Obtain Low Energy Consumption Using Forwarding Technique in Wireless Sensor Network

Mamatha G, A. Sreenivasan
Telecommunication Department, Dayananda Sagar College of Engineering, Bengaluru, India
mamatha.glmns1@gmail.com , asreenivasan@yahoo.com

ABSTRACT— This paper presents high throughput reliable multicast in multi hop wireless mesh networks. The combined MAC layer retransmission, link quality awareness and wireless broadcast advantage are capture to design EMTX. EMTX based multicast routing will increase end to end delivery of packet, less number of hops per packet.
Keywords— Wireless mesh networks, routing metric, EMTX, wireless sensor networks, multicast.

NTRODUCTION

In wireless networking standards one of the important transmission mechanisms is multicasting. In wireless communication using broadcast advantage, within the transmission range of the sender it can reach multiple nodes. The capacity can be very limited in multi hop wireless networks such as wireless mesh networks; to design of multicast routing algorithms it is will take advantage of the wireless broadcast to support various group communication applications.

In multicast, by default MAC-layer protocol chooses lowest available transmission rate and it doesn't provide any error recovery in MAC layer. In multi-hop wireless networks, by hidden node in network it leads to packet collision and added packet loss. This results to decreased end to end packet delivery ratio for many applications in wireless networks. Wireless mesh networks, mesh routers are general stationary and energy constraint are not required , it offer high end to end packet delivery ratio at user end in wireless mesh networks. In spite of active research on MAC layer multicast for reliable MAC layer single hop group communication. For reliable multicast routing in multi-hop wireless networks developing high throughput is challenging. For achieving high throughput reliable multicast routing propose EMTX as a metric. The combined MAC layer retransmission, link quality awareness and wireless broadcast advantage are capture to design EMTX.

II.EXISTING TECHNIQUE

In the existing technique during the route discovery process the next forward node is chosen based on the neighbor whose expected transmission count is higher. This process is called as minimum forward tree algorithm based on EMTX.

$$EMTX=\frac{TOTAL\ NUMBER\ OF\ TEST\ PACKETS\ RECEIVED}{TOTAL\ NUMBER\ OF\ TEST\ PACKETS\ SENT}$$

The sum of EMTX metric values up to a window period, based on this values forwarding node is choices in the network area. The route that is used for sending the packets has the lowest End to End Delay there by reducing the amount of time required for delivery of packets.

This way the process in repeated until the destination is reached but it will suffered from the following drawbacks are MFT(minimum forward tree) to find reliable paths that consist of links requiring reduced number of retransmissions for lost packet. This paths will consume less energy but results less number of retransmissions. They don't minimize energy consumption for packet delivery at destination giving a higher priority for reliable route results in more dead nodes. If there are some hops more reliable than others, these hops will repeatedly use to send packets. Nodes at these paths will fail quickly, since the nodes at this path will become dead nodes or it has a less energy.

The remaining energy of nodes is not considered during the route discovery to avoid overuse of nodes. They do not consider the actual energy consumption of nodes to discover energy-efficient routes. They consider the power of nodes while transmitting neglecting the energy consumed by elements of transmitters and receivers while processing.

III. PROPOSED TECHNIQUE

One single route is discovered between the given source and destination node. The route will have lowest value of EMTX and also satisfies the reduce network bandwidth consumption while ensure high end-to-end packet delivery ratio. The algorithm will first find the neighbors and then looks for destination. If the destination is not found then it picks one of the neighbors as the forward node based on EMTX and bandwidth measureMTT algorithm is responsible for finding the best route which is having lowest EMTX and High Packet Delivery ratio. MTT algorithm sends the RREQ to the entire neighbors list. If the neighbors have destination node then stop the process. If the destination node is not present then find the forward node which has lowest EMTX and maximum reliability. MTT algorithm is responsible for finding the best route which is having lowest EMTX and High Packet Delivery ratio. MTT algorithm sends the RREQ to the entire neighbors list. If the neighbors have destination node then stop the process. If the destination node is not present then find the forward node which has highest greedy criteria value and maximum reliability.

