NOVATEUR PUBLICATIONS
International Journal of Research Publications in Engineering and Technology [IJRPET]
ISSN: 2454-7875
VOLUME 3, ISSUE 9, Sep. -2017

DATA LOSS PREVENTION IN CONGESTION PRONE WIRELESS SENSOR NETWORK USING VCLR MODEL

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ABSTRACT

In WSN source node generate an event within the cluster at that time this collected information forward towards sink node through cluster head node. Cluster head acts as intermediate node between sink node and source node. The congestion may occur at the cluster head and this prompts to data loss also affect the reliability of the network. In existing system cluster head only performs normal data packet transmission from source node to sink. Due to insufficient buffer size at cluster head node there is more packets drop during the transmission of packets. So, this system gives lower packet delivery ratio. The current work concentrates on improving reliable data collection at sink node. In this proposed system database file attached to the cluster head node for storage of data packets. The data packets which are lost during the transmission from cluster head node to sink node. The drop packets are recovered from the attached database file. The recovered packets are resend to sink node by cluster head node. So, we can improve packet delivery ratio, more number of received packet, less number of drop packet, lesser end to end delay.

KEYWORDS: Wireless sensor network, ns2, Packet Delivery. Ratio, Reliability.

I. INTRODUCTION:

Wireless sensor Network consist of small microcontroller fitted with sensors and some means of communication radios. They are distributed over wide area and transmit gathered data to one or many central nodes called as Sink or also know as base station.[1] The applications of wireless sensor network can be categories as remote environmental monitoring and target tracking. The monitoring applications includes physical or environmental event monitoring at indoor/outdoor locations, factory monitoring, process automation monitoring, health monitoring, power monitoring, inventory monitoring, structural monitoring etc. The tracking applications include military tracking applications, objects tracking, animals tracking, humans tracking, and vehicles tracking etc. [2].

There are many problems to be solved in wireless sensor network, such as congestion control, rate control, flow control, medium access control, queue management, power control and topology control etc. In a Wireless sensor network a large amount of data flows from sensors to sink. When large numbers of sensor nodes are transmitting the data packets, the load becomes heavy and data traffic also increases and this might lead to congestion situation. Congestion in a wireless sensor network may leads to problems like data packet loss, delay of critical information, wastage of resources, buffer overflow. The packet loss may occur due to overflow of buffer capacity, congestion situation, poor radio communication, and failure of node. The packet loss results in wasted energy and degraded quality of service [4].

In a wireless sensor networks one common critical service is data collection, where sensed data are continuously collected by sensor nodes and forwarded to a central base station for further processing. The detection of packet loss and correctly recovering missing packets is important factor to be considered. Wireless sensor networks need to be overcome problems like congestion control, reliable data collection or dissemination, energy conservation etc. Some mechanism should be implemented to avoid data packet loss in congestion situations.

The objective of current work is to enhance reliable data collection at sink node. It focuses data packets storage mechanism as primary task in a wireless sensor network to achieve reliable data collection in wireless sensor network. The packet loss is minimized by retransmitting the dropped packets to sink. The dropped packets are recovered from attached database file. This technique improves data collection by avoiding congestion situations in the wireless sensor network.

II. PROPOSED WORK:

In wireless sensor networks sensor nodes senses physical parameters data and transmit the gathered information to base station. The source node will generate events as per the frequency provided to that source node. If all source nodes[4] forward there packets towards the sink the possibility of congestion is more since each node will process these packets in hop by hop data distribution. The nodes near to the sink[4]operate as intermediate node, there energy will consume more so, they dead early and further data packets transmission from source nodes to sink node blocked that leads to congestion situation in network. Congestion in wireless sensor network[5] may

leads to higher packets drop, lower throughput and increased delay. We propose two architectures for measuring reliability in data collection the first architecture is hierarchical virtual cluster based architecture is shown in Fig. 1. This architecture is similar as second hierarchical cluster based architecture, in addition to that, each cluster head act as storage node that attached with database file. The source nodes forward sensed data packets towards their cluster head which will further transmits packets to the sink. The dropped data packets are stored in database file attached to cluster head automatically in background. The packets which are dropped in between cluster head and sink during transmission will be identified by cluster head on getting negative acknowledgement from sink node. These packets will be sent back to the sink by cluster head node after recovering dropped packets from database file. So, packet loss is minimized and reliable data collection [4] can be achieved at sink node.

