VoIP over MANET Routing Protocols OLSR & TORA Performance Evaluation

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Abstract: *(MANETs) Mobile Ad hoc Networks is group of wireless mobile nodes forming a temporary network without utilizing any centralized access point administration of the mobile networks. Its provide a good platform for the fast deployment of VoIP service application and provide low cost .in This paper investigates the performances of routing protocols (OLSR, TORA) in MANETs carrying VoIP traffic. Using the network simulator OPNET 14.5 present the analysis and evaluating some Qos metrics like end-to-end delay, Jitter, throughput and Mean Opinion Score MOS. The OPNET simulation results show that the OLSR protocol is a good candidate for VoIP application*

Keywords: VoIP over MANET, *OLSR, TORA, OPNET*

1. Introduction

The mobile ad hoc network (MANET permits a more Flexible communication model than traditional wire line Networks since the client is not restricted to an altered physical area [1]. It is another unique network that does not have any fixed wired communication framework or other network supplies. With no previous settled infrastructure, MANETs are increasing expanding notoriety because of their simplicity of organization and ease of use. Whenever and anyplace. So they are seen as reasonable system.

Which can support some particular applications as virtual classrooms, military communications, and emergency search and safeguard operations, information obtaining in threatening situations, communications set up in displays, conferences and meetings, in battle field among soldiers to coordinate defense or attack, at airplane terminal terminals for laborers to share files… etc

Routing protocols in ad hoc networks has received wide interest for as long years because of the way that current internet routing protocols were designed to support fixed infrastructure and their possessions are unacceptable for mobile ad hoc networks. The up to date standardized protocols are categorized into reactive and proactive Protocols. Reactive protocols, for example TORA [9] discover the route just when there is data to be transmitted and therefore, produce low control traffic and routing overhead. Proactive protocols like OLSR [7]

Voice over Internet Protocol (VoIP)[2] is a technology that permits you to make voice calls utilizing an Internet connection rather than a general (or simple) telephone line. The QoS on VoIP network incompletely relies on the types of voice codec utilized [2].

In this paper, we will concentrate on researching Manet's performance in a VoIP Context. Network Simulator is utilized to run several simulations

We make estimation on VoIP channel characteristic such as end-to-end delay, Jitter, Mean Opinion Score MOS and throughput. To mea- sure the Qos for different scenarios

2. Routing Protocols

Routing protocols characterizes how packets will be delivered. In this section we show two IETF standard routing protocols, reactive TORA and proactive OLSR.

A. Optimized Link State Routing (OLSR)
OLSR [7] is a proactive routing protocol for mobile ad hoc Network .The protocol acquires the stability of a link state Algorithm and has the benefit of having routes promptly accessible when required because of its proactive nature. OLSR is an optimization over the traditional link state protocol, customized for mobile ad hoc networks. Every one of the nodes in the network does not broadcast the route packets. Multipoint Relay (MPR) nodes broadcast route packets. These MPR nodes can be chosen in the neighbor of source node. Every node in the network keeps a list of MPR nodes. This MPR selector is gotten from HELLO packets sending between in neighbor nodes.

B. Temporally Ordered Routing Algorithm (TORA)
Temporally Ordered Routing Algorithm (TORA) is an On Demand routing algorithm based on the notion of link reversal. This Routing protocol enhances the incomplete link reversal technique by detecting partitions and stopping nonproductive link reversals. TORA can be utilized for very dynamic mobile ad hoc networks. TORA [4] has three basic steps: route creation, route maintenance and route deletion. In TORA the DAG gives the ability that many nodes can send packets to a given destination and ensures that all routes are loop-set free. Because of node mobility the DAG in TORA might be detached. So, route maintenance step is an imperative part of TORA this routing protocol has the unique feature that control messages are limited into a small set of nodes close to the topology changes happened.

3. QOS Parameters in VoIP Services

Performance metrics markers for QoS are used to establish utilized to set up the performance of systems. The performance metrics are end-to-end delay, Jitter, MOS and Throughput.

End-to-End Delay
This metric is used to measure the average time taken for a data packet to move from the source to the Destination [1], when packet End-to-end delay is low the protocol is best performance.

Jitter
Jitter is variability in the packet arrival to the destination. This can be occurred by network congestion (bursts of data traffic), routing changes or timing float.

Mean Opinion Score (MOS)
Mean Opinion Score (MOS) factor keeps a stable value of 1 from 70 seconds. This value is duplicated in the MOS values received while measuring the performance of the network.

Throughput
It is bit rate sending for higher layer. Representing the rate of data effectively received from different stations. Throughput is expressed as bits per sec.

