Impact Factor (SJIF): 3.632

International Journal of Advance Research in Engineering, Science & Technology

e-ISSN: 2393-9877, p-ISSN: 2394-2444

Volume 3, Issue 5, May-2016

Optimizing Routing Paths using Path Quality and Distance for Zigbee based Wireless Networks

Parag Pimple,Dr. B.G. Hogade,Dr. Ravish Singh

*Electronics & Telecommunication, Shree L.R. Tiwari College of Engg.*Terna*Engg.* College, *Nerul (W)*

Abstract —Neighbour Table based shortcut tree routing protocol provides the near optimal routing path as well as maintains the advantages of the ZigBee tree routing such as no route discovery overhead and low memory consumption. However, the route discovery is only on basis of Distance between Nodes; thus, it cannot provide optimized paths. Here, the concept of path quality parameter between Source and Destination nodes is added along with the distance parameter to calculate the shortest path between source and destination. Where the parameter Path quality will depend upon busy factor of intermediate nodes from source to destination, higher the traffic at intermediate nodes, busy will be the nodes due to which lesser the path quality parameter and vice versa. Cost will be calculated for paths which is function of Distance and Path Quality parameter between source and destination nodes i.e cost = f(d,q), this is the concept proposed in OPTIMIZING ROUTING PATHS USING PATH QUALITY AND DISTANCE FOR ZIGBEE BASED WIRELESS NETWORK.

Keywords— ZigBee, Wireless Network, Routing

I. INTRODUCTION

ZigBee is a worldwide standard of wireless personal area network targeted to low-power, cost-effective, reliable, and scalable products and applications. Different from the other personal area network standards such as Bluetooth, UWB, and Wireless USB, ZigBee provides the low power wireless mesh networking and supports up to thousands of devices in a network. Based on these characteristics, ZigBee Alliance has extended the applications to the diverse areas such as smart home, building automation, health care, smart energy, telecommunication, and retail services.

The ZigBee network layer, which is the core of the standard, provides dynamic network formation, addressing, routing, and network management functions. ZigBee supports up to 64,000 devices in a network with the multihop tree and mesh topologies as well as star topology. Every node is assigned a unique 16-bit short address dynamically using either distributed addressing or stochastic addressing scheme. The routing protocols of ZigBee are diverse so that a system or users can choose the optimal.

The ZigBee tree routing is widely used in many resource-limited devices and applications, since it does not require any routing table and route discovery overhead to send a packet to the destination. However, the ZigBee tree routing has the fundamental limitation that a packet follows the tree topology; thus, it cannot provide the optimal routing path.

In this paper, we propose the shortcut tree routing (STR) protocol that provides the near optimal routing path as well as maintains the advantages of the ZigBee tree routing such as no route discovery overhead and low memory consumption. The main idea of the shortcut tree routing is to calculate remaining hops from an arbitrary source to the destination using the hierarchical addressing scheme in ZigBee, and each source or intermediate node forwards a packet to the neighbor node with the smallest remaining hops in its neighbor table.

II. PROBLEM STATEMENT

If say Destination node can be reached from source via two paths, distance wise first path is best than second path. Destination will be reached via first path. Now data traffic via first path starts to increase and due to which intermediate node processing time will go up and now scenario is such that destination can be reached quicker via second path. But second path will not be considered as only Distance parameter kept into consideration. Therefore delay in routing.

III. THE PROPOSED MECHANISM AND DESIGN

Routing Using Path Quality Parameter:

Optimizing routing paths using path quality and distance parameter shortcut trees for zigbee based wireless network is proposed, in which route are calculated not only considering distance parameter but also path quality parameter which indirectly depend upon traffic along the path. Selection of best route from source to destination depend upon metric cost. Cost will be the function of attributes, distance and path quality along the path. Distance, d is the euclidean distance

calculated by, d= sqrt ((x-x1)2 + (y-y1)2), where x and y are coordinates of nodes placement. Path quality, q indirectly depends upon traffic along the path. Value of path quality will switch between 0-1. Cost which is function of distance and path quality calculated as, Cost = d/q, so when higher the link quality lower will be the cost and when lower will be the cost better will be path and vice versa. Stimulation is done on NS 2 (Network Stimulator-2) which is Object-oriented, discrete event-driven simulator. Written in C++ and Otcl.NS2 programs written in object Tcl programming.

