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An Efficient OLSR and TORA Routing Protocols for MANETs

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Abstract- A mobile ad-hoc network (MANET) is an autonomous non-centralized network of mobile devices connected by wireless links. Every node in a MANET is unrestricted to move randomly at any path and will therefore modify its links to other nodes promptly and randomly. Mobile devices can communicate with each other without the use of a predefined infrastructure or centralized administration. In this paper routing protocols OLSR and TORA for mobile ad hoc network are compared on the basis of delay, network load and throughput. An attempt has also been made to tune the performance of both routing protocols.

Keywords- MANET, OLSR, TORA, ROUTING, OPNET

I. INTRODUCTION

MANET is a self-configuring system of movable nodes (and associated hosts) linked by wireless links—the amalgamation of which form a capricious topology. The nodes are unrestricted to move arbitrarily and consolidate themselves randomly; thus, the network's wireless topology may variates rapidly and unpredictably. The network topology is unstructured and nodes may arrive or leave at their will. A node can interchange statistics to other nodes which are within its transmission range. Such networks are malleable and suit numerous conditions and applications, thereby allowing the establishment of temporary communication sans pre-installed infrastructure [1]. Because of wireless interfaces narrow transmission range data traffic is transmitted over several transitional nodes to guarantee a communication connection between two nodes. A collection of wireless mobile nodes can vigorously establish the network in the absence of fixed groundwork [1]. Because of these features, routing is a serious issue and ancompetent routing protocol needs to be chosen to make the MANET trustworthy [2]. The most popular routing protocols in MANET are AODV (reactive) and TODV (on-demand), OLSR (proactive) and TORA (on-demand). Reactive protocols find the routes when they are needed. On-demand protocols find a route on demand by flooding the network with route request packets. Proactive protocols are table driven protocols and find routes before they need it. In this paper, two MANET routing protocols OLSR and TORA are evaluated on the basis of various parameters: delay, network load, and throughput. The organization of the paper is as follows. Paper explain routing protocols in section II, related works are discussed in section III, section IV explains the simulation and performance metrics, section V explains the results of simulations and finally section VI concludes the paper.

II. MANET ROUTING PROTOCOLS

Mobile Ad-hoc Network (MANET) have various routing strategies with each category routing protocols [2]. MANET routing protocols are based on how routing information is acquired and maintained by the mobile nodes and thus, can be divided into proactive and reactive category. The routing protocols are as follow:

1) **OLSR**- OLSR is a proactive or table driven, link-state routing protocol. Link-state routing algorithms choose best route by determining various characteristics like link load, delay, bandwidth etc. Link-state routes are more reliable, stable and accurate in calculating best route and more complicated than hop count. To update topological information in each node, periodic message is broadcast over the network. Multipoint relays are used to facilitate efficient flooding of control message in the network. Route calculations are done by multipoint relays to form the rout from a given node to any destination in the network. The OLSR protocol is developed to work independently from other protocols. Conceptually, OLSR contain three generic elements: a mechanism for neighbour sensing, a mechanism for efficient flooding of control traffic, and a specification of how to select and diffuse sufficient topological information in the network in order to prove optimal routes [11].

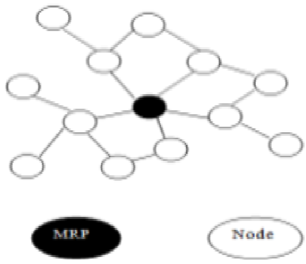

Figure 1 MPR nodes in OLSR

OLSR performance relay on HELLO and TC messages. The (TC) messages used for continuous keep of the routes to all endpoints in the system, the protocol is very proficient for movement patterns where anenormous subset of nodes areinteracting with otherenormous subset of nodes, and where the [source, destination] pairs change over time.

2) **Temporally Ordered Routing Algorithm (TORA)** The TORA usesa "flat", non-hierarchical routing algorithm which enables it to achieve a high degree of scalability. TORA forms and keeps a Directed Acyclic Graph (DAG) between nodes. It is on demand source-initiated routing protocol. It discoversseveral routes from a foundation node to aend node. The key feature of TORA is that itgoverns messages that are restricted to a very minor set of nodes proximate the occurrence of a topological modification. To accomplish this, the wireless device retainsthe routing statistics about neighbouring nodes. The TORA has three elementary functions: Route creation, Route maintenance and Route erasure [7].

