIQUE

Multipath routing is the routing technique of using multiple alternative paths through a network. The benefits are fault tolerance, increased bandwidth, and improved security.

3.1 Multipath routing in wireless sensor network:

In routing it has two types of routing approach namely single path routing, multipath routing. In single path routing is the efficient of high data transmission in wireless transmission. In multipath routing is used to simultaneously to evaluate the data transmission. There are two different approaches to provided reliable transmission through multipath routing. The first approach is based on transmitting multiple copies of an original data packet over different paths to ensure packet recovery from several path failures. Through this technique, data transmission reliability can be guaranteed, if data forwarding over at last one path is done successfully. Erasure coding is another technique each source node adds some additional information to the original data packets and then distributes the generated data packets over different paths. To reconstruct original packets, at last a certain number of transmitted data packets from each source node should be received by the sink node. Accordingly, if a few numbers of paths failed to deliver some data packets to the sink node, still the reliability of data transmission can be guaranteed through reconstructing data packets from successfully received data packets by the sink node.

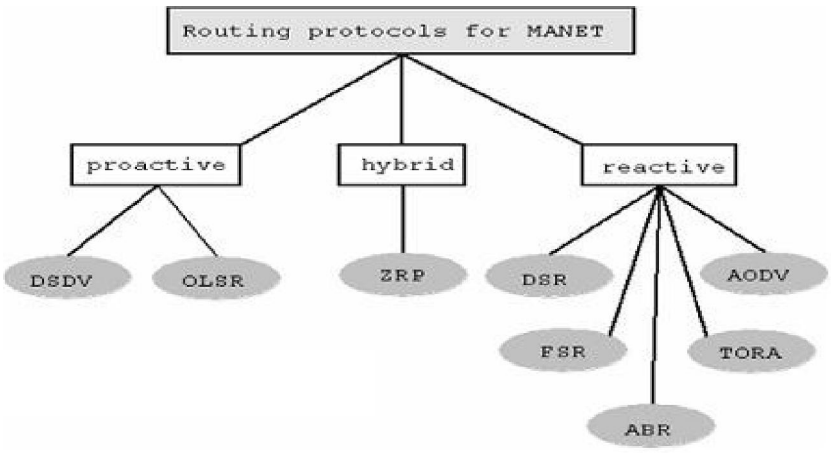

Figure 3. Types of routing protocol

4.1.1 Benefits of multipath routing protocols

(i) Reliability and Fault- tolerance: It provides path resilience for against node or link failure and reliable data transmission. It can benefit from availability of alternate paths to salvage its data packets from node or link failure.

(ii) Load Balancing: Spreading the traffic along multiple routes can alleviate congestion in some links.

(iii) QOS Improvement: QOS support in terms of network throughput, end-to-end latency. Data delivery ratio is an important objective in designing multipath routing Protocols for different types of networks

(v) Reduced Delay: The delay is minimized in multipath routing because backup routes are identified during route discovery.

4.1 A hoc On Demand Distance Vector Routing Protocol:

The proposed Ad hoc on demand distance vector routing protocol. Before that first we construct the greedy incremental tree, this scheme the aggregation tree is the only built sequentially. At the first step the tree consists of only the shortest path between the sink and the nearest source. At each step after that the next source closest to the current tree is connected to the tree. AODV is the combination of DSDV and DSR. Over head on transmit the packets to single packet. Due to overhead the packets can be loss, instead of retransmission it takes additional delay and the performance of in network aggregation is low performance .To overcome these problem we are using AODV protocol in multipath technique and it provide the reliable transmissions.

In multipath routing protocol, each multipath routing protocol consists of several components to construct path and distribute network traffic over the discovered paths.

(i) Path Discovery: Since data transmission in wireless sensor networks is commonly performed through multi-hop data forwarding techniques, the main task of the route discovery process is to determine a set of intermediate nodes that should be selected to construct several paths from the source nodes towards the sink node. Discovered paths can be generally categorized as node-disjoint, link-disjoint, or partially disjoint paths. For node-disjoint paths, there is no common node or link among the discovered paths. Therefore, any node or link failure in a set of node-disjoint paths only affects the path, which contains the failed node or link. Since this kind of path disjointedness provides higher aggregated network resources, node-disjoint paths are preferred over link-disjoint

(ii) Path Maintenance: Due to the resource constrains of sensor nodes and high dynamics of low-power wireless links, paths are highly error prone. Therefore, path reconstruction should be provided to reduce performance degradation. This is the main task of the path maintenance phase in multipath routing protocols. Path rediscovery process can be initiated in three different situations: (1) when an active path has failed, (2) when all the active paths have failed or, (3) when a certain number of active paths have failed. Since, the frequency of initiating route rediscovery process in the first approach is higher than for the two other approaches, using this strategy imposes a high overhead. Nevertheless, performing a route rediscovery process after the failure of all the active paths may significantly reduce network performance. Therefore, it seems that the third approach may represent a trade-off between the advantages and disadvantages of the first two approaches.

