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# Improved OLSR Protocol in MANET

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***Abstract: An independent collection of mobile nodes is known as MANET. Manet's network is decentralized when the network organization and message delivery are executed by mobile nodes. The routing functionality is still integrated into the mobile nodes. This research using a proactive routing protocol that is Optimized Link State Routing Protocol (OLSR).OLSR is proactive routing protocol. The unique character of OLSR is that it minimizes the size of control messages and rebroadcasting by using the MRP. This paper adds a new field namely threshold energy in the packet format of the OLSR. This field increases the life time of the node that improves the performance of the network. We will use set of nodes i.e. numbers of nodes for simulation. From the simulation re comparison will be made between the existing model and the proposed model on the basis of parameters namely end to end delay, routing overhead and remaining energy. And performance is analyzed for proposed model with respect to the existing model.***

***Keywords: MANET, OLSR, MPR, Routing, Congestion.***

## 1. INTRODUCTION

Mobile Ad hoc Network (MANET) is a system of wireless mobile nodes that dynamically self-organize in arbitrary and temporary network topologies. People and vehicles can thus be internetworked in areas without a preexisting communication infrastructure or when the use of such infrastructure requires wireless extension [2]. In the mobile ad hoc network, nodes can directly communicate with all the other nodes within their radio ranges; whereas nodes that not in the direct communication range use intermediate node(s) to communicate with each other. In these two situations, all the nodes that have participated in the communication automatically form a wireless network, therefore this kind of wireless network can be viewed as mobile ad hoc network [3]. This paper is organized as follows: Section 2 presents the OLSR protocol and related works. Section 3 discusses the proposed modification on OLSR protocol. Section 4 includes simulation environment scenario used in NS-2 simulator. It also, shows performance comparison of OLSR and modified protocol, based on simulation results. Finally we provide a conclusion to our work.

## 2. OPTIMIZED LINK STATE ROUTING PROTOCOL (OLSR)

OLSR is a proactive routing protocol for mobile ad hoc networks. The protocol inherits the stability of the link state algorithm and has the advantage of having routes immediately available when needed due to its proactive nature. OLSR minimizes the overhead caused by flooding of control traffic by using only selected nodes, called Multi-Point Relays (MPR), to retransmit control messages. This technique significantly reduces the number of retransmissions required to flood a message to all nodes in the network. Upon receiving an update message, the node determines the routes (sequence of hops) toward its known nodes. Each node selects its MPRs from the set of its neighbors saved in the Neighbor list. The set covers nodes with a distance of two hops. The idea is that whenever the node broadcasts the message, only the nodes included in its MPR set are responsible for broadcasting the message [4] [1]. OLSR uses HELLO and TC messages. The Topology Control (TC) messages for continuous maintain of the routes to all destinations in the network, the protocol is very efficient for traffic patterns where a large subset of nodes is communicating with another large subset of nodes, and where the [source, destination] pairs change over time. The HELLO messages are exchanged periodically among neighbor nodes, to detect the identity of neighbors and to signal MPR selection. The protocol is particularly suited for large and dense networks, as the optimization is done by using MPRs which work well in this context. The larger and more dense a network, the more optimization can be achieved as compared to the classic link state algorithm. OLSR uses hop-by-hop routing, i.e., each node uses its local information to route packets [4].

## 3. PROPOSED WORK

### 3.1 IMPROVED OLSR

Congestion of the network disappears and load is transmitted uniformly throughout the network. Proposed technique evaluates optimum paths based on number of hops and available energy. Load will be mainly assigned to the main path, but

 

if the energy of the intermediate nodes is reaching to threshold (given by the ,user), then another path to be considered. This will give the benefit of shortest hop route as well as optimum node energy consideration for longer life span of the network.

