Enhancing the Performance of Multipath Ring Routing Protocol with Heterogeneous System in Wireless Sensor Network

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Abstract—Multipath ring routing in wireless sensor network (WSN) is used to provide reliability and minimize the congestion in a network. Multipath routing provides different alternative paths, so it is better to use multipath than single path. It provides variety of benefits like fault tolerance, increased bandwidth, and security. Here we are going to use ring topology with multipath routing protocol. We use Castalia simulator which is developed in omnet++. Omnet++ is an object oriented module. It is base platform for various wired and wireless sensor network. Simulator is conducted which shows the result of static and mobile node implementation of multipath ring routing protocol. Here we are going to use clustering approach to improve the performance of multipath ring routing protocol.

Key words: Multipath Ring Routing Protocol, Wireless Sensor Network, Castalia, Ring Routing

I. INTRODUCTION

Wireless Sensor Network (WSN) consists of large number of sensor nodes which have different size and different capabilities. WSN use multi-hop communication to send their data to base station. Multipath routing is a routing technique of using alternative paths through a network. Tree based technique set up a single path from sensor node to base station. So, it is better to use multipath technique. The WSN is built of “nodes” – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or Connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting. We use three different type of nodes: Source node, Sink node and event node.

II. WORKING OF MULTIPATH RING ROUTING PROTOCOL

Nodes do not have define parent in Multipath ring routing.\textsuperscript{[2]}

A node just get level ring number. During topology formation, Ring number indicates the hop distance from source to sink. Any node that receives this topology set up packet it will increment the ring number by 1 and rebroadcast it. This process continues until all packets get ring number.
ring R1 will die then it will create impact on partial region of whole network.

III. SIMULATION AND ENVIRONMENT

Castalia is a simulator for wireless sensor network (WSN) and body area network (BAN). Castalia provides advanced channel model and also provide real life scenario for wireless channel like path loss, interference of other nodes, mobility as Castalia is used for wireless sensor network. Simulation node in the network are not connected directly to each other but they are connected via wireless link. Whenever any node wants to send their data, it will put their data onto wireless channel. Data dissemination is the process by which query or data are routed in the sensor network. The data connected by sensor nodes has to be communicated to the node which is interested in the data.

IV. STATIC IMPLEMENTATION OF MULTIPATH RING ROUTING IN HOMOGENEOUS SYSTEM

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation Time</td>
<td>3600 Sec.</td>
</tr>
<tr>
<td>X axis</td>
<td>100 meters</td>
</tr>
<tr>
<td>Y axis</td>
<td>100 meters</td>
</tr>
<tr>
<td>Number Of Sensor nodes</td>
<td>36</td>
</tr>
<tr>
<td>Deployment Type</td>
<td>6*6 Grid</td>
</tr>
<tr>
<td>Routing Protocol</td>
<td>Multipath Ring Routing</td>
</tr>
<tr>
<td>Application Name</td>
<td>Value Reporting</td>
</tr>
<tr>
<td>Sink Node</td>
<td>Node 3</td>
</tr>
<tr>
<td>Radio Type</td>
<td>CC420</td>
</tr>
</tbody>
</table>

Table 1: Performance Evaluation of Multipath ring routing Protocol

Above table gives a basic information about multipath ring routing protocol and its parameters. Whenever we implement static multipath routing protocol in homogeneous system we use value reporting application. We can increase or decrease the sensor nodes number and size. Whenever we implement value Reporting application and generate the result with Castalia results below table will be generated.
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Fig. 6:
Above graph shows the total number of packets break down occur in mobile nodes. Compare to static nodes number of data and sync packets breakdown is more. Because we use mobile nodes.

Fig. 7:
Above graph shows the energy consumption of mobile node. Here we can easily compare the static and mobile node energy graph. Mobile node consumes more energy than static nodes.

VI. ENHANCING THE PERFORMANCE USING CLUSTERING APPROACH

To improve the performance of multipath ring routing Protocol we use clustering approach. In which we divide the nodes into clusters. So packets break down decreases and data delivery become robust.

Fig. 8:
Above figure shows that nodes are divided into different clusters. And in every cluster one cluster head is there which manages all other nodes in cluster. Communication between two different cluster nodes are controlled by cluster heads. We can improve the multipath ring routing protocol performance by clustering approach.

Fig. 9:
Above figure shows that Proposed approach is better than multipath ring routing Protocol.

VII. CONCLUSION

Here we just analyse the static and mobile node implementation of multipath ring routing protocol. And we analyse that mobile node consumer more energy as well as more packets break down occur. Using clustering approach we can improve the multipath ring routing protocol. In future We will also use the different techniques to improve the performance of multipath ring routing protocol.

REFERENCES