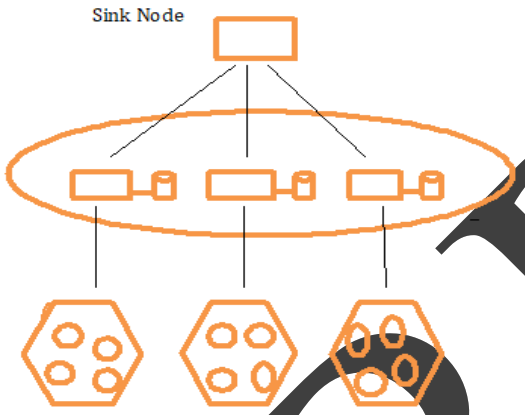


Fig 1-Hierarchical Architecture with database

The second architecture is hierarchical cluster based architecture is shown in Fig. 2. In this architecture a cluster of few nodes fashioned in hierarchical manner all source nodes in this cluster can sense parameter information values and forward information packets towards the sink [4] through their individual cluster head node.

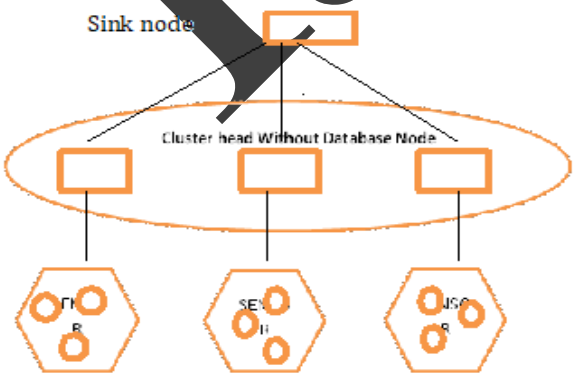
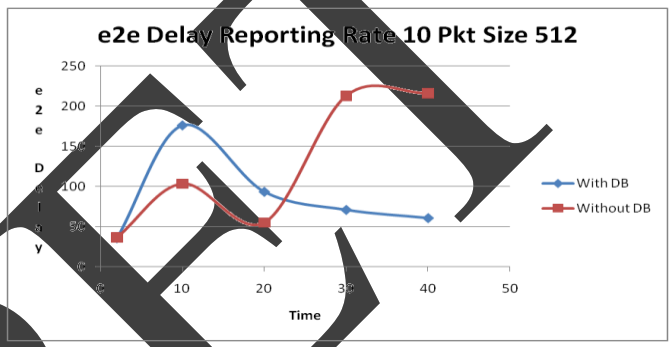


Fig 2- Hierarchical Architecture without database

III RESULT:

For experimental result we consider two networks one is simple hierarchical network without database node and other one is hierarchical with database node. We compare these two networks in term of reliable data collection at sink, we will consider different factor for comparing these two like end-to-end delay, packet delivery ratio, energy of each node, drop packet and receive packets by these two network and try to prove that hierarchical with database node will gives better result than simple without database architecture.

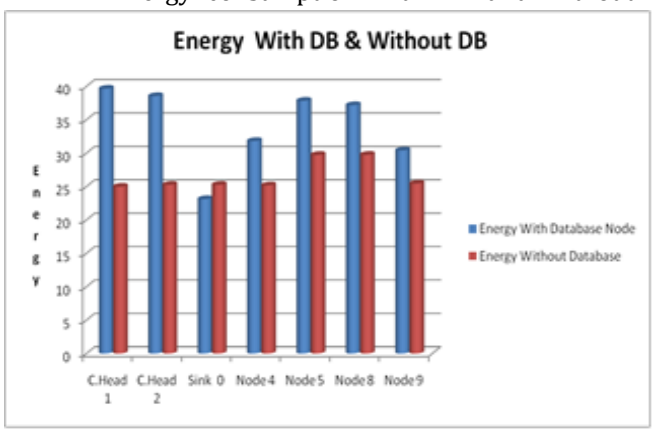
A. END TO END DELAY:



The graph shows that end-to-end delay [4]for each the design Here reporting rate is 10 and packet size is 512 bytes with these parameter can observe that end-to-end delay for each the design will increase and at 20 sec it will decreases, but after 20 sec without DB model will increases continuously as a result of congestion happens within the network because of that packets are drop. But with DB design once 20 sec its end-to-end delay can decreases. so after analyzing the graph can prove that database design provides minimum end-to-end delay.[4]

B. ENERGY:

Energy consumption with DB and without DB



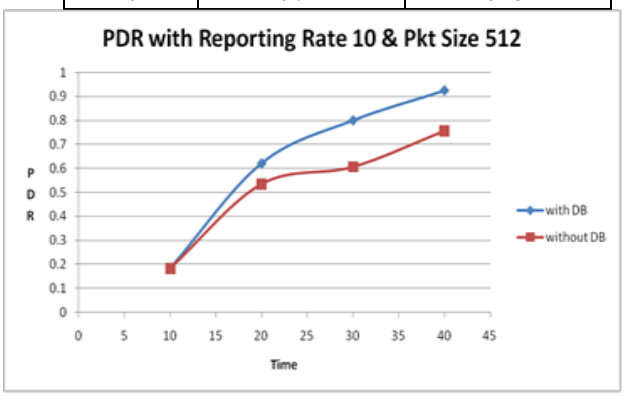
The graph shows that energy consumed by all nodes for the hierarchical architecture with DB and without DB. In this graph for all the nodes we take initial energy 100 joules after simulation will take average energy of all nodes and we find that energy consumed by database

model will more than without database model. The database model consumes more energy because they have [4] to retransmit the packet which are drop between cluster heads and sink node.