**3.1.1Modified Hello message format:**

| Residual energy | Threshold energy | Htime | Willingness |
|---|---|---|---|
| Link Code | | Reserved | Link Message Size |
| Neighbor Interface Address | | | |
| Neighbor Interface Address | | | |

**3.1.2 Modified TC message format:**

| ANSN | Residual Energy | Threshold energy |
|---|---|---|
| Advertised Neighbor Main Address | | |
| Advertised Neighbor Main Address | | |

The residual energy of any particular node will get compared to the threshold energy of the node. If the threshold energy of the node is greater than the residual energy of the node then data will not travel through the node, as further reduction of energy in the node may lead to the dead node. This will improve the performance of the OLSR. The performance can be evaluated by using various parameters end to end delay, routing overhead and the remaining energy.

## 4. Results

Nam is a Tcl/Tk based animation tool that is used to visualize the ns simulations and real world packet trace data. The first step to use nam is to produce a nam trace file. The nam trace file should contain topology information like nodes, links, queues, node connectivity etc as well as packet trace information. In this chapter we shall describe the nam trace format and simple ns commands/APIs that can be used to produce topology configurations and control animation in nam.

### 4.1 Parameter used

1. **Routing Overhead:** Nodes often change their location within network. So, some routes are generated in the routing table which leads to unnecessary routing overhead.
2. **End-to-end Delay:** The average time taken by a data packet to arrive in the destination. It also includes the delay caused by route discovery process and the queue in data packet transmission. Only the data packets that successfully delivered to destinations that counted.

   $\sum$ (arrive time – send time) / $\sum$ Number of connections

**Table1: Parameters of Simulation**

| Name of parameter | Value of the parameter |
|---|---|
| Number of nodes | 5,10,15,20 |
| Simulation area | 400X600 |
| Simulation Time | 150 ms |
| Protocol name | OLSR |
| Packet Size | 512 |
| Packet rate | 20kb |
| Initial Energy | 10 |

**Table 2: Performance analysis of 2 parameters for existing OLSR protocol**

| Number of nodes | End to end delay | Routing overhead |
|---|---|---|
| 5 | 46.2834 | 2.88679 |
| 10 | 51.8088 | 2.57154 |
| 15 | 39.9078 | 2.68262 |
| 20 | 45.675 | 2.95271 |

 

**Table 3: Performance analysis of 2 parameters for improved OLSR protocol**

| Number of nodes | End to end delay | Routing overhead |
|---|---|---|
| 5 | 21.1312 | 2.70521 |
| 10 | 23.4758 | 2.54988 |
| 15 | 36.0763 | 2.61192 |
| 20 | 40.4072 | 2.88659 |

