

# Minimizing The Network Traffic And Reducing The Memory Usage in Zigbee Wireless Network - A Literature Review Report

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**Abstract:** *Mobile Adhoc Networks (MANETs) plays an important role in emergency communications where network can be constructed temporarily and quickly. The nodes move randomly, ZigBee is one of the newest technologies developed by ZigBee Alliance and it enabling Wireless Personal Area works (WPAN). ZigBee tree routing (ZTR) protocol is used in many electronic devices and applications. Parent devices calculate addresses of their child devices by a tree concepts. It does not require any routing table and route discovery overhead to send a packet to the destination. It transmit the packets from source to destination through nodes, if path breaks during the transmission it sends the original data packets to the sender. For that purpose we uses the shortcut tree routing (STR) protocol they calculate remaining hops from an source to the destination. And it occupies large amount of memory for storing the tables for each nodes and time delay occurs due to calculating tables for each path, traffic will remains constant in their paths during the transmission of packets in shortcut tree routing protocol and it changes the path if they have an very high network traffic. Comparing to the zigbee tree routing protocol it overcomes the network density and the network traffic.*

**Key words—** *ZigBee, tree routing, shortcut tree routing, neighbor table, MANET, Wireless Sensor Network.*

## I. INTRODUCTION

Mobile ad hoc networks (MANETs) are self-organizing wireless networks without any fixed infrastructure and centralized management. All the nodes move randomly, which communicate with each other through multi-hop wireless links. If two mobile nodes are not within radio range, the communication between them can be established through one or more intermediate nodes. Multi-cast is an efficient way to transmit packets from one point or multi-points to multi-points, which can reduce the consumptions of network bandwidth and host power by sending the same data to multiple recipients. multi-casting plays an important role for communication in MANETs, where group tasks are often deployed.

ZigBee is a standard form of wireless personal area network used in many applications that require a very low data rate, very high battery life, low-power, effective in costs, reliability, and security in networking. It differs from the other personal area network such as Bluetooth and Wireless USB, ZigBee will gives the low-power wireless mesh networks and supports up to thousands of devices in a network. ZigBee has a defined rate of 250 kilo bit/s, best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. Applications of Zigbee has extended to many areas such as smart homes, build an automation, take care in health, energy, telecommunication, and retail shops. Router can communicate with other routers and end devices. Zigbee supports many devices in a network with the multi-hop tree and mesh topology and star topology, The routing protocols of ZigBee or the users can choose the optimal routing strategy according to the applications.

The reactive routing protocol used in ZigBee network are derived in the from AODVjr (AODV junior), Is one of the representation of routing protocols in MANET (Mobile Adhoc Networks). Similar with other MANET routing protocols, ZigBee reactive routing protocol provides the optimal routing path for the source node and destination pair through the on-demand route discovery. They requires the route discovery method for each communication pairs, so the route discovery overhead and the memory consumption will increases with the number of traffic sessions. And route discovery packets are flooded to the overall networks, And the interfere with transmission of other packets even in the spatially uncorrelated area with the route discovery.

ZigBee tree routing (ZTR) prevents the route discovery overhead in both memory and bandwidth using the distributed block addressing scheme. In ZTR, since each node is assigned an hierarchical address, a source node or an

intermediate node only says whether to forward a packet to the parent node or one of the children node by comparing its address with the destination address. And the benefit of ZTR is that any source node can transmit a packet to an arbitrary destination in a network without any route discovery overheads.

Shortcut tree routing (STR) that enhances their path efficiency of ZTR by adding the 1-hop neighbor information. Where ZTR only uses tree links like connecting the parent nodes and child nodes, STR provides the neighbor nodes by focusing that there exist the neighbor nodes short cutting the tree routing paths in the mesh topology. In STR a source nodes or an intermediate nodes select the next hop node having the smallest remaining tree hops to the destination. whether it is a parent node , one of children node, or neighboring node.

## II. LITERATURE SURVEY

### *Neighbor Table Based Tree Routing protocol*

Neighbor table based shortcut tree routing protocol is used to reduce the time consumption during the transmission of packets from source node to the destination. And it creates a table for all possible paths and calculate the network traffic , The table contains the information about their neighbor node address, path distance, traffic rate. If heavy traffic occurs in the shortest path it selects the next shortest path for transmitting the data packets. By using the table information, the shortest distance between source and destination can be identified.

### *Interference avoidance algorithm*

Agility-based interference avoidance algorithm is proposed to detect interference and adaptively switch nodes to “safe” channel to dynamically avoid WLAN interference with small latency and small energy consumption. Is implemented with a Meshnetics ZigBit Development Kit and their performance is evaluated in terms of the packet error rate (PER) using a ZigBee network and Wi-Fi coexistence test bed. And it is shown that the results that agree with an analytic results. The measurements demonstrate that our designs and guideline can efficiently migrate the effect of WiFi interference and enhances the performance of ZigBee networks.

### *A Reliable Transmission Protocol*

Reliable transmission protocol based on any cast routing for wireless patient monitoring to select the closest data receiver in any cast group as a destination to reduce the transmission latency as well as the control overheads, And an multihop ZigBee network, the existing systems usually uses broadcast or multicast schemes to increase the reliability of signals transmission, lead to higher network traffic and end-to-end transmission delay. It show the results of our scheme is fast and reliable. It also shows that our devices can integrate with the next generation technology of wireless wide area network.