III. LITERATURE REVIEW

Robinpreet Kaur *et al.* conduct survey on the various routing protocols. In this paper an effort has been made on the comparative study of Reactive, Proactive and Hybrid routing protocols. The field of mobile ad- hoc networks is very vast and there are various challenges that need to be met, so these networks are going to have widespread use in the future [1].

P.Suganthi*et al.* have determined the performance of OLRS under different refresh intervals. Performance varies from time 2 seconds to set seconds. There is substantialredeemable in bandwidth which could be valuable in bandwidth reservedsystems. Still when the 'Hello' interval is altered to 8 seconds, the output is natural which can cut the quality of facility provided. The entire goal is to improve the performance of OLSR which can be achieved by tuning the 'Hello' interval based on the type of network [2].

DurgeshWadbude*t al.* implemented the secure AODV routing protocol. The paper discuss the performance of two protocols (SAODV and ARAN) was tested in simulation and their communication costs were measured using the NS-2 simulator, which was suitable for the present purpose [3].

Dilpreet Kaur *et al.* have done the Comparative Analysis of AODV, OLSR, and TORA. The paper concludes that as the mobility increases there is an improvement in the throughput of OLSR, DSR and DSDV. So these three protocols can be used in emergency and military applications [4].

EktaNehra*et al.* have done the Performance Comparison of AODV, TODV, OLSR and ABR using OPNET. OLSR performs best in terms of network load and throughput. AODV performs worst in terms of load and throughput. ABR's performance was consistently good in terms of load and throughput. TODV's performance was consistent for the three parameters. In summary, we can say that OLSR was best as compared to AODV, TODV, and ABR in type of traffic taken into consideration for simulation because of its maximum throughput [5]..

PriyankaDahiya*et al.* had performed experiment on QoS Based TORA Reactive Routing Protocol using OPNET 14.5 [7]. In this paper performance of Reactive TORA is evaluated for metrics like Network Load, Throughput, Delay, Upload and Download response time, TORA Control traffic sent and received by varying number of nodes and version of IEEE 802.11 WLAN Standard. From the above discussion it has find out that TORA small network performs best in each case in terms of Delay and Network load and TORA large Network perform best in each case in terms of Throughput, Upload and Download Response Time, TORA Control Traffic Sent and Received are showing better results with 802.11b technology.

IV. SIMULATION PARAMETERS AND PROPOSED WORK

Table I Simulation parameters

Maximum Simulation Time	600 seconds
Environment size	100*100 meter
No. of nodes	75
Routing Protocol	OLSR and TORA
Data Rate	1 Mbps
Packet size	1024 bytes
Speed	10 m/s
Traffic type	FTP
Trajectory	Handover move
TTL (time to live)	Defined

The aim of proposed work is to enhance the performance of OLSR and TORA routing protocol. The altering of control interval values done for OLS for its unsurpassed performance. The values of control interval are optimally used considering the factors like distance, power and global cost. The routing of TORA routing protocol is not based on shortest path selection but based on stable path selection, as the result it decline the overall performance of routing. The long paths are followed based on stability consequences in more energy consumption and network span is shorten. So, in our proposed approach the routing of TORA is based on energy oriented routing. The node with highest residual energy is selected for forwarding the packets. The scenarios are designed using OPNET-14.5. The simulation results had shown improvement in performance of both routing protocols in compare with their original versions.

V. RESULTS AND DISCUSSION

A. Delay- The delay for OLSR and TORA is represented in figure 3, the delay of TORA routing protocol for both default and tuned version is much higher than of OLSR. The tuned OLSR is better in term of delay.

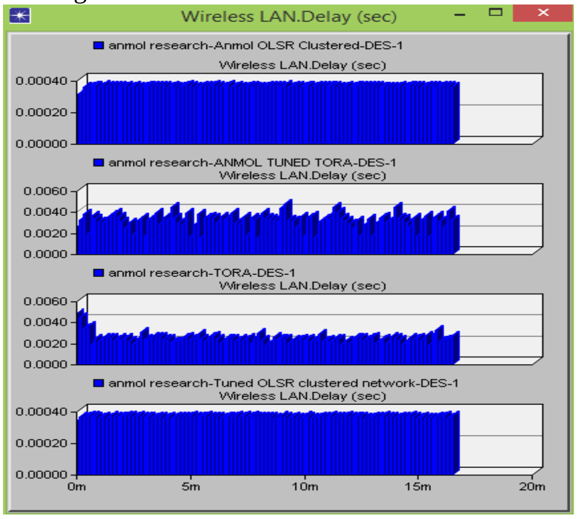

Figure 2 OLSR and TORA Delay

B. Medium Access Delay-The medium access delay is higher for TORA in comparison with OLSR routing protocol. The performance of improved OLSR is better than original OLSR. The delay shown by all versions is very less, which had less significance.

