ENERGY AND TRANSMISSION RATE AWARE TIMESERVING ROUTING IN WIRELESS SENSOR NETWORK

Mrs.N.Kanthimathi.,M.E.,(Ph.D).,
Asst. Prof/Dept of ECE,
SCAD College of Engineering & Technology,
Cheranmahadevi.

Abstract-

Timeserving routing has been implemented to minimize the energy consumption and to improve delivery ratio and packet ratio. The packets are forwarded through the higher priority nodes later lower priority nodes are discarded. Timeserving routing has been explored to extend the network throughput and minimize the energy consumption. Mainly to minimize the energy consumption the system focuses on selection and prioritizing of forwarder list. The forwarder list is further optimized with the help of probability of effective successful transmission scheme for efficient opportunistic routing. Here energy transmission power of each node such as fixed and dynamic power adjustment is implemented.

Key words: **Time serving routing, PEST rate, Energy consumption, Delivery ratio.**

1INTRODUCTION

The increasing interest in wireless sensor networks can be promptly understood simply by thinking about what they essentially are: a large number of small sensing self-powered nodes which gather information or detect special events and communicate in a wireless fashion, with the end goal of handing their processed data to a base station. Sensing, processing and communication are three key elements whose combination in one tiny device gives rise to a vast number of applications. Sensor networks provide endless opportunities, but at the same time pose formidable challenges, such as the fact that energy is a scarce and usually non-renewable resource.

Routing protocols have been studied extensively in wireless networks. In general, designs of those protocols are guided by two essential requirements: reduce energy cost and increase network delivery ratio. The

ISSN: 2278 – 1323

traditional routing protocols in wired networks choose the best sequence of nodes between the source and destination, and forward each packet through that sequence until next routing update period. The lossy and dynamic wireless links make traditional routing protocol unsuitable as well, *i.e.*, in multihop wireless networks, various factors, like fading, interference, multi-path effects, and collisions, can temporarily lead to heavy packet losses in the pre-selected good path, even not mentioning whether that link is actually good or not.

2 METHODOLOGY

In wireless sensor network environment we mainly concentrate following three parameters, that is energy, delay ratio and delivery ratio. So that our main aim of the project is reduced the energy consumption, increase the delivery ratio and reduce the delay ratio. Here selecting and prioritizing forwarder list to minimize energy consumptions by all nodes. The forwarder list is further optimized with the help of Transmission Rate based End to-End Probability of Effective Successful Transmission scheme. It provides the effective delivery ratio to the wireless sensor network. The node selection based on the expected cost can help to minimize the energy consumption of total transmission and based on the PEST rate give 100% reliable for transmission. So the system gives good performance in terms of energy consumption, delay ratio, and delivery ratio.

3. TIMESERVING ROUTING

In order to support the multi hop communications, specific routings protocols are necessary. Routing in multi hop ad hoc networks is supported by the collaboration of intermediate nodes that retransmit the messages from the source to the final destination. Thus, packets are said to hop from node to node. The sequence of nodes that a packet traverses from the source to the destination constitutes a path. It based on the operation of opportunistic routing. The opportunistic routing is defined as exploits a redundancy of nodes to transmit a packet to nodes that are available for routing. It is based on the idea of geographic routing. Opportunistic routing still exploits location information, but the forwarding node is elected differently, according to the protocol which is used in each case. The advantages of opportunistic routing appear in denser networks, where the number of potential forwarding nodes is larger. This provides high neighborhood cardinality.

ISSN: 2278 – 1323

3.1 SET FORWARDER

This module first step is to select forwarder. That means sending packets from a source node to destination node through different path. Then after sending packets get acknowledge for each step. On the basis of these acknowledges select some forwarder from the initial state. Then following this procedure calculate the cost for each transmission through path, that explain in the next section. In this section the source node has been sending request to all the nodes in the system using AODV protocols.

3.2 COMPUTE EXPECT COST & PEST

A wireless sensor network and assume that all wireless nodes have distinctive identities, i.e.,$i \in [1, n]$. We first assume that every wireless node u has fixed transmission power W. Let w denote such adjusted transmission power. The multihop wireless network is then modeled by a communication graph,

$$G = (E.V) \qquad (1)$$

Where,

V is a set of n = |V| wireless nodes

E is a set of directed links.