### *Smart Home Energy Management System*

Home Energy Management Systems(HEMS) are used to minimize the energy cost of home appliances and lights. The energy consumption in home areas are increased as more as home appliances are to be installed. Energy saving and renewable energy sources are considered that the methods of solving home energy problems. Home server can estimate the energy generation based on a weather forecasting. By using the obtained energy information, the home server can control the home energy use schedules to minimize the energy cost.

### *Cooperative Load Balancing*

A lightweight dynamic channel allocation mechanism and a cooperative load balancing strategy that are applicable to cluster based MANET, and it is used to improve performance in terms of throughput and energy consumption. Loads on the channel coordinators originate from the demands of the ordinary nodes. Many nodes in a network have access to more than one channel coordinator. The underlying idea of the cooperative load balancing algorithm is that the active nodes can continuously monitor the load of the channel coordinators and switch from heavily loaded coordinators to the ones with available resources. These nodes can detect the depletion of the channels at the coordinator and shift their load to the other coordinators with more available resources. The resources vacated by the nodes that switch can be used for other nodes that do not have access to any other channel coordinators.

### *Distributed Throughput Optimization*

An adoptive parent based framework for a zigbee cluster-tree network to increase bandwidth utilization without generating any extra messages to exchange, ZigBee cluster-tree is

especially suitable for low-power and low-cost wireless sensor networks because it supports power saving operations and light-weight routing. the information about some area of interest may be used for future investigations such as more traffic will be generated. A development of distributed algorithm is fully completed with the ZigBee standard. The routing protocols of ZigBee users can choose the optimal routing strategy according to the applications.

### III. ZIGBEE TREE ROUTING PROTOCOL (ZTR)

ZTR is designed for resource constrained ZigBee devices to choose multi-hop routing path without any route discovery procedure. In ZTR, each source or intermediate node sends the data to one of its children node if the path breaks during the transmission before it reaches the destination, it sends the packet to its parent.

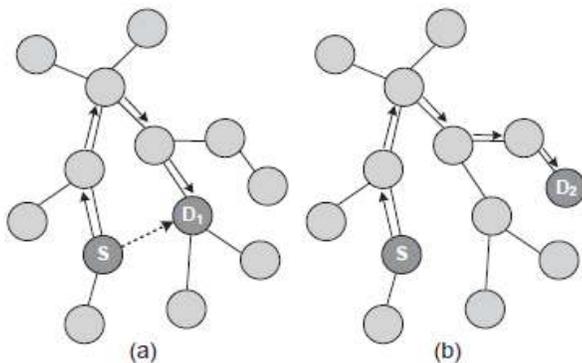


Fig. ZigBee tree routing

The benefits of ZTR is that any source node can transmit a packet to an arbitrary destination in a network without any route discovery overheads.

### IV. AD HOC ON DEMAND DISTANCE VECTOR ROUTING (AODV)

Ad hoc on-demand distance vector routing protocol uses an on-demand approach for finding routes in the networks. and it established the route when it is required by the source node for transmitting the data packets. It provide a sequence number to identify the most recent paths. In AODV the source node and the intermediate nodes stores the next hop information corresponding to each flow of data packets transmission. AODV does not depend on particular aspects of the physical medium across which packets are disseminated its development has been largely motivated by limited range broadcast media such as those utilized by

infrared or radio frequency wireless communications adapters.

### V. SHORTCUT TREE ROUTING PROTOCOL (STR)

The STR algorithm that solves these two problems of the ZTR by using 1-hop neighbors information. STR algorithm follows ZTR to chooses one of neighbor nodes as the next hop node when the remaining tree hops to the destination can be reduced. STR computes the remaining tree hops from the next hop node to the destination for all the neighbor nodes, and selects the N4 as the next hop node to transmit a packet to the destination D2. The Proposed concept includes as the shortcut tree routing 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.

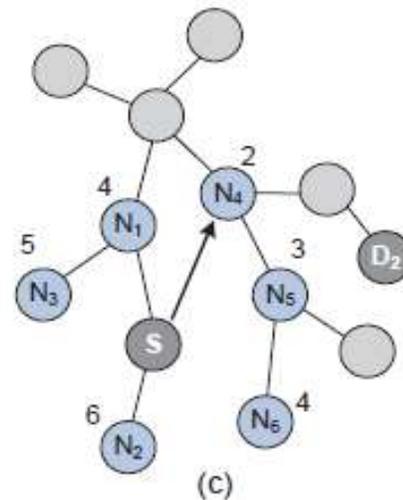


Fig. Shortcut Tree Routing

The routing path selection in STR is decided by individual node in an distributed manners, and the STR is fully completable with the ZigBee standard that applies the different routing strategies according to each node's status. And it also requires neither any additional cost nor change of the ZigBee standard including the creation and maintenance mechanism of 1-hop neighbor information.

### VI. CONCLUSION

The ZigBee network is an emerging field with an high practical values. Routing protocol is one of the key technologies of Mobile Ad Hoc networks. In this paper, we have identified the problems of the general tree routing

protocols, It cause the overall networks performance degradation. And to overcome those problems, we uses STR, they uses the neighbor table. In STR, each node can find the optimal next hop node based on the remaining tree hops to the destination by using their table information. It reduces the traffic load in their tree links for providing efficient routing paths. They used in many applications to increase the routing performance, In this we have to overcome the path selection problems, high memory consumption and traffic clearance problem of the STR. We have done a survey on the proposed modified algorithms based on the existing routing algorithms to improve the network performance and reducing the memory consumption.

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