

Performance Optimization in Multi-Media Over MANET

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Abstract: “A mobile ad-hoc network is an autonomous network that can be formed without any established infrastructure, where nodes can move arbitrary in the topology with variation of speed and trajectory” [1]. Routing is a critical issue in multimedia over MANET, this study addresses this issue by comparing the performance of two adhoc routing protocols: (DSR) and (AODV). Our simulation tool will be OPNET modeler. The performance of these routing protocols is analyzed by two metrics: delay and throughput.

Keywords: OPNET, (QoS), Multimedia, Performance, MANET, DSR, AODV.

1. Introduction

“Multimedia application is an application that uses a combination of multimedia sources such as (animation, graphics, text, audio and video)” [2]. Ad hoc networking establish communication anytime and anywhere without the aid of a central infrastructure, routing in MANET means to choose a right and suitable path from source to destination. The DSR is an efficient routing protocol proposed and designed especially for multi-hop Wireless MANETs, the AODV protocol is another protocol in MANET, it offers quick adaptation to dynamic link conditions, low processing overhead. The concept of (QoS) is a great importance in multimedia systems, it is necessary to improve performance and meet the needs of users to realize high productivity.

2. (QoS) In Video Conference over MANET

“Video Conferencing (or video conference) means to conduct a conference between two or more participants at different sites by using computer networks to transmit audio and video data”[3], multimedia finds its application in various areas including, for examples: Commercial, education and multimedia in Public Places, the Parameters of (QoS) In Multimedia Defining to throughput, delay, jitter and reliability.

3. DSR and AODV

“The Dynamic Source Routing (DSR) Protocol is a Reactive routing Protocol, there are two major phases in DSR namely: The Route Discovery Phase and Route Maintenance

Phase.”[4] “The AODV Routing Protocol uses an on-demand approach for finding routes, that is, a route is established only when it is required by a source node for transmitting data packets” [5]

4. Problem Definition

By using simulation software OPNET with routing protocols for solve the problem of the routing due to dynamically changing topology which leads to a collision.

5. Related Work

Jorg D.O. [6] studied the behavior of different routing protocols for the changes of network Topology which resulting from link breaks, node movement, etc. In his paper, performance of Routing protocols was evaluated by varying number of nodes. But he did not investigate the Performance of protocols under high mobility, large number of traffic sources and larger Number of nodes in the network which may lead to congestion situations’ Broch et al. [7] performed experimental performance comparison of both proactive and reactive routing protocols. In their NS-2 simulation, a network density of 50 nodes with varying pause times and various movement patterns were chosen. As a promising network type for future mobile application, MANETs are attracting more and more researcher. Mobile ad hoc networks are resource constrained and hence routing in mobile ad hoc networks is more challenging task, many researchers have done work on analyzing the characteristics of different routing protocols in mobile ad hoc networks. Rachit Jain, Laxmi Shrivastava [8] analyzed the performance of AODV & DSR on the basis of Path Loss Propagation Models based on various performance metrics in order to create substantial understanding of choosing the correct protocol for any active operating environment.

6. Simulation with OPNET

Table 1: Simulation Parameters

Simulator	OPNET
Protocols	AODV and DSR
Si Simulation area	1000 m x 1000 m
Simulation duration	3600 seconds
Number of nodes	10, 20, 40
MAC Layer Protocol	IEEE 802.11

