ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering
(IJARMATE) Vol. 3, Issue 6, June 2017

An Integrated Energy – Packet transmission Optimized Node Selection Routing For WSN

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Abstract—Devices that are interconnected in Wireless sensor network for on-demand communication, rely on available battery power to transmit and receive packets . For such energy concentrated network, packets drop due to planned neighbors selection is more frequent that requires additional retransmission . An acknowledgement based slot assignment scheme was proposed to minimizing transmission errors that fails in minimizing overloaded drops when the Expected transmission count(ETX)metric is high. To overcome the drawback of the existing approaches , an ETX based enables neighbor preference communication by estimating the flow capacity of each neighbor . Beside an integrated duty cycle algorithm serve the process of energy optimization through frequent node switching that prevents drops and re-transmission due to energy failures. The proposed approaches improves Network throughput and transmission rates , minimize delay and drop.

Keywords-Expected transmission count , duty cycle , Acknowledgement .

I INTRODUCTION

WIRELESS sensor networks (WSNs) [1], [2] are mostly battery-powered and thus energy-constrained. In order to save energy, sensor nodes are duty-cycled and rely on multihop forwarding to deliver data to the sink. Design of data forwarding mechanism, which guarantees the packet delivery ratio (PDR) and keeps the energy consumption low, is a crucial and challenging issue in low-duty-cycle WSNs. A widely adopted low-duty-cycle protocol is X-MAC [3], in which sensor nodes sleep and wake up asynchronously. To guarantee transmission of a data packet from sender to receiver, the sender has to keep sending multiple copies of the same packet (called preamble) for a long period that exceeds the sleeping period of the receiver, called Low Power Listening(LPL).As a result, if the forwarder is deterministic, the end-to-end delay is likely high. Obviously, sender energy is wasted on waiting for the forwarder. The duty-cycled communication nature makes the deterministic forwarding schemes inefficient. To shorten the waiting time, an intuitive idea is to take the earliest forwarding opportunity instead of waiting forthe deterministic forwarder, like opportunistic routing [7]. Temporally available links may be exploited to reduce the transmission cost in wireless sensor networks. In order to address the above issues, we propose Acknowledgement based slot assignment scheme. Sender node initiate transmission through shortest path and Duty cycle algorithm serve the process of energy optimization.ETX (Expected Transmission Count) is used as the metric for measuring link quality. Expected Transmission Count (ETX) measures the loss rate of broadcast packets between pairs of neighboring nodes and estimates the number of retransmissions required to send unicast packets.After receiving first packet ,destination compute ETX of all its neighbor and create few Acknowledgement based on ETX value of sender node.Sender node compare its neighbor ETX value and transmit via high ETX node after finishing current transmission.After completed few packet transmission, Source node initiate next transmission through high ETX with high Residual energy of node

II RELATED WORK

Routing over Duty-cycled WSNs including i) Opportunistic Routing(ORW) ii) Deterministic Routing.opportunistic routing schemes that exploit the broadcast nature of wireless transmissions and dynamically select a next-hop per-packet based on loss conditions at that instant are being actively explored. These protocols exploit the redundancy among nodes by using a node that is available for routing at thetime of packet transmission. In traditional deterministic forwarding, continuously sends the data to the predetermined relay node until it wakes up . As to deterministic routing, it includes

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shortest path routing, minimum-hop routing, on-demandrouting (AODV), geographic routing etc. In 2014 Zhichao Cao proposed Lazy Forwarding that is a node is able to dynamically schedule data forwarding to multiple good parents instead of one deterministic parent. In 2014 Ashfaq Ahmad proposed cluster heads (CHs) with adaptive clustering habit *(ACH)*2) scheme for WSNs .In 2015Shuang Li propose an improvement on computing the appropriate route ETX to rectify the above problem by taking into account bottleneck links in paths that may cause higher delay. The use of ETX has been criticized because of its deficiency in modeling transmission interference. computing ETX for a route measures intra-flow interference more accurately by considering the maximum total ETX of any three consecutive links in a route .In our method ,it minimizes the delay and maximize throughput by select the high throughput path towards destination.

III PROPOSED WORK

In our approach,ETX (Expected Transmission Count)enables senders to transmit packet with high throughput and low delay**.**This process is performed by the following task as

- ETX based Neighbor selection
- Energy Optimization based on Duty Cycling

A) ETX based Neighbor selection

Sender node find the shortest path using AODV protocol.Sender node initiate packet transmission through shortest path towardsdestination.After receiving first packet , destination

