AN APPROACH: TO CONSIDER LINK QUALITY OF OLSR USING THE PERFORMANCE EVALUATION OF OLSR-ML AND OLSR-MD IN MANET

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ABSTRACT

In mobile ad hoc networks end-user devices can communicate anywhere and anytime they want, without the need for any pre-existing infrastructure. The drastically different nature of ad-hoc networks also poses various challenges such as limited bandwidth. In a MANET, OLSR plays a very crucial role in forwarding the packet with the help of the Multipoint Relay(MPR) .Thus its selection should be very effective. Through Multipoint Relay the packets are forwarded further in the network without flooding the network. Beside this it can expend a lot of resources by selecting the Multipoint Relay and exchanging Topology Control information and also does not require much consideration about link quality that results in degrade network performance. With the help of these ideas I have done performance analysis of OLSR versions like OLSR-ML and OLSR-MD using NS2 simulator. By simulation results, we would be able to consider the link quality of OLSR and compare the results between OLSR-ML and OLSR-MD protocols in terms of the packet delivery ratio (PDR), normalized routing load and throughput.

Keywords: Multipoint Relay (MPR), Optimized Link State Routing Protocol (OLSR), Packet Delivery Ratio, Minimum Loss (ML), Minimum Delay (MD).

1. INTRODUCTION

A mobile ad hoc network (MANET) is a dynamic collection of mobile nodes that are interconnected over wireless links. MANETs have no centralized communication controllers or base stations. Mobile nodes can freely and dynamically move and organize themselves into arbitrary and temporary network topologies. Therefore, the network topologies may change quickly and erratically. Referable to the absence of any fixed communication infrastructure, each node in MANETs must be capable of functioning not only as a host but also as a router in order to forward packages to further nodes [3].

On that point are primarily three types of routing protocols in MANET. Proactive routing protocols- it is table driven routing protocol and it immediately creates the path when require that's why it is proactive in nature. These

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proactive protocols like distance vector (DSDV), optimized Link state routing protocol (OLSR), reactive routing protocols are on demand like AODV, DSR , hybrid routing protocols like zone routing protocol (ZRP) combines both proactive and reactive approaches to achieve a higher level of efficiency and scalability[10].

In this research work I take proactive routing protocol named optimized link state routing protocol (OLSR). OLSR work on the basis of MPR selection. The idea of multipoint relay is to minimize the flooding of broadcast packet in the network by reducing duplicate retransmission in the same region. Each node in the network selects a group of nodes in its neighborhood which retransmits its packets. This set of selected neighbor node is called multi point relays (MPR) of that node [2].

OLSR work on the basis of four modules.

1) Neighbor sensing: OLSR continuously sense the neighbor in a particular time interval so that routes are available immediately.
2) Message flooding: message is flooding in the network when source sent a message to its destination. So, OLSR by choosing MPR technique reduce the flooding problem.
3) Topology information: OLSR by getting topology information for each node in the network the route computation is done. topology information refresh periodically.
4) Path computation: OLSR finding a route between two nodes in the network in a very short time by choosing MPR and exchanging topology information.

II RELATED WORK

In paper [9], Passos et al. Propose an alternative routing metric OLSR-ML which is similar to path LQ to some extent and evaluate the metric in an outdoor test-bed with six nodes. Because of routing instabilities and higher packet loss rates (PLR) observed with the original OLSR algorithm, passes uses an algorithm for selecting multi-hop paths based on minimum loss probability along the entire path. Test results show that the mesh network performance has been improved, leading to more stable routes.

In paper [11] Halperin et al. Developed a prediction model for 802.1 In link-point packet loss using proprietary software that entirely runs on specific wireless LAN hardware. They built an indoor test-bed and focused on the effects of multiple spatial streams.

In paper [4] the problem is QoS routing may suffer badly due to several factors, including radio interference on available bandwidth, and inefficient flooding of information to the adjacent nodes. As a result the performance of the network degrades substantially. So, the author tries to give the solution for energy efficient QoS routing by better utilization of network resources such as energy and bandwidth.