4. Simulation Scenarios and Results

The performance of the above discussed routing protocols during the transmission of voice is simulated utilizing Opnet modeler14.5 to modeling the behavior of the routing protocols under various node sizes like 20 and 50 mobile nodes. The QoS metrics incorporate the parameters like End-end-delay, Jitter, MOS and Throughput. The simulation parameters appointed in table (1).

Table 1: Simulation Parameters

Parameters	Value
Routing protocol	OLSR-TORA
Mac	802.11 with transmission rate of 11Mbps for voice application
Number of node	50,20 nodes
Node position	Random
Area	10kmx10km
Traffic type	VOIP
Simulation time	20m
Performance Parameter	End-to-end delay, Jitter, MOS and Throughput.

a) Scenario (1)
In this Scenario the network comprises of 20nodes. Different attributes of this scenario are same as appeared in Table 1.

Result and Discussion
Scenario [1] network have a little no. of nodes when transmitting Voice traffic in the network, Figure (1) show The OLSR while its delay is less than TORA.

Figure (2) show OLSR got little and acceptable voice jitter compared to TORA. TORA have maximum jitter. Figure (3) show the mean opinion value (MOS) is taken for this Scenario that OLSR has the great voice quality for 20 nodes.

OLSR show very acceptable Outcome in comparison with TORA protocol with an average throughput in Figure (4). This is because of reason that conduct of proactive protocols OLSR in smaller networks with nodes this shows that the proactive protocols can handle mobility better than reactive protocols. From this Scenario and analyzing all the performance Matrices it is apparent that OLSR protocol is the best candidate for VoIP application in small no of node.
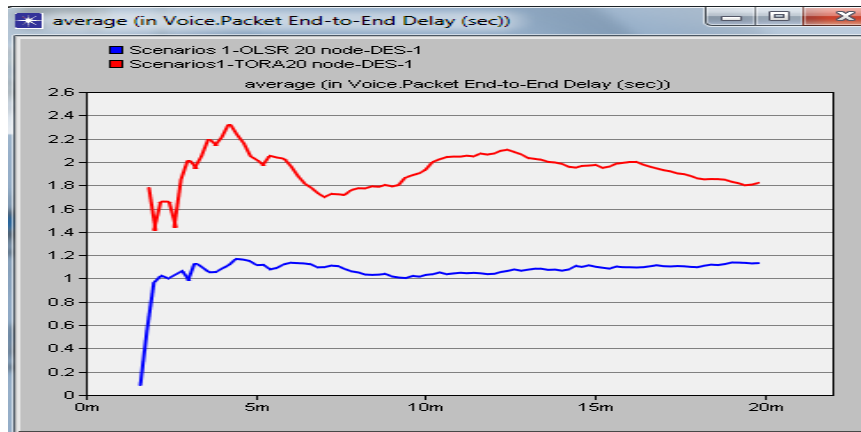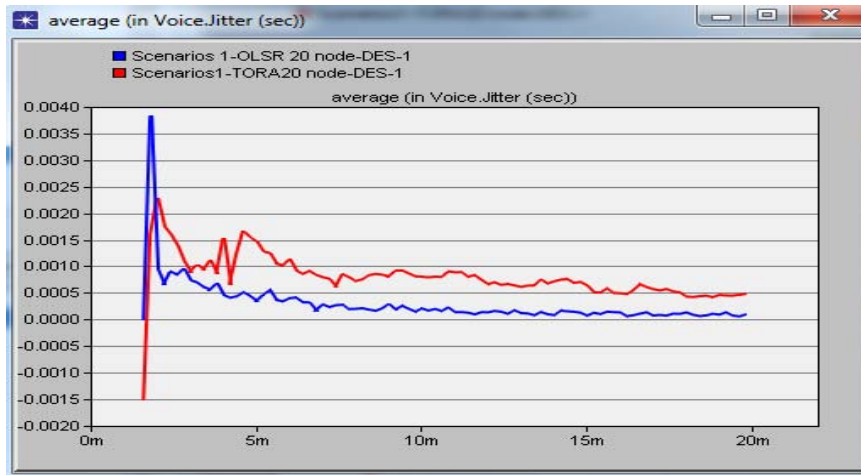

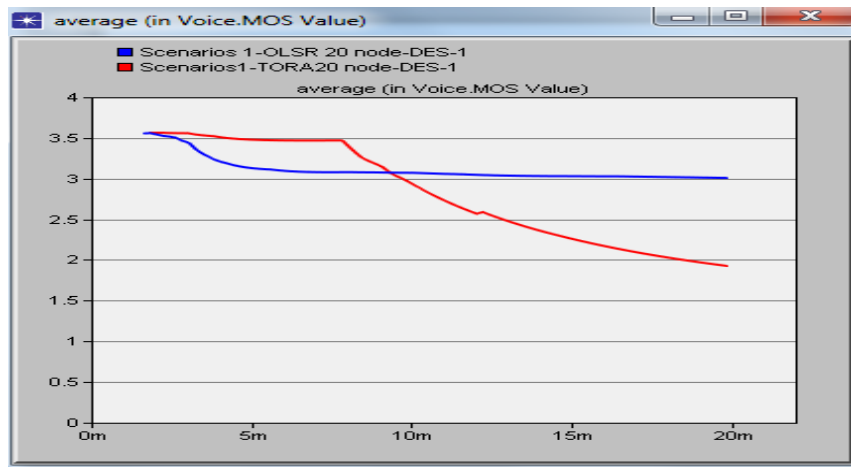**Figure 1:** End to End Delay for 20 nodes

Figure 2: Jitter for 20 nodes
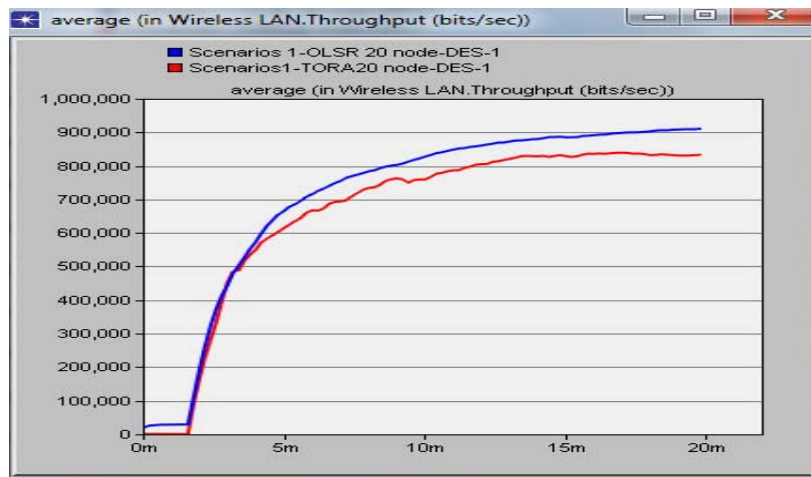

Figure 3: MOS for 20 nodes

Figure 4: Throughput for 20node

b) Scenario (2)

In this Scenario the network comprises of 50 nodes. Different attributes of this scenario are same as appeared in Table (1).

Result and Discussion

When increase the network size to middle size (Scenario 2) the performance of TORA becomes worst as its maximum delay compared with OLSR in figure (5). low voice quality (MOS)and OLSR have high voice quality as it is shown in Figure(7) .high value of delay , jitter and minimum mean opinion value(MOS)of TORA protocol Which not suitable for voice application traffic, also its TORA provide supreme throughput in comparison with OLSR in figure (8) However, we find that OLSR performance better in term of end to end delay ,jitter ,MOS value the reason behind such result could be the grouping of nodes done by OSLR in topology. Grouping divides the nodes into the sets of one hop and two hops neighbors and thus makes OLSR more competent in link process exclusive of having each node partaking in this.
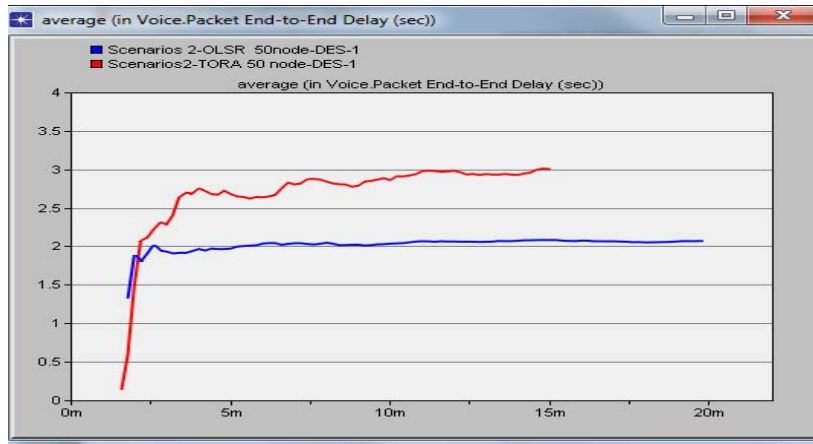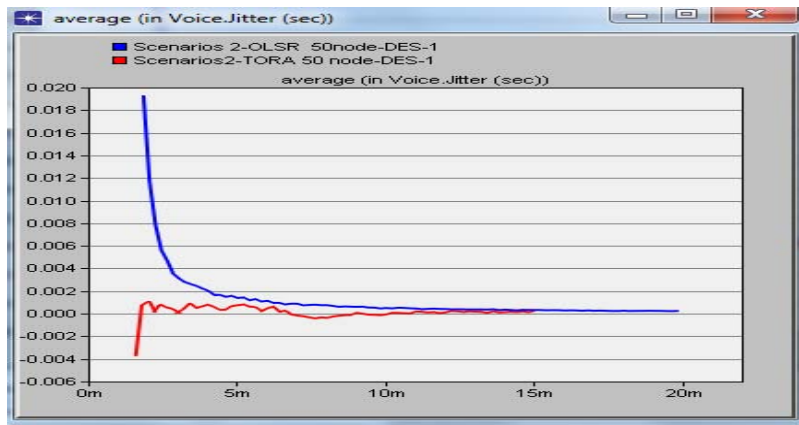
Figure 5: End to End Delay for 50 nodes
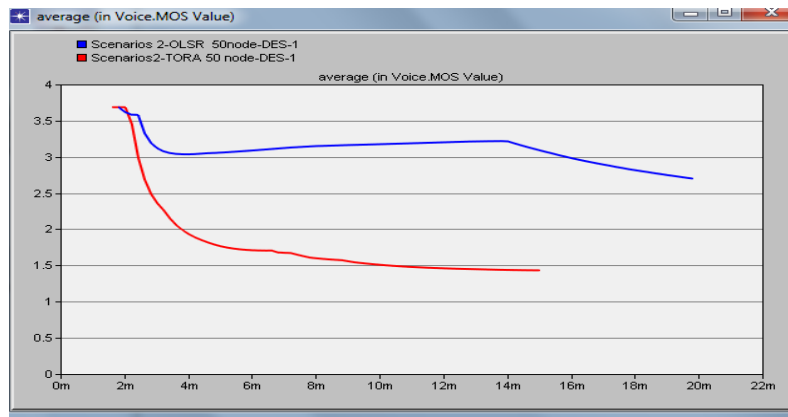

Figure 6: Jitter for 50 nodes

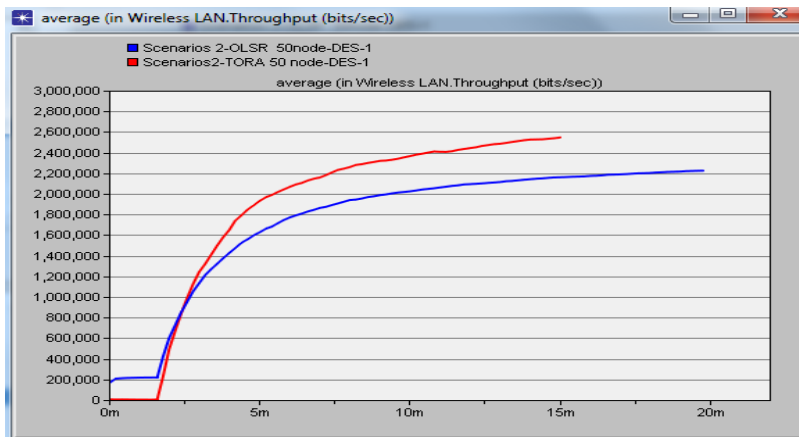**Figure 7:** MOS for 50 nodes

Figure 8: Throughput for 50nodes

5. Conclusion

In this paper, we talked about the routing protocols (OLSR and TORA) depend on OPNET simulator. Our point was to look at the performance of these two routing protocols in MANET on the above indicated parameters. We analyzed for different proactive (OLSR) and reactive (TORA) ad-hoc routing protocols with different mobile nodes transmitting voice traffic data. Also, it is found that the total performance of OLSR is better determination for small and large networks compared to TORA. Simulation result additionally described OLSR protocol is best appropriate for MANET protocol in high populace of nodes, while TORA has extremely poor QoS in high populace of node (50 nodes) networks with voice traffic data.

OLSR give the least Average end to end Delay, Jitter and great voice quality (MOS) in both networks. Low delay and low jitter are mainly required in voice applications.
Finally, we reach to the point that the routing protocols performance changes with network. It is the decision of reasonable routing protocols (contemplating the sort of network) that at long last affect the efficiency of that network in great way.

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