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Energy Efficient Zigbee Network with New Strategy

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***Abstract*— As Zigbee is an standard for wireless personal network. Tree Routing is simple routing where the node communication is restricted to parent-child links only. There is no routing discovery in tree routing as well as routing overhead. But one demerit of tree routing is that end to end delay is increased during packet transmission which resulting more energy usage or energy consumption. After that when deeply study of Extended tree routing or improved tree routing in that neighbor table are implemented but finding the best neighbor node or apt node is not implemented. In the given new strategy it finds or choose the best node or data transmission and then after energy model helps in conservation of energy as well as routing cost balance. It reduces the network cost also. Simulations have been run using NS2. This simulation concludes the trace file which shows the visual transmission of data and energy traces for that network transmission.**

***Keywords*— Energy Model, Cost, Neighbor table, End to End Delay**

I. INTRODUCTION

As we all know that, Wireless Sensor Network has been a hot research topic now days. A Wireless Sensor Network may be designed with different objectives. It may be designed to gather and process data from environment in order to have best network and monitoring of that network. Flexibility, Self-organization, high sensing, low cost, low power consumption of Wireless Sensor Network is the characteristics for these standards.

Zigbee has been made various developments in wireless pan network for remote monitoring, home control, and industrial automation as examples of the Zigbee Alliance. Zigbee Technology itself as well as the combination with other technologies will be playing a leading role in various fields. In Zigbee there is Tree Routing that is simplified routing where the node communication is restricted to parent-child links only. When an intermediate node receives a packet and the destination itself, it will forward the packet either downwards to its descendent nodes or upwards to its parent node along the tree. There is no routing discovery and any routing overhead in the tree routing.

In the tree routing protocol, when packets transmitted from Source S to Destination D it follow tree topology for forwarding the packets to Destination D. It is simple to understand as well as easy to implement and use limited resources. In this routing, when node sense data from environment and want to send it to Destination D, it first checks if the Destination address is in address space of its descendants. If this is the case when Source simply transmit the data packet downwards to its descendants. Otherwise it transmit the packet upwards to its root node or parent node. When both parent and descendants are receive this packet they will select the hop node according to the destination address following the same manner. In this routing strategy we consider only parent child relationship not neighbor node.

The Main Drawback of tree routing is that it uses only the parent and relationship for routing, ignoring neighbor nodes. As a result, Data packet may be routed through several hops towards the destination even Destination node is near by Sender node. So it would lead to end to end delay increase during data packet transmission, especially in the large networks, which results transmission imbalance and energy consumption.

After that Taehong Kim and Youn-Soo Kim proposed Shortcut Tree algorithm and Extended Tree algorithm by using neighbor table which can reduce the routing hop. But how to select the neighbor nodes is not introduced. If there are unapt(not suitable) neighbor nodes, memory and complexity will be added. Nodes exhaustion is fast due to energy usage by the nodes.

II. PREVIOUS STRATEGY

The Improved Tree Strategy basically follows ZigBee tree routing algorithm, but chooses neighbor nodes as next hope nodes if the routing cost to the destination can be reduced. The neighbor table that we use in improved algorithm is defined in the ZigBee Specification, so we don't need to make an effort to search neighbor list.

In order to choose the next hope node that can reduce the routing cost, the remaining hope count from next

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hop node to the destination is computed for all the neighbor nodes including parent and children nodes. In the above the remaining hops to the destination for each neighbor can be computed assuming that the route from the neighbor to the destination goes along the tree. In this the route cost can be minimized if the sender transmits the data directly to the destination.

III. NEW STRATEGY

A. *New Strategy*

Case 1: Destination is parent of source:
The source node checks if its parent node is the destination node. If yes, then it will transmit the packets to the parent and stop.

Case 2: Destination is source's descendent:
The source node checks if the destination address is one of its descendants. If yes then it will transmit the packets to its descendant. Then checks if the descendent is the destination. If yes, it means destination is found therefore stop. Otherwise, the descendent will search for the destination in its own descendents until the destination found.

Case 3: Destination is its neighbor:
The source nodes checks if the destination address is one of its neighbors. If yes, then it will transmit the packets to the neighbors and stop.

Case4: Destination is its neighbor's descendent or parent:
The source node checks if the destination address is one of its neighbor's descendents. If yes, it will transmit the packets to the neighbor. Then the neighbor will find the destination among its descendents.

Table 1. Comparison of Present Routing and Previous Routing Strategy

Present Routing Strategy	Previous Routing Strategy
❖ It is very simple	❖ It is more complex.
❖ It needs fewer calculations.	❖ It needs more calculations.
❖ It has fewer cases.	❖ It has more cases.
❖ Easy to understand and implement than previous one..	❖ It is difficult to implement due to more calculations.
❖ It will take less time as compare to previous simulation.	❖ It will take more time as compare to new simulation.
❖ It does not need to calculate ancestor address.	❖ It needs to calculate ancestor address.