In ad hoc on demand distance vector routing protocol each node maintains one routing table. *Each routing table contains:*

(i) Active neighbor list: A list of neighbor nodes that are actively using this route entry. Once the link in the entry is broken, neighbor node in the list will be in formed
(ii) Destination address.
(iii)Number of hops to destination.
(iv)Sequence number: for choosing route and prevent loop.
(v) Lifetime: Time when that entry expires.

Routing in AODV consists of two phases:

Route discovery: when a node wants to communicate with a destination, it looks up in the routing table. If the destination is found, node transmits data in the same way as in DSDV. If not, it start Route Discovery mechanism: Source node broadcast the Route Request packet to its neighbor nodes, which in turns rebroadcast this request to their neighbor nodes until finding possible way to the destination. When intermediate node receives a RREQ, it updates the route to previous node and checks whether it satisfies the two conditions:

(i) There is an available entry which has the same destination with RREQ
(ii) Its sequence number is greater or equal to sequence number of RREQ.

If no, it rebroadcast RREQ. If yes, it generates a RREP message to the source node. When RREP is routed back, node in the reverse path updates their routing table with the added next hop information. If a node receives a RREQ that it has seen before (checked by the sequence number), it discards the RREQ for preventing loop. If source node receives more than one RREP, the one with greater sequence number will be chosen. For two RREPs with the same sequence number, the one will less number of hops to destination will be chosen. When a route is found, it is maintained by route maintenance.

Route Maintenance mechanism: Each node periodically send Hello packet to its neighbors for proving its availability. When Hello packet is not received from a node in a time, link to that node is considered to be broken. The node which does not receive Hello message will invalidate all of its related routes to the failed node and inform other neighbor using this node by Route Error packet. The source if still want to transmit data to the destination should restart Route Discovery to get a new path. AODV has advantages of decreasing the overhead control messages, low processing, quick adapt to net work topology change, more scalable up to 10000 mobile nodes. However, the disadvantages are that AODV only accepts bi-directional link and has much delay when it initiates a route and repairs the broken link.

IV. CONCLUSION

In the paper hybrid method is used to aggregate the data in network aggregation. In wireless sensor network, in-network aggregation only improves the energy efficiency when goal of the network is compute a global function. However, since the loss of an aggregate packet is far more harmful than un aggregated packet, a higher level of protection is required for reliable operations in lossy wireless sensor environments. We propose a multipath technique to reliable transmission. In multipath technique AODV protocol is used to frequent path establish and it using path discovery and routing mechanism.

REFERENCES

[1] A. Giridhar and P. R. Kumar, "Toward a theory of in-network computation in wireless sensor networks," *IEEE Commun. Mag.* , vol. 44, no. 4, pp. 98–107, Apr. 2006.
[2] R. G. Gallager, "Finding parity in a simple broadcast network," *IEEE Trans. Inf. Theory*, vol. 34, no. 2, pp. 176–180, Mar. 1988.
[3] E. Kushilevitz and Y. Mansour, "Computation in noisy radio networks," *SIAM J. Discrete Math.* , vol. 19, no. 1, pp. 96–108, 2005.
[4] L. Ying, R. Srikant, and G. Dullerud, "Distributed symmetric function computation in noisy wireless sensor networks," *IEEE Trans. Inf. Theory*, vol. 53, no. 12, pp. 4826–4833, Dec. 2007.
[5] L. L. Peterson and B. S. Davie, *Computer Networks: A Systems Approach, 3rd Edition*. San Francisco, CA, USA: Morgan Kaufmann, 2003.
[6] A. Giridhar and P. R. Kumar, "Computing and communicating functions over sensor networks," *IEEE J. Sel. Areas Commun.* , vol. 23, no. 4, pp. 755–764, Apr. 2005.
[7] S. Kamath and D. Manjunath, "On distributed function computation in structure-free random networks," in *Proc. IEEE ISIT*, Jul. 2008, pp. 647–651.

[8] C. Li and H. Dai, "Towards efficient designs for in-network computing with noisy wireless channels," in *Proc. IEEE INFOCOM*, Mar. 2010, pp. 1–8.
[9] J. Zhao, R. Govindan, and D. Estrin, "Computing aggregates for monitoring wireless sensor networks," in *Proc. IEEE Int. Workshop Sensor Netw. Protocols Appl.* , May 2003, pp. 139–148.
[10] J.-Y. Chen, G. Pandurangan, and D. Xu, "Robust computation of aggregates in wireless sensor networks: Distributed randomized algorithms and analysis," in *Proc. IPSN*, 2005, p. 46.
[11] N. Khude, A. Kumar, and A. Karnik, "Time and energy complexity of distributed computation in wireless sensor networks," in *Proc. IEEE INFOCOM*, 2005, vol. 4, pp. 2625–2637.
[12] S. A. Hofmeyr, A. Somayaji, and S. Forrest, "Intrusion detection using sequences of system calls," *J. Comput. Security*, vol. 6, pp. 151–180, 1998.
[13] E. D. Manley, H. A. Nahas, and J. S. Deogun, "Localization and tracking in sensor systems," in *Proc. IEEE Int. Conf. Sensor Netw., Ubiq., Trustworthy Comput.* , Jun. 2006, vol. 2, pp. 237–242.