Each directed link (u,v) has a nonnegative weight, denoted by w(u ,v), which is the minimum transmission power required by node u to send a packet to node v successfully. $N_w(u)$represent the neighboring node u transmit with power w, e(u,v) represent the error probability.Error probability is defined as the probability that a transmission over link (u,v) is not successful, i.e,

$$W(u,v) = 1 - e(u,v) \qquad (2)$$

To find the expected cost of node u, we first sort all nodes in the forwarder list Fwd*(u) in increasing order by the expected cost, i.e., Fwd*(u) = $\{v_1, v_2, v_3, \ldots\ldots, v_{|FWD(u)|}\}$, where i <j $C_{vi} \leq C_{vj}$. Let α denote the probability that a packet sent by node u is not received by any node in Fwd*(u). Clearly,

$$\alpha = \prod_{i=1}^{FWD*(u)} e_{uvi} \qquad (3)$$

Let ρ denote the probability that a packet sent by node u is received by at least one node in Fwd*(u). Then, ρ = 1-α.

The cost consists of three parts.The first part is the expected cost for the sender to successfully transmit a packet to at least one receiver in Fwd.

ISSN: 2278 – 1323

$$c_u^h(\mathrm{Fwd}) = \frac{\omega}{\rho} \qquad (4)$$

The second part is the expected cost that there is one node in the forwarder list Fwd to help to relay the packet to the final destination node.

$$c_u^f(\mathrm{Fwd}) = \frac{\beta}{\rho} \qquad (5)$$

Where,

$$\beta = (1 - e_{uv1})c_{v1} + \sum_{i=2}^{|FWD*|} \prod_{j=1}^{i-1} e_{uvi}\,(1 - e_{uvj}) \qquad (6)$$

The third part is the communication cost to reach an agreement on choosing the actual relay node.

$$c_u^c(\mathrm{Fwd}) \qquad (7)$$

The total expect cost is,

$$c_u(\mathrm{Fwd}) = c_u^h(\mathrm{Fwd}) + c_u^f(\mathrm{Fwd}) + c_u^c \qquad (8)$$

The Probability of Effective Successful Transmission (PEST) is not only by means of data sent from the source node to destination node, but also include the probability of acknowledgment message (ACK) packet from the destination node to source node. Only when the source node receives the acknowledgment message from destination node, the packet(s) sent from source node to destination node are truly effective. Otherwise, when the acknowledgment messages are lost due to the unreliability of the wireless environment, source node must retransmit the data packets in a period of time. Therefore, the PEST includes not only the delivery probability between the nodes *di;j*, but also the acknowledgment messages transmission probability pACK

$$\mathrm{PEST} = d\,.\mathrm{pACK} \qquad (9)$$

pACK is the delivery rate of response packet ACK from destination node to source node. If the ACK packet delivery rate is 100% in wireless network environment, then PEST = d. In the expression, d is the delivery rate between any two nodes.

3.3 OPTIMAL FORWARDER LIST

Now we know the expected cost and PEST rate for each and every node in the selected forwarder list. Using that both values we going to make optimal forwarder list for broadcasting i.e, the lowest cost and highest PEST value node to assign higher priority node like that arranging all nodes in descending order from the selected forwarder list. The lower priority nodes are discarded. Thus creates the optimal forwarder list.

ISSN: 2278 – 1323

4 PERFORMANCE ANALYSIS

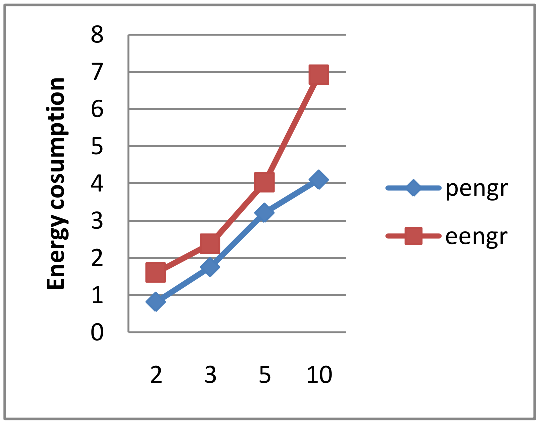

Fig 1: Energy consumption

Here we take it three parameters to analysis energy consumption, delay ratio and delivery ratio. Compare with existing system, it has been reduced the energy 2.624% as shown in fig 1.