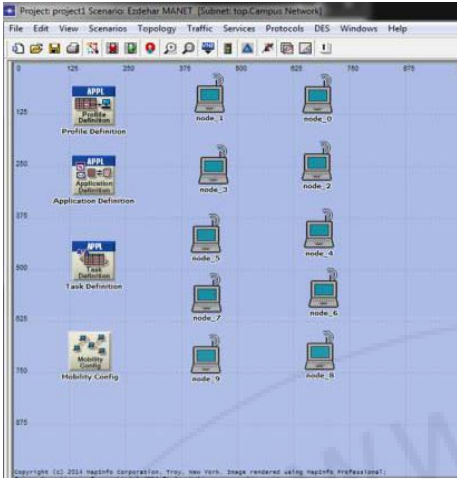


Figure 1: Scenario (1): MANET (10 Nodes) with DSR

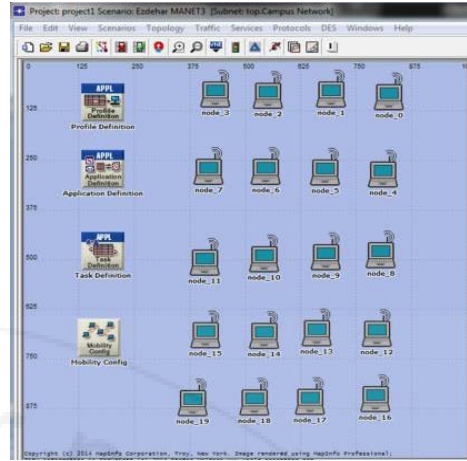


Figure 4: Scenario (4): MANET (20 Nodes) with DSR

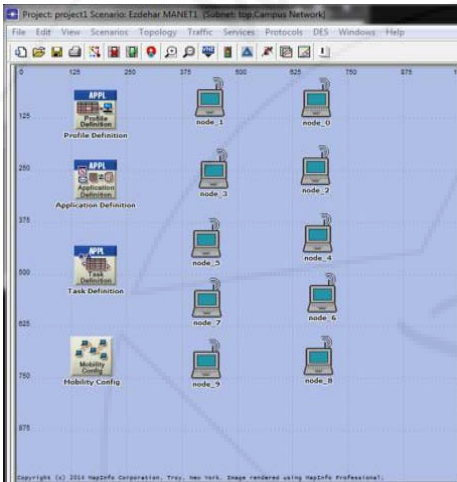


Figure 2: Scenario (2): MANET (10 Nodes) with AODV

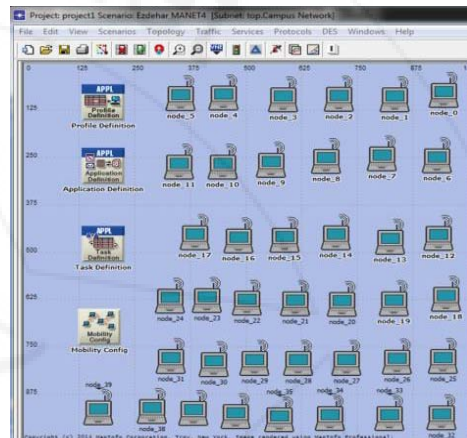


Figure 5: Scenario (5): MANET (40 Nodes) with DSR

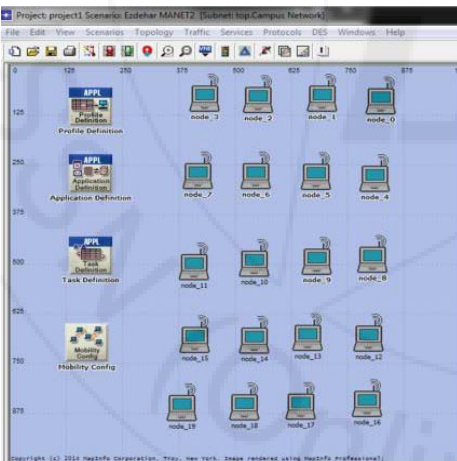


Figure 3: Scenario (3): MANET (20 Nodes) with AODV

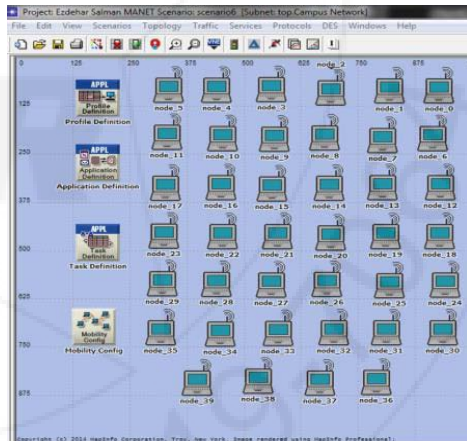


Figure 6: Scenario (6): MANET (40 Nodes) with AODV

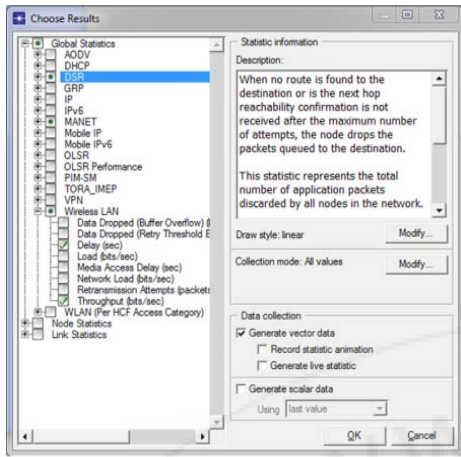


Figure 7: Choose Results for Scenarios (1- 4-5): MANET with DSR

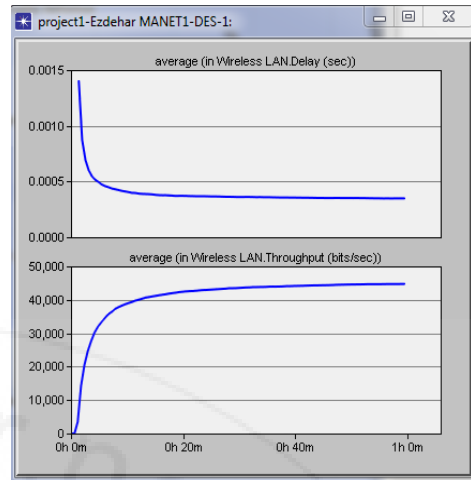