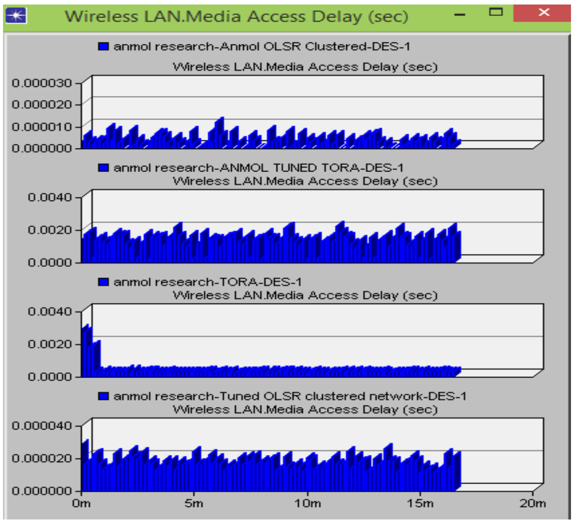

Figure 3 OLSR and TORA Medium Access Delay

C. Load- The load of OLSR is much higher than TORA. The load depends on the number of packets in the network. The higher load may result in network congestion sometime, which is not desirable. The proposed network is not under congestion as its throughput is also higher.

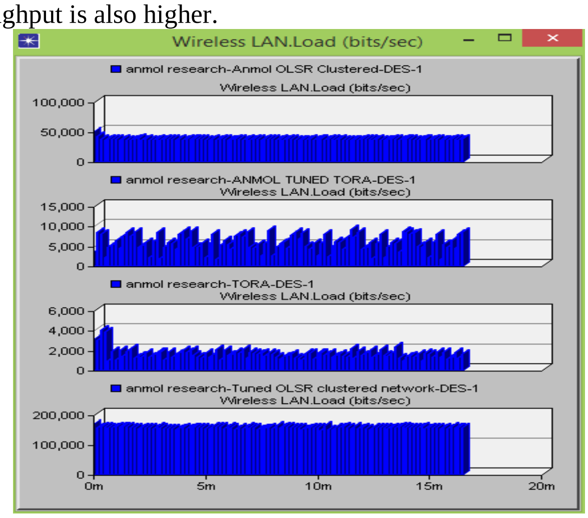

Figure 4 OLSR and TORA Load

D. Throughput- The proposed OLSR is best in terms of throughput. The OLSR shows the maximum throughput, whereas TORA throughput is quite low in compare with OLSR and proposed OLSR. The proposed Tora throughput is higher than normal TORA.

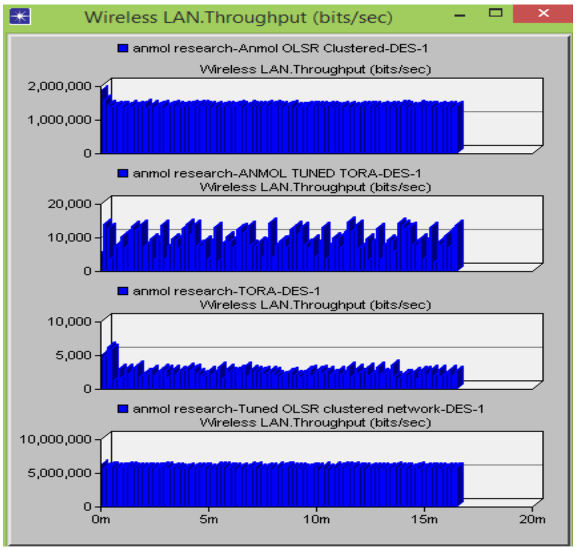

Figure 5 OLSR and TORA Throughput

VI. CONCLUSION

The simulation study has shown that OLSR performance is better than TORA in all the terms. The proposed TORA perform better than original TORA version, which indicate that energy routing for TORA suits the network. The tuned OLSR perform much better than OLSR, in proposed work the control values are adjusted along with selection of forwarder on basis of power, distance and stability. The proposed approach shows much better results for tuned OLSR in comparison with OLSR. The throughput of tuned OLSR is much higher than OLSR. The proposed routing for OLSR and TORA is efficient and reliable too. The reliability makes the protocols trustworthy, which has high impact on throughput.

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