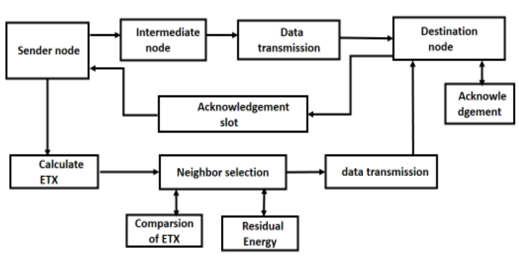

Fig. 1.Packet transmit via high ETX node

calculate the number of packets that the sender node can Send by using datarate / transmission count of node. Now destination know approximately how many packets that the sender node can send then it creates that number of acknowledgement and add this information along with the acknowledgement of first transaction. The set of predefine acknowledgement is called acknowledgement slot. sender node transfer specified amount of data to destination consequentially it receive amount of acknowledgement . Before initiate a data transaction , sender node need to find high throughput path by using Expected Transmission Count(ETX) routing metric.ETX estimates the number of transmissions (including retransmissions) required to send a packet over a link. Minimizing the number of transmissions does not only optimize the overall throughput, it does also minimize the total consumed energy. calculate link ETX using forward and reverse delivery ratio by

$$ETX = 1 / df * dr$$

where d_f and d_r are the forward and the reverse delivery ratios of the link. ETX of a path is defined by sum of ETX link values along that path .Thechosen route is the one with the lowest sum of ETX valuesalong the route to the destination.

B) Energy Optimization based on Duty Cycling :

Duty Cycle provides a way to establish communications in the presence of sleeping nodes.Each sleeping node wakes up periodically to listen. If a node wantsto establish communications, it starts sending out beacons polling a specific user. Within abounded time, the polled node will wake up and receive the poll, after which the two nodes areable to communicate.The time required for a transmission and the energy efficiency of the network is closely relatedto the duty cycle values used. Higher values of duty cycle provide more nodes available for datarouting and thereby energy consumption of the nodes increases. When sender node choose a path with minimum ETX value ,the node in that path are in active mode ,all other node are in sleep mode.When a node has a packet to send, it sends an RTS packet and keeps retransmitting theRTS packet until receiving a CTS packet,The expected number of RTS transmissions neededbefore the first successful RTS/CTS handshake is

$$\sum_{i=1}^{\infty} i(1-p_1)^i p_1 = \frac{1-p_1}{p_1} = (e^{\xi dN} - 1)^{-1}$$

where p1 = 1-e-ξdN is the probability that at least one node replies to the RTS packet, since thenumber of nodes residing

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in an area can be approximated by Poisson distribution for uniformlyrandom deployment.

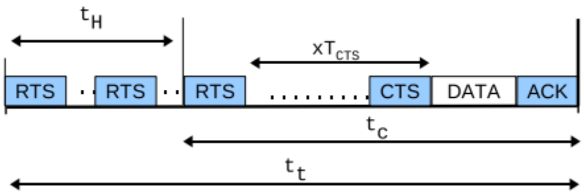

Fig. 2. Duty cycle communication

ALGORITHM

For all n £ N do
{
Initiate Tx from S to D via Shortest Path
If path_node(i) → D then
Compute ETX for all i
If ETX(i) > ETX(i+1) then
Continue TX ;
{sleepstate} → (i+1)
Else
Compute wait_time for(i+1)
If wait_time = endof[Tx_time(i)] then
{i}: → {sleepstate}
{Active state} → {i+1}
Compute RE(i+1) ; Routing path: S → (i+1) → D
If RE(i+1) < RE(i) for 1 < TX < K then
Goto condition
If all Tx £ K is completed
Update RE of all n £ N
Endif
Endif
Endif

IV EXPERIMENTAL RESULT

In our simulation-based evaluation, we solely focus on ETXas routing metrics . For each topology we determine the neighbor sets of all nodes and link qualities. The performance of acknowledgement based slot assignment scheme increase throughput with low delay in network . We compare the performance of proposed method against the traditional implementation , in terms of throughput and delay for all the scenarios described above. The result is that the throughput of network is much better than that of standard diffusion.

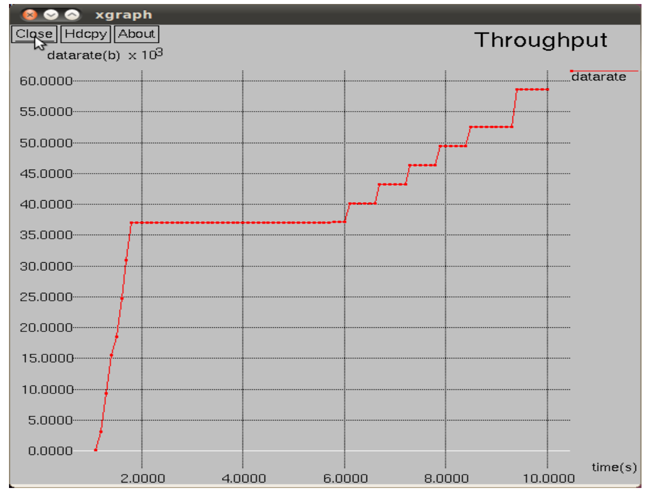

Fig 3 ,Shows the Throughput graph of proposed work.

V CONCLUSION

We have described Acknowledgement based slot assignment scheme and ETX metrics for selecting routes based on link quality that include both throughput and delay. The advantage of ETX is that it can maximize throughput and minimize delay. Our simulation results show that the throughput performance of ETX is on the average 4 times better than the traditional method.Duty cycle serve the process of energy optimization.

VIFURTURE WORK

Acknowledgement based slot assignment scheme and ETX metrics is focus on throughput and delay but topology control is overhead. Several aspects of the algorithm could still be improved in our future work such as Mobility support topology control algorithm.

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