GC=Approximation ratio + R + weight

Where

$$\text{Approximation ratio} = \frac{EMTX(rx)}{EMTX(tx)}$$

R= number of transceiver

Weight=α REnode,

α= environmental factor 0.1<α<1

RE= Residual Energy of node

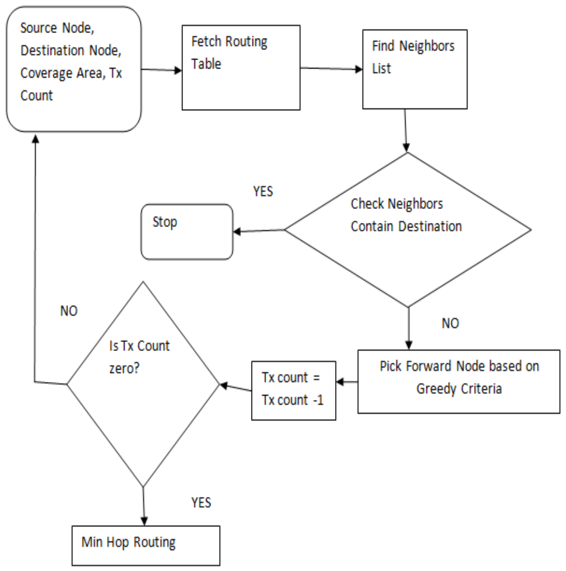

Fig.1 Minimum Transmission Tree

If the neighbor nodes has destination node then stop the process otherwise proceed to find the forward node based on greedy criteria. The greedy criteria are found for all the neighbor nodes. The node which has highest greedy criteria acts as an input and decrement the Threshold count, find the Threshold count. If the TC is not zero then the process is repeated until TC is zero or destination is reached. If TC is zero then Min Hop algorithm is called.

The Min Hop algorithm can be described as Source Node, Destination Node & Transmission Range acts as an input. The neighbor nodes are computed w.r.t Source Node. If the neighbor nodes has the destination node then stop the process. If the Destination node is not present then jump to compute the distance of each of the neighbor w.r.t destination find the node which corresponds to minimum distance. Repeat the process until destination is reached.

IV. RESULTS AND DISCUSSION

The simulation-based multicast routing performance is focused on three parameters. Throughput, defined as total number of packets delivered successfully at the destination for time taken to routing the packet. An end to end packet delivery ratio increases then high throughput will obtain. Throughput comparison of MFT and MTT as shown in fig 2. The throughput of MTT is up to 24 percent higher than that of MFT.

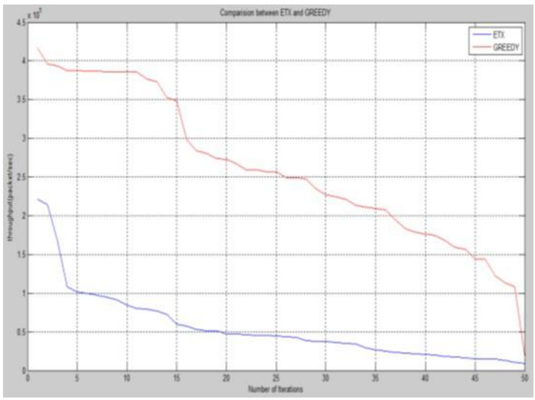

Fig.2. Comparison of Throughput

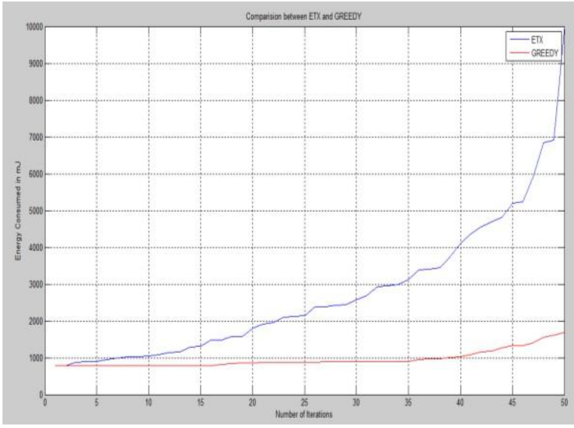

Fig.3. Comparison of Energy consumption

Energy Consumption, defined the energy wasted for delivering the packets from the source node to destination node. Energy consumption comparison of MFT and MTT as shown in fig 3. The Energy consumption of MTT is higher than that of MFT. The total energy consumption is given as follows