In paper [5] studied the problem (OLSR) protocol expend a lot of resources by selecting the Multi Point Relays (MPR) and exchanging Topology Control information. Author proposed a protocol OE-OLSR and compare over OLSR. Proposed protocol out performs OLSR.

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In paper [6] author present investigations on the behavior of five routing protocols AODV, DSR ,DYMO, OLSR and ZRP based on IEEE 802.11CSMA/CA MAC protocol are analyzed and compared using the Qual Net simulator using performance metrics such as, Packet Delivery Ratio, Throughput etc.

In paper [7] presents a literature survey on number of routing protocols for MANET, Proactive routing protocols tend to provide lower latency than that of the on-demand protocols. Reactive protocols discover routes only when they are needed beside this as the mobility of nodes in the network increases, reactive protocols perform better.

In paper [12] Routing protocols have been proposed for ad hoc networks, that select routes by aiming to optimize some aspects related to quality of service, such as bandwidth and link quality. Reactive and proactive protocols have been improved to give support to link capacity measurement

In paper [13] QoS-enhanced OLSR (QOLSR) is an OLSR extension which provides QoS and, in addition to being based on a new heuristic for the selection of Multipoint Relays (MPRs), uses a variant of the topology control message defined by the original OLSR to inform communication link quality between nodes and their close neighbors.

III PROPOSED WORK

3.1 Working

The main objective behind this research work is to improve the link quality with shortest path of OLSR. So, on the basis of three strong performance parameters like average throughput, normalize routing load, the packet delivery ratio. I have done performance analysis of OLSR. Versions name OLSR.-ML and OLSR.-MD with the help of NS2.34 simulator.

The various versions of OLSR can be classified as:

OLSR-ML , Passos *et al.* Proposed a new alternative for calculating the link quality of a particular route, based on the expected number of link transmissions, which was designated OLSR Minimum Losses (OLSR-ML) [8] [9].

OLSR-MD, In this protocol, route selection between the current node and an arbitrary node in the network will use as a criterion the least transmission delay, that is, the least sum of the transmission delays for all hops in the path [8].

OLSR-ETX, is an OLSR extension that uses a new metric, the Expected Transmission Count (ETX) [14] to select the best routes. This extension aims to find routes having the lowest expected transmission count, that is, the required number of transmissions so that a packet can be delivered and confirmed by its final destination [2].

Below are the simulation results obtained from the TR file used along with the AWK scripts.

3.2 Average throughput

The Average throughput is the throughput which shows the average bandwidth of the protocol.

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PROTOCOL	AVERAGE THROUGHPUT (data packets/sec)
OLSR-ML	42.08
OLSR-MD	92.79

Figure1. Average throughput of OLSR-ML & OLSR-MD

3.3 Packet Delivery Ratio

The ratio of the number of delivered data packets to the destination. This illustrates the level of delivered data to the destination.

PROTOCOL	PDR (%)
OLSR-ML	0.5493
OLSR-MD	0.5237

Figure2. PDR of OLSR-ML & OLSR-MD

3.4 Normalized Routing Load

It is defined as the total number of routing packets (i.e. RREP, RREQ etc.) transmitted per data packet.

PROTOCOL	NORMALIZED ROUTING LOAD
OLSR-ML	0.074
OLSR-MD	0.079

Figure3. Normalized routing load of OLSR-ML & OLSR-MD

IV CONCLUSION AND FUTURE WORK

From the study and simulation process through NS2. I came to the conclusion that Throughput of the OLSR-MD is much higher than OLSR- ML. PDR for the OLSR-MD was 0.5237 which is a bit lesser than the OLSR-ML. Normalized Routing Load of OLSR-MD is higher than OLSR- ML. After analysis various versions of OLSR like

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OLSR-ML,OLSR-MD I examine that these OLSR versions does not much more consider good link quality. So, due to high normalize routing load of OLSR-MD and low packet delivery ratio, link quality is not much better than OLSR- ML. So, in future I proposed a routing algorithm named OLSR-ETX (ILLR) that improves the link quality of OLSR and simulate on NS2 simulator and I hope after simulation we get the better result in terms of average throughput, packet delivery ratio, normalize routing load than other OLSR versions.

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