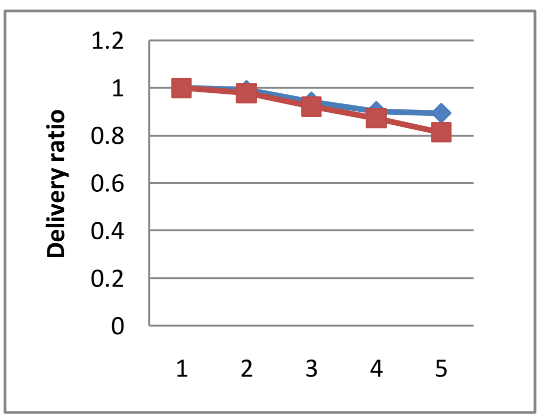

Fig 2: Delivery ratio

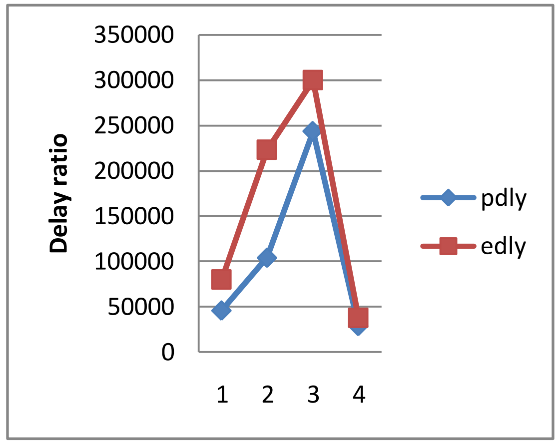

Fig 3: Delay ratio

Like comparing existing system delivery ratio with proposed system delivery ratio has been increased to 4.85% as shown in fig 2. And 5.36% decreased in delay ratio as shown in fig 3.

5 RELATED WORKS

Later various techniques use the opportunistic routing, that has been support only unicast transmissions [3] [4] [5] [7] [9] [10]. In [3] takes more time to deliver the packet.

In [6] construct distributed routing protocol, that difficult to error correction. Robust acknowledgement technique used in [8], the size of RACK is fixed. In [4] consider only one link with lowest cost, which is not effective for transmission.

ISSN: 2278 – 1323

ETX is used in [10], which is not capture the real closeness of node pair and dose not considers the range of the path. The average power consumption per node is significantly low in [9] and it does not track the correct cost of the transmission.

6 CONCLUSION

In wireless sensor communication the main challenge is energy consumption. Here the efficient protocol has been used to reduce the energy consumption and compute probability of effective successful transmission rate can help to create effective optimal forwarder list which is reduced the energy consumption and improve the delivery and delay ratio.

REFERENCES

[1] Xufei Mao and Shaojie Tang, "Energy- Efficient Opportunistic Routing in WirelessSensor Networks*", IEEE Transactions On Parallel And Distributed Systems, Vol. 22, No. 11,2011.*

[2] Xaio Du and Yuanan," Effective Successful Transmission Rate Based Opportunistic Routing in wireless Mesh Network," *Journal of Information & computational science,2012*.

[3] X.-F. Mao, X.-Y. Li, W.-Z. Song, P. Xu, and K. Moaveni-Nejad,"Energy Efficient Oppurtunistic Routing in Wireless Networks", *Proc. ACM Int'l Conf. Modeling, Analysis and Simulation of Wireless and Mobile Systems(MSWIM'09),2009.*

[4] S.Biswas and R. Morris, "ExOR: Opportunistic Multi-Hop Routing for Wireless Networks",*Proc. ACM SIGCOMM, pp.133-144, 2005.*

[5] S. Chachulski, M. Jennings, S. Katti, and D. Katabi, "Trading Structure for Randomness in Wireless Opportunistic Routing", *Proc. ACM SIGCOMM, 2007.*

[6] Q. Dong, S. Banerjee, M. Adler, and A. Misra, "Minimum Energy Reliable Paths Using Unreliable Wireless Links", *Proc. ACM MobiHoc, pp. 449-459, 2005.*

[7] Y. Wang, W.-Z. Wang, and X.-Y. Li, "Distributed Low-Cost Backbone Formation for Wireless Ad Hoc Networks," *Proc. ACM MobiHoc, 2005.*

[8] Z. Zhong, J. Wang, and S. Nelakuditi, "Opportunistic Any-Path Forwarding in Multi-Hop Wireless Mesh Networks", *Technical Report TR-2006-015, USC-CSE.*

[9] V. Rodoplu and T.H. Meng, "Minimum Energy Mobile Wireless Networks",*Proc. IEEE Int'l Conf. Comm. (ICC), vol. 3, 1998.*

[10] D. De Couto, D. Aguayo, J. Bicket, and R. Morris, "A High-Throughput Path Metric for Multi-Hop Wireless Routing",*Proc .ACM Mobi Com, 2003.*

ISSN: 2278 – 1323