$$TE_c = \sum_{i=1}^{l} E_i$$

Where,

$l = number\ of\ links$

$E_i = Energy\ consumed\ by\ the\ i^{th}\ link$

The energy consumed by the i^{th} link given by

$$E_c = 2E_{tx} + E_{amp}\ d^{\gamma}$$

$E_{tx} = energy\ required\ for\ data\ transmission$

$E_{amp} = energy\ required\ for\ data\ generation$

$d = dis\tan ce\ between\ two\ \text{int}\ ermediate\ nodes$

$\gamma = environment\ factor$

$0.1 \le \gamma \le 1$

$The\ S\tan dard\ environment\ factor$

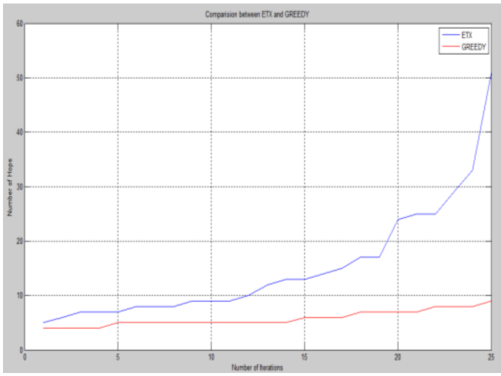

Fig.4. Comparison of Number of Hops

The Number of intermediate links from the source node to destination node is called Number of Hops. In fig 2 when increases the multicast group size, than throughput decreases. This is larger number of intermediate nodes is required for routing packets. This is shown in Fig. 4

average number of hops required for each multicast routing algorithm in comparison as the group size increases.

V. CONCLUSIONS

Our focus in this paper is in multi-hop wireless mesh networks for developing high-throughput algorithms based on reliable multicast routing. For this challenge, we have proposed greedy criteria as a robust metric that captures the combined effects of MAC-layer retransmission-based reliability, link quality awareness, and wireless broadcast advantage. We have formulated the MTT with objective of high throughput, low energy consumption and less number of forwarding nodes.

REFERENCES

1. M. Kim, D. Lucani, X. Shi, F. Zhao, and M. Medard, ―Network coding for multi-resolution multicast,‖ in Proc. IEEE Conf. Comput. Commun., Mar. 2010, pp. 1–10.
2. L. F. M. Vieira, M. Gerla, and A. Misra, ―Fundamental limits on end-to-end throughput of network coding in multi-rate and multicast wireless networks,‖ Comput. Netw., vol. 57, no. 17, pp. 3267– 3275, Dec. 2013.
3. X. Li, C.-C. Wang, and X. Lin, ―On the capacity of immediately decodable coding schemes for wireless stored-video broadcast with hard deadline constraints,‖ IEEE J. Sel. Areas Commun., vol. 29, no. 5, pp. 1094–1105, May 2011.
4. M. Ghaderi, D. F. Towsley and J. F. Kurose, ―Reliability gain of network coding in lossy wireless networks,‖ in Proc. IEEE Conf. Comput. Commun., 2008, pp. 2171–2179.
5. G. Bianchi, ―Performance analysis of the IEEE 802.11 distributed coordination function,‖ IEEE J. Sel. Areas Commun., vol. 18, no. 3, pp. 535–547, Mar. 2000.
6. R. Draves, J. Padhye, and B. Zill, ―Routing in multi-radio, multihop wireless mesh networks,‖ in Proc. ACM Mobicom Annu. Int. Conf. Mobile Comput. Netw., Sep. 2004, pp. 114–128. [33] R. K. Ahuja, T. L. Magnanti, and J. B. Orlin, Network Flows: Theory, Algorithms, and Applications. Englewood Cliffs, NJ, USA: Prentice Hall, 1993.
7. CPLEX. [Online]. Available: http://www.ilog.com/products/ cplex
8. M. L. Fisher, ―The Lagrangian relaxation method for solving integer programming problems,‖ Manage. Sci., vol. 27, no. 1, pp. 1–18, Jan. 1981.
9. U. Feige, ―A threshold of lnn for approximating set cover,‖ J. ACM, vol. 45, no. 4, pp. 634–652, Jul. 1998.
10. X. Zhao. (2010). Reliable multicast in wireless mesh networks, Ph.D. dissertation, Univ. New South Wales, Sydney, Australia [Online]. Available: http://unsworks.unsw.edu.au/fapi/datastream/unsworks:8371/SOURCE02