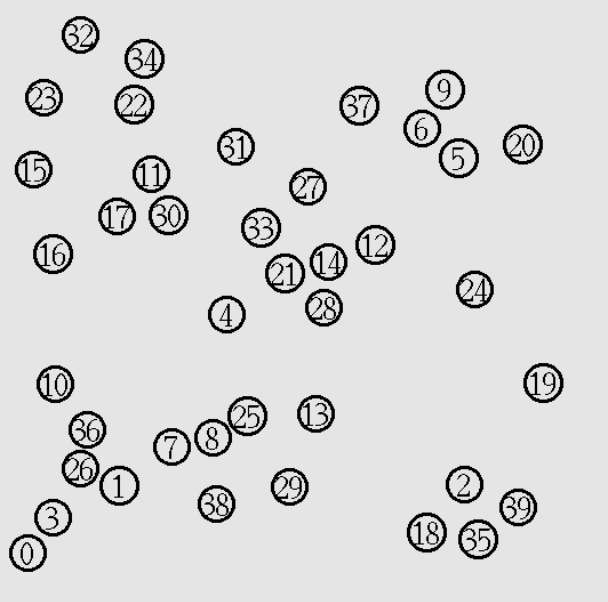

Fig. 1.Random Placement of Wireless nodes.

Stimulation Parameter	Value
Network Size	300m x 300m
No. of nodes	40
Deployment type	Random
Propogation type	Two- ray
Network protocol	AOMDV
Interface queue	Priority queue
Antenna model	Omni directional
Topology	Flat-grid

Table 1. Stimulation Parameters

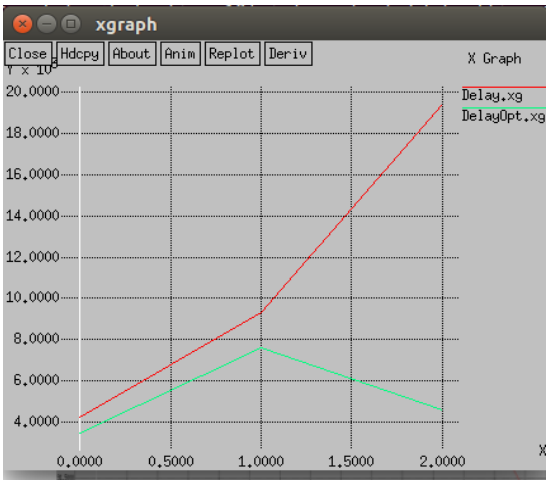

Fig. 2. Delay Comparision Graph

IV. CONCLUSIONS

In this paper, we address the problem of delay in routing due to consideration of only distance parameter for calculation of best path from source to destination in wireless networks. To overcome this issue we added path quality parameter along with distance parameter for finding the optimized path from source to destination in wireless environment.

V. REFERENCES

[1] Taehong Kim, SeaongHoon Kim, "Neighbor Table Based Shortcut Tree Routing in ZigBee Wireless Networks," IEEE Transactions on Parallel and Distributed Systems, Vol. 25, No. 3, March 2014.

[2] D. Han and J. Lim, Smart Home Energy Management System Using IEEE 802.15.4 and ZigBee, IEEE Trans. Consumer Electronics, Oct. 2010.

[3] ZigBee Alliance, ZigBee Specification, 2009.

[4] The Network Simulator, http://www.isi.edu/nsnam/ns, 2013.

[5] H. Lu et al., "A Distributed and Efficient Flooding Scheme Using 1-Hop Information in Mobile Ad Hoc Networks," IEEE Trans. Parallel and Distributed Systems, vol. 18, no. 5, pp. 658-671, Apr.2007.

[6] Y. Huang, et al, "Distributed Throughput Optimization for ZigBee Cluster-Tree Networks," IEEE Transaction on Parallel and Distributed Systems, vol. 23, no. 3, pp. 513-520, 2012.

[7] D.B. Johnson and D.A. Maltz, "Dynamic Source Routing in Ad Hoc Wireless Networks," Mobile Computing, vol. 353, 1996, p. 153–181.

[8] Li, C. F., Ye, M., Chen, G., & Wu, J. (2005). An energy efficient unequal clustering mechanism for wireless sensor networks. In IEEE international conference on mobile ad-hoc and sensor systems (pp. 535–540).