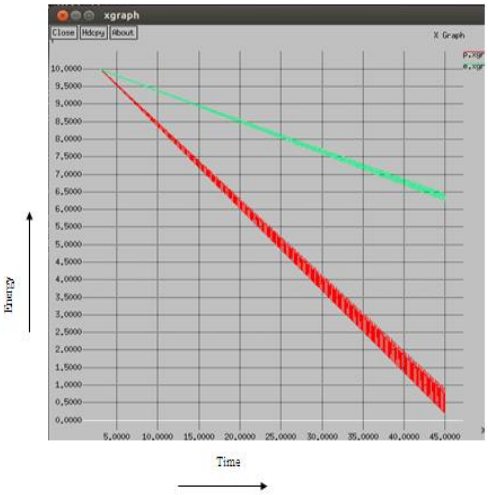


**Figure 1: Remaining energy vs time for 5 nodes**

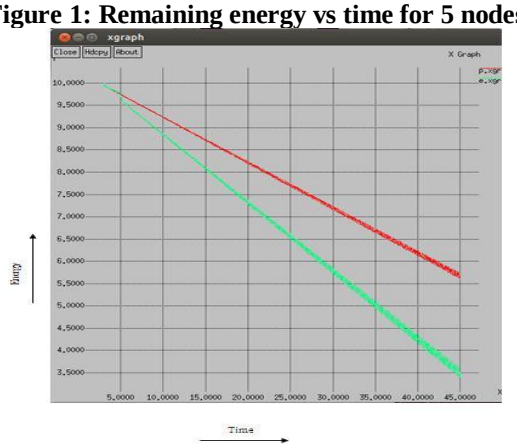


**Figure 2: Remaining energy vs time for 10 nodes**

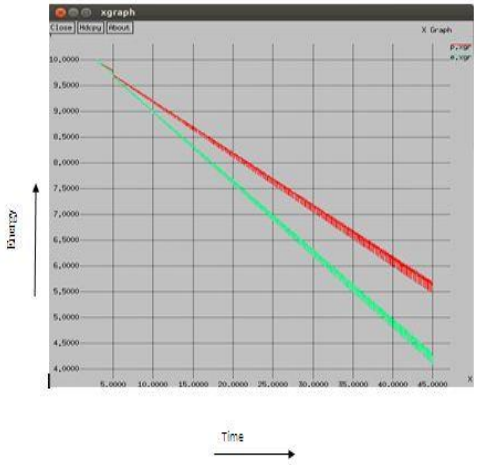


**Figure 3: Remaining energy vs time for 15 nodes**

 

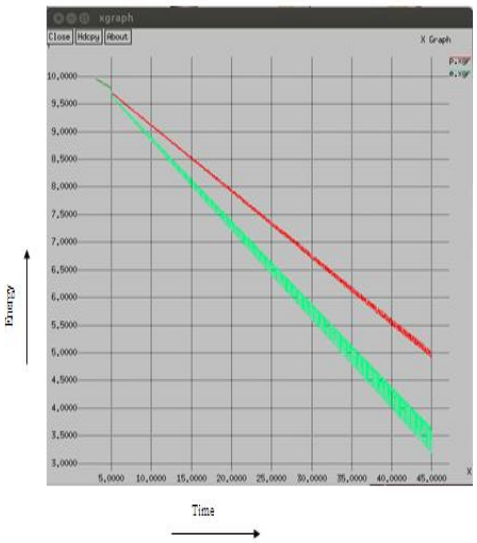


**Figure 4: Remaining energy vs time for 20 nodes**

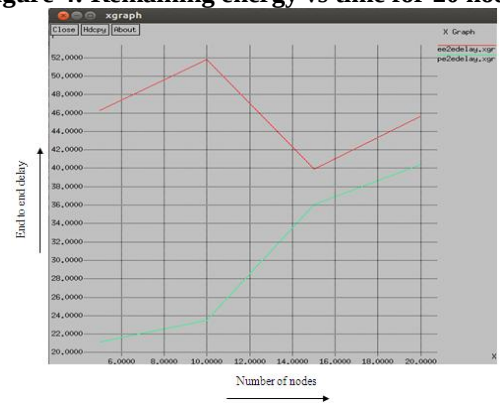


**Figure 5: End to end delay of existing and proposed OLSR**

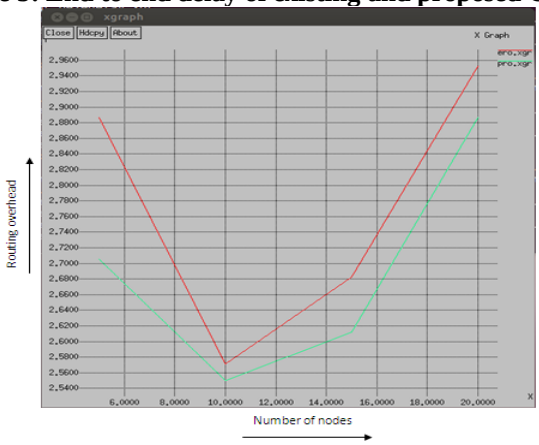


**Figure 6: Routing overhead of existing and proposed OLSR**

## 5. CONCULSION

Optimized Link State Routing (OLSR) is such a proactive routing protocol. Condition of bandwidth and energy will increase for higher mobility. OLSR is an optimization of pure link state routing protocol which inherits the stability of a link state algorithm and takes over the advantage of proactive routing nature to provide route instantly when needed. In this paper, we have evaluated an optimum paths based on number of hops and available energy. Load will be mainly assigned to the main path, but if the energy of the intermediate nodes is reaching to threshold (given by the user and generally depends on data type), then another path to be considered. This will give the advantage of shortest hop route as well as optimum node energy consideration for longer life span of the network. Some methods or techniques can be added to reduce the normalized overheads. In future, message authentication can be applied to the proposed protocol using SHA, routing table can be modified to introduce the integrity.

 

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