American Journal of Applied Sciences 4 (9): 663-665, 2007
ISSN 1546-9239


# A Comparative Study between Various Protocols of MANET Networks

[1]Mohammed F. Al-Hunaity, [2]Salam A. Najim and [2]Ibrahiem M. El-Emary
[1]Department of Information Technology, Prince Abdullah Bin Ghazi Faculty of Science and Information Technology, Al-Balqa' Applied University, Al-Salt 19117, Jordan
[2]Department of Computer Engineering, Faculty of Engineering, Al-Ahliyya Amman University, Amman 11910, Jordan

**Abstract:** Multicast Ad-Hoc on-Demand Distance Vector (MAODV) protocol keeps sending control packets within static periods whether there was sending of data packets or not, and it was not concerned with the amount of these data packets. Based on this, many people found out that there are a high number of control packets in the short-lived connection. The main idea of this paper was to compare between the original MAODV with another proposed approach used for enhancing MAODV protocol called (E-MAODV). The result appears that the E-MAODV protocol performs better than the traditional MAODV protocol.

**Key words:** MANET, Ad-Hoc, CO, TO, MAODV, E-MAODV

## INTRODUCTION

A mobile ad hoc network (MANET) is a type of wireless networks. This type depends on the mobile nodes and there is no infrastructure in such type. There are no routers, servers, access points or cables. Nodes (mobiles) can move freely and in arbitrary ways, so it may change its location from time to time. Each node may be a sender or a receiver, and any node may work as a router and do all router functions. This means that it can forward packets to other nodes. Many applications of MANET's are implemented and used until today like in: meeting conferences; military operations; search and rescue operations, all of them are examples of MANET networks [1-3]. MAODV protocol keeps sending control packets within static periods, whether there is sending of data packets or not, and it is not concerned with the amount of these data packets. Based on this, many people found out that there are a high number of control packets in the short-lived connection [4].

The main idea behind this paper is to study the MAODV protocol and the enhanced MAODV, then compare results of both protocols.

The final result that is obtained after comparison clarify a clear enhancement in control overhead (CO) and total overhead (TO) for the new MAODV. Paper study MAODV and E-MAODV, then discuss the result by comparison. This paper is organized from five sections; section two will show the related works, section three will study the problem definition. Methodology of solution and the simulation results will be discussed in section four. Final section represents a summary and conclusion. Many researches studied MAODV protocol, some of them focused on performance, security, scalability, and some others studied this protocol comparing with other protocols. This research studied MAODV comparing with the E-MAODV.

Tarawneh, E.K. "Mobile Ad Hoc Networks Route Maintenance Analysis in Reactive Routing Protocols". This master thesis gave a new idea by studying the short-lived connection and small transfers, but it evaluated them for unicast AODV and dynamic Source Routing (DSR) [5].

Al-Mimi, H.M. "Performance Evaluation of MAODV". In this master thesis, the different connection models are identified, and the values of transmission rate for each model are determined. Many simulation experiments were executed, the result was studied and analyzed, and then the decision for each model was taken. Author executed all of his experiments using network simulator NS-2 [6].

**Corresponding Author**: Mohammed F. Al-Hunaity, Department of Information Technology, Prince Abdullah Bin Ghazi Faculty of Science and Information Technology, Al-Balqa' Applied University, Al-Salt 19117, Jordan

Cheng, E. "On-Demand multicast routing (ODMR) in mobile ad hoc networks". This thesis studied the performance of two on-demand multicast routing protocols (MAODV and ODMR). Author demonstrated them sharing similar on-demand behavior. The difference in the two protocols can lead to know the performance differentials [7].

**Problem Definition:** There are many versions of MAODV implementation which can add to NS, but in the technical report for the authors Kunz and Zhu is the suitable and best implementation [8].
This is because it has been updated many times and many modern researches and papers that worked on MAODV used this version.

Therefore, we used it. Same experiments with author was done and compared with author results. This step was done before begin to be sure that the simulator work
properly. The original MAODV code was simulated and compared with the simulation results for the enhanced protocol.

## METHODOLOGY OF SOLUTION AND SIMULATION RESULTS

Both protocols original MAODV and the E-MAODV are simulated on the NS-2, this simulated are compared to appear the enhancement that add to MAODV code. The NS-2 was written using C++ language and it uses the Object Oriented Tool Command Language (OTCL). It came as an extension of Tool Command Language (TCL). It is a language with a very simple syntax. OTCL works as the NS commands and the structure of its interface. The NS came in two main versions and some subversion between them. NS-1 and NS-2 are the main versions and there are NS (2.26 and 2.28) and others as subversions. In this paper, the NS-2.26 version is used because it contains the last MAODV protocol code.

The NS is strong software, and it is widely used in network research because it supports many types of simulations. These types include transmission control protocol (TCP), multicast protocols over wired and wireless networks, and the routing protocols [9]. MAODV original code and the enhanced code are compared for two metrics CO and TO. Three parameters are changed; the test was under varying number of senders, receivers and mobility speed. The following figures show the result of comparison.