Energy Consumption in Basic v/s New One

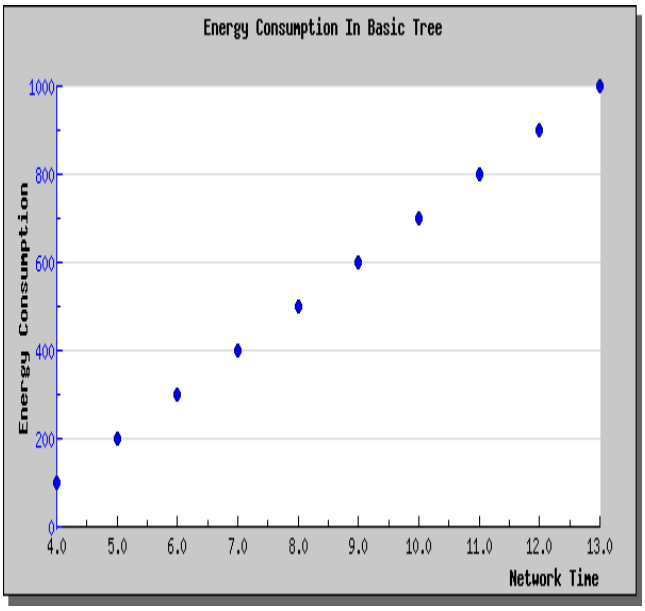

Figure 1

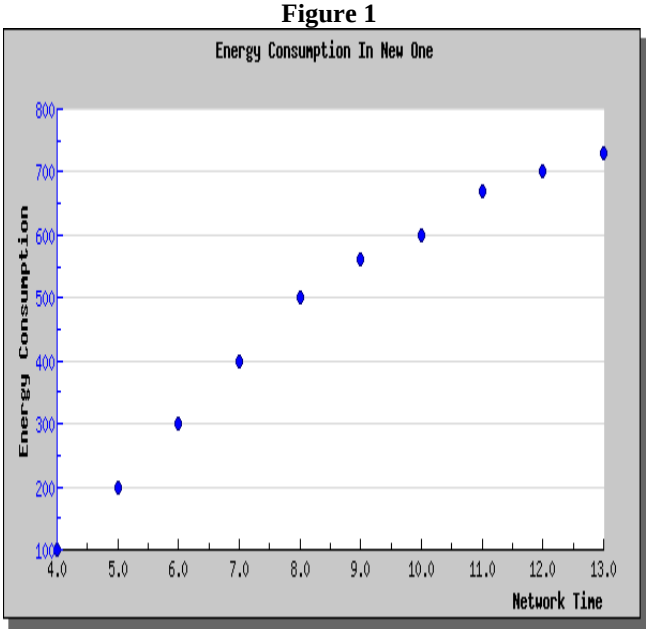

Figure 2

B. Result and Discussion

My results for the energy efficient network and best path routing is simulated on NS2 i: e Network simulator -2 is the result of an on-going effort of research and development that is administrated by research at Berkeley. It is a discrete event simulator targeted at networking research. It provides substantial support for simulation of TCP, routing, and multicast protocols.

1) We consider a network consisting of N=n sensor nodes distributed on d * d msq. area ,all sensor nodes are configured in nonbeacon-enabled mode. Parameters of node is set. When the simulation is started, the first task of the scheduler is to schedule the events that are already predefined by the user in the scenario file. Thus ns TCL commands from the scenario file are scheduled first. Events like creating a new simulator object, starting nodes/traffic, node configuring, etc can be predefined, hence are scheduled first. Trace file shows results in which starting state is:

2) Starting- [energy 1000.000000 ei 0.000 es 0.000 et 0.000 er 0.000] ------- [0:0 1:0 32 0] [0] 0 .

3) and after some time [energy 999.994342 ei 0.003 es 0.000 et 0.000 er 0.002] then energy value changes until 0 energy.

4) Cost of node is reduced as per energy conserved for each hop.

IV. CONCLUSION

As we all know, there are a multitude of standards that address mid to high data rates for voice, PC LANs, video, etc. However, up till now there hasn't been a wireless network standard that meets the unique needs of sensors and control devices. Sensors and controls don't need high bandwidth but they do need low latency and very low energy consumption for long battery lives and for large device arrays. Here we have new strategy it finds or choose the best node or data transmission and then after energy model helps in conservation of energy as well as routing cost balance. It reduces the network cost also.

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Biography

I Antriksh Devgan did M-Tech in Computer Sciences from the one of the top most university i:e Lovely Professional University. I am working on the Mobile Nodes in Zigbee Networks.