C. PACKET DELIVERY RATIO:

Reporting Rate 10 & Packet Size 521

TIME	PDR with DB	PDR without DB
10	0.18	0.18
20	0.62	0.53
30	0.80	0.60
40	0.92	0.75

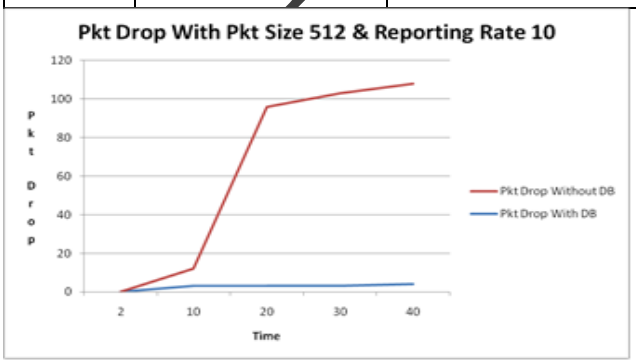


The graph shows the packet delivery ratio(PDR)[4] comparison for DB and without DB model. Here Reporting rate is 10 and Packet size 512 bytes. The graph shows that the packet delivery ratio for DB model is high as compare to without DB model. In database model packets are resent to the sink by the cluster head node attached to the database file and due to that PDR will increases for DB model. we take fix reporting rate 10 and Packet size is variable (256, 512, 1000, 1500, 2000) the packet delivery ratio for DB model is high as compare to without DB model because the drop packet will retransmit. But as we increase the packet size PDR is also decreases because large packet will take more time for processing.[4]

D. PACKET DROP:

Reporting Rate 10 & Packet size 512

TIME	Packet Drop with DB	Packet Drop without DB
2	0	0
10	3	9
20	3	93
30	3	100
40	4	104

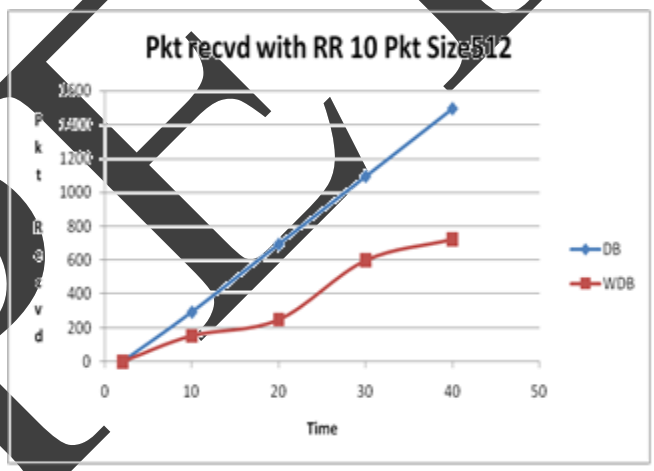


The Graph shows the packet drop comparison for with DB model and without DB model here we take packet size 512 byte and reporting rate 10 after simulation we observe that packet drop with DB model is very less as compare to without DB model because database file attached to the cluster head node for storage of data packets which are lost during transmission. so that packet drop in our model is very less.

E. RECEIVED PACKET:

Reporting Rate 10 & Packet size 512

TIME	Pkt Recv with DB	Pkt Recv without DB
2	1	1
10	295	155
20	695	250
30	1095	600
40	1495	725



The graph shows the received packets by both the model DB and Without DB. Here packet received by DB model is more as compared to without DB model because the congestion occurs in the network and due to that packets are drop but in DB model we maintain the database at cluster head and due to that reliability will be maintain drop packet will be retransmitted.

IV. CONCLUSION:

During the transmission of data packets some data may be lost and it becomes difficult to recover the loss packets. In our loss recovery model we have attached database file to cluster head node for storage of data packets. The dropped packets will be identified by cluster head node getting acknowledgement from sink node. The dropped packets will be recollected from database file and sent back to sink node by cluster head node. Our ns-2 simulation results graph analysis shows that hierarchical design with database model can give the improved packet delivery ratio, more number of received packets, less number of dropped packets and lesser end-to-end delay.

The database model minimizes the congestion and improves the reliability of the network in data collection at sink node.

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