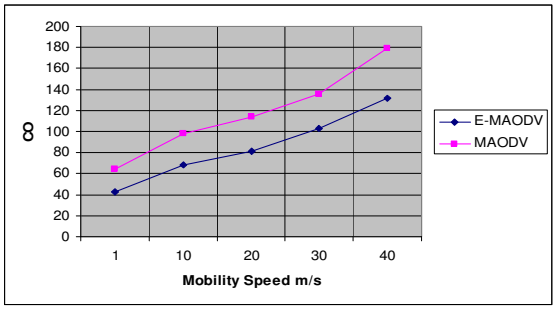


Fig. 1: Comparison for CO with varying mobility speed

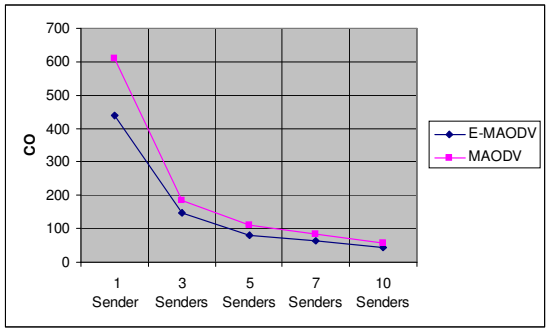


Fig. 2: Comparison for CO with varying number of senders

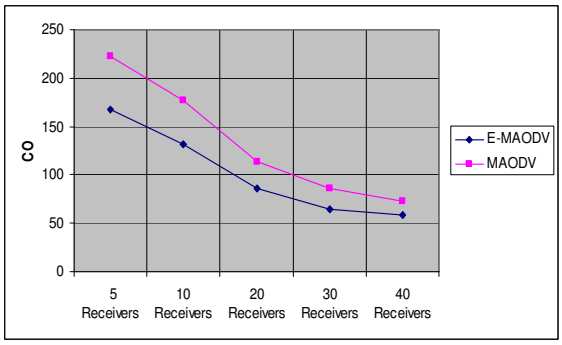


Fig. 3: Comparison for CO with varying number of receivers

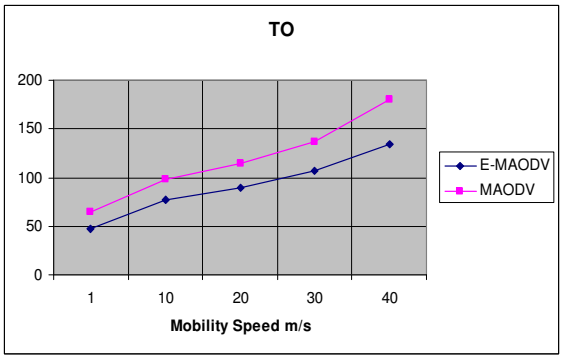


Fig. 4: Comparison for TO with varying mobility speeds

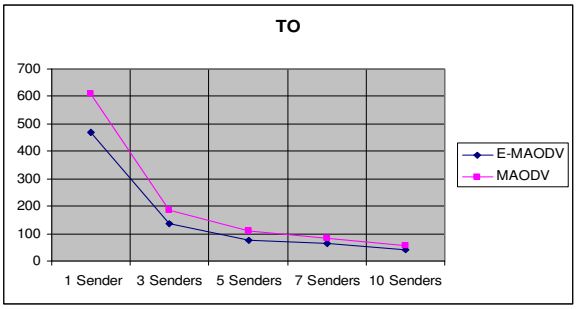


Fig. 5: Comparison for TO with varying number of senders

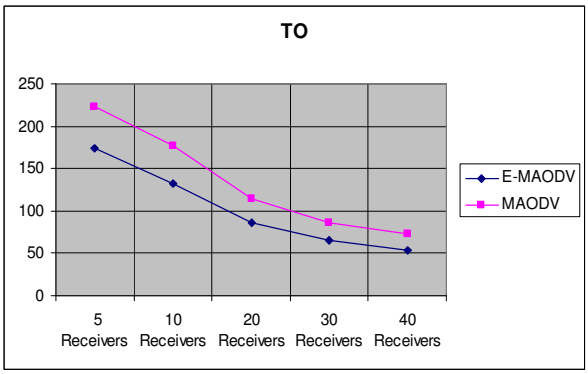


Fig. 6: Comparison for TO with varying number of receivers

From Fig. 1 we see that enhanced protocol gives best decreasing of the CO by increasing the speed.

Figure 2 shows the enhanced of the protocol by decreased the CO in E-MAODV more than it in MAODV, this decrement enhanced the performance, and by this comparison we can see the decrement of the difference between the two protocols by increasing the number of senders, this come because increasing the packets want to send with increasing the time.

CO is enhanced in E-MAODV protocol and studied with increasing receivers, this enhanced shows in Fig. 3, the CO is 225 for MAODV but it enhanced to be 170 for E-MAODV for 5 receivers, this enhancement decreased by increasing the number of receivers, the reason is because the CO is normally decrease in MAODV so the difference between two protocols come to be nearer.

Figure 4 shows the TO comparison between the MAODV and E-MAODV, by this figure the difference of TO is clear that is decreased in the enhanced protocol, the enhanced protocol gives best decreasing of the TO by increasing the speed, this because the increasing of speed needs more control packets, so the E-MAODV protocol reduce the control packets and this effect