Figure 10: Average in MANET delay and throughput (bits /sec): (10 Nodes) with AODV

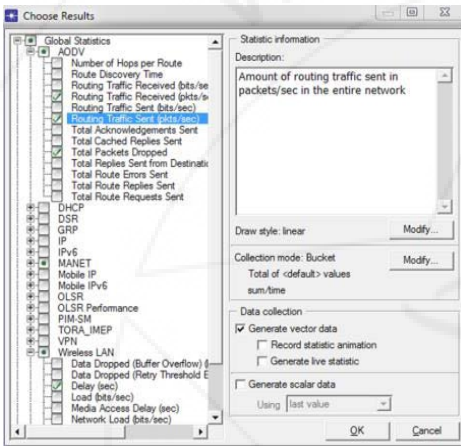


Figure 8: Choose Results for Scenarios (2-3-6): MANET with AODV

The figure (10) is the case of small network of ten nodes with AODV .The x-axis represents time in min and the y-axis data rate in bit/sec. The peak value of delay is 0.0014 sec and the peak value of throughput is 45000 bit/sec.

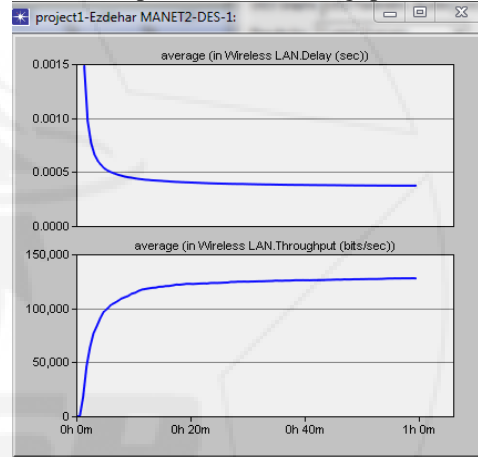


Figure 11: Average in MANET delay and throughput (bits /sec): (20 Nodes) with AODV

The figure (11) gives the AODV required results. The number of mobile nodes is 20. AODV was checked by two parameters as delay and throughput. The peak value of network delay is 0.0015 sec. The peak value of throughput is 130.000 bit/sec.

8. Results and Discussions

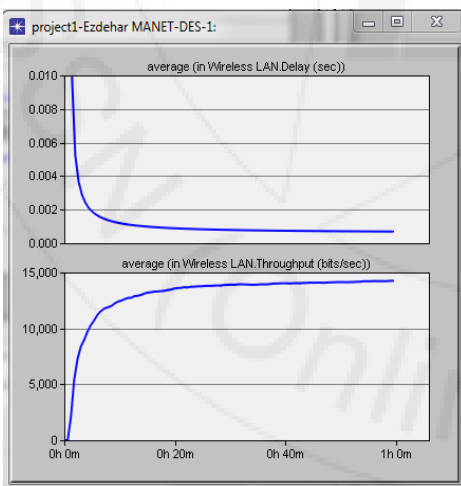


Figure 9: Average in MANET Delay (sec) and throughput (bits /sec) (10 Nodes) with DSR

The figure (9) is the case of small network of ten nodes with DSR .The x-axis represents time in min and the y-axis data rate in bit/sec. The peak value of delay is 0.010 sec and the peak value of throughput is 13800 bit/sec.

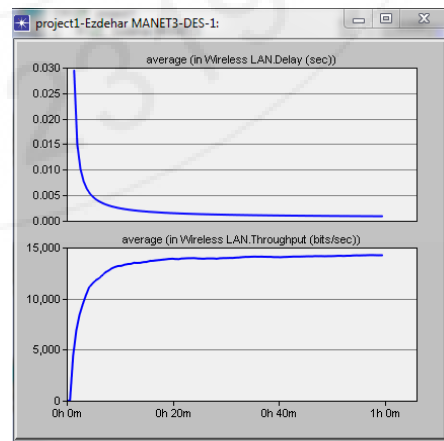


Figure 12: Average in MANET delay and Throughput (bits /sec): (20 Nodes) with DSR

The image gives the DSR required results and it is shown in the figure (12). The number of mobile nodes is 20. Dynamic Source Routing protocol was checked by two parameters as delay and throughput. In the given figure the small upper window shows the network delay. The peak value of network delay is 0.029sec. The DSR throughput is also clear from the given figure (12).The peak DSR value of throughput when the numbers of mobile nodes were 20 is 14000 bit/sec.

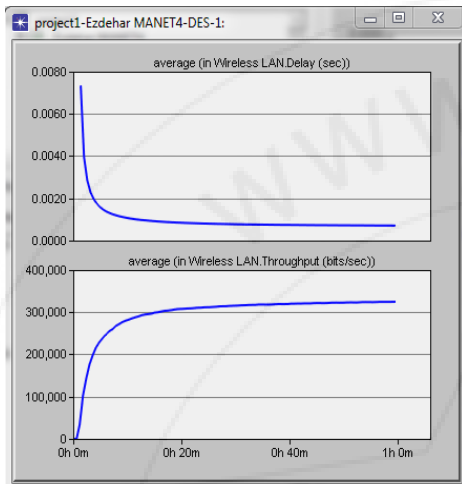


Figure 13: Average in MANET Delay and Throughput: (40 Nodes) with DSR

The performance of DSR will be checked in the increased number of mobile nodes. The number of mobile nodes will be 40. The DSR will be checked against the two Parameters i.e. delay and throughput. In the given figure (13). The peak value of DSR delay is 0.0075 sec, the upper throughput is 330.000 bits/sec.

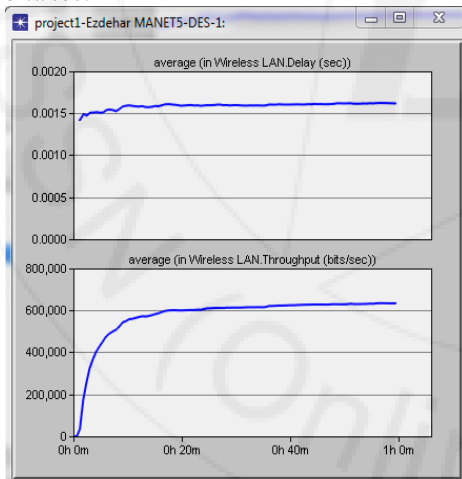


Figure 14: Average in MANET Throughput and delay: (40 Nodes) with AODV

The performance of AODV will be checked in the increased number of mobile nodes. The number of mobile nodes will be 40. The AODV will be checked against the two Parameters i.e. delay and throughput. In the given figure (14). The peak value of AODV delay is 0.0017 sec. The upper throughput is 640.000 bits/sec.

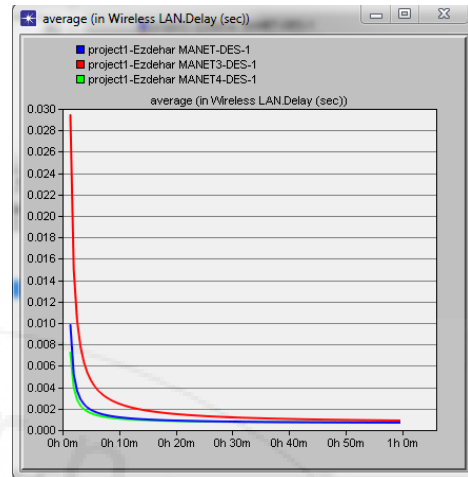


Figure 15: Average in MANET delay: (MANET – MANET 3 - MANET 4) scenarios with DSR

Figure (15) shows that the highest value of the delay in the case of DSR (20 nodes), the middle value of the delay in the case of DSR (10 nodes) and the least value of the delay in the case of DSR (40 nodes).

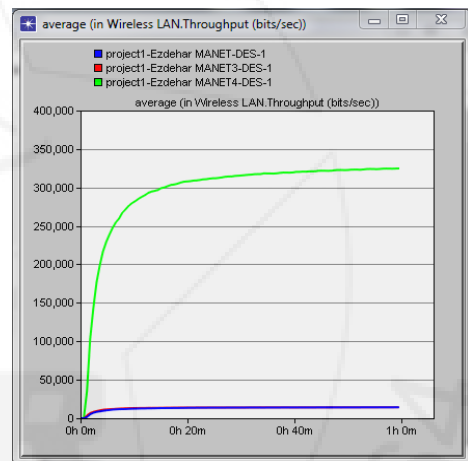


Figure 16: Average in MANET throughput: (MANET – MANET 3 - MANET 4) scenarios with DSR

Figure (16) shows that the highest value of the throughput in the case of DSR (40 nodes), the value of the throughput in the case of DSR (20 nodes) about to matching the value of the throughput in the case of DSR (10 nodes) but slightly higher.

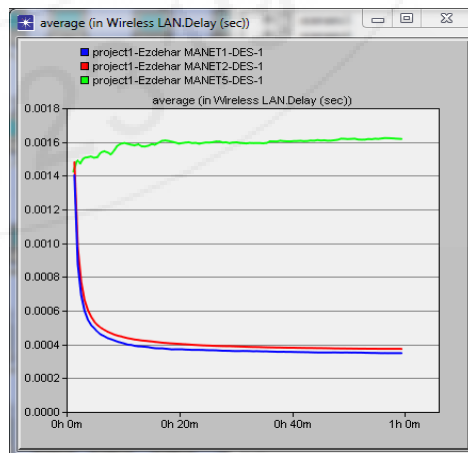


Figure 17: Average in MANET Delay: (MANET 1 – MANET 2 - MANET 5) scenarios with AODV

Figure (17) shows that the highest value of the delay in the case of AODV (40 nodes), the middle value of the delay in the case of AODV (20 nodes) and the least value of the delay in the case of AODV (10 nodes).

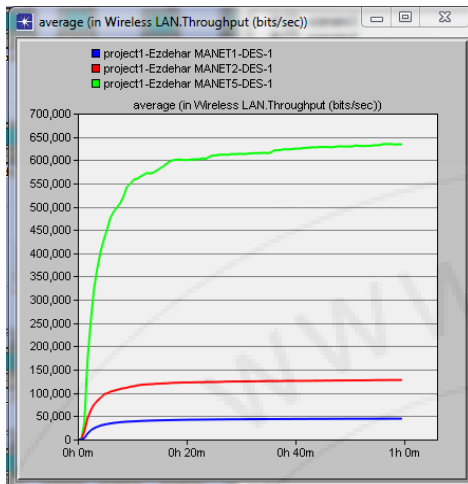


Figure 18: Average in MANET Throughput: (MANET1 – MANET 2 - MANET 5) scenarios with AODV

Figure (18) shows that the highest value of the throughput in the case of AODV (40 nodes), the middle value of the throughput in the case of AODV (20 nodes) and the least value of the throughput in the case of AODV (10 nodes).

9. Comparison between DSR and AODV

Table 2: Comparison between DSR and AODV

Nodes	Parameters	DSR	AODV
10	Delay (sec)	0.010	0.0014
10	Throughput (bit/sec)	13800	45000
20	Delay (sec)	0.029	0.0015
20	Throughput (bit/sec)	14000	130000
40	Delay (sec)	0.0075	0.0017
40	Throughput (bit/sec)	330000	640000

10. Conclusion

In this paper, we studied the performance of two MANET reactive routing protocols, AODV and DSR, from the above simulation the performance throughput and delay are analyzed for 10, 20 and 40 mobile nodes. For DSR MANET routing protocol, from above it is observed analysis that throughput is more in 40 nodes than 10 and 20, also the delay is less for 10 nodes than 20. This paper discusses the simulation model for the variable network size we found that the AODV throughput and delay increasing by increasing the number of mobile nodes. In all the three scenarios of small, medium and large networks AODV gives considerably less delay and higher throughput as compared to DSR. In mobile nodes networks AODV is a good choice in very large network for minimal delay and higher throughput.

11. Future Work

In our research we recognized that, deploying a MANET security is one of the important features that should be considered. A wireless MANET involves greater security

problem as compared to wired networks because of its characteristics. Some of the aspects in this study are still under observation as the performance is still to be compared by other routing protocols with more metrics like jitter and packet loss.

References

- [1] Manpreet Kaur and Jyoti Kohli, “ Routing for Mobile Ad-hoc Network towards Quality of Services "Lovely University, Phagwara,2013.
- [2] [http://. en.wikipedia.org/wiki/Multimedia](http://en.wikipedia.org/wiki/Multimedia).
- [3] www.webopedia.com/TERM/V/videoconferencing
- [4] Shiva Prakash, Rajeev Kumar, Brijesh Nayak and Manindar Kumar Yadav, A Highly Effective and Efficient Route Discovery & Maintenance in DSR , Department of Computer Science and Engineering, Madan Mohan Malaviya Engineering College, Gorakhpur, India, 4 Apr 2011
- [5] [http: // .en.wikipedia.org/.../Ad_hoc_On_Demand_Distance_Vector](http://en.wikipedia.org/.../Ad_hoc_On_Demand_Distance_Vector)
- [6] David Oliver Jorg, “Performance Comparison of MANET Routing Protocols in Different Network Sizes”, Computer Networks & Distributed Systems, University of Berne, Switzerland, 2003.
- [7] J. Broch, D. A. Maltz, D. B. Johnson et.al.”, A Performance Comparison of Multi-Hop Wireless Network Routing Protocols,” Proceedings of the Fourth Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom’98), October 25-30, 1998, USA,pp.25-30.
- [8] Rachit Jain1, Laxmi Shrivastava “Study and Performance Comparison of AODV & DSR on the basis of Path Loss Propagation Models” International Journal of Advanced Science and Technology 32, July, 2011
- [9] [http:// www.startimes.com/?t=14690508](http://www.startimes.com/?t=14690508)
- [10] Jarmo Prokkola “OPNET - Network Simulator”, VTT Technical Research Centre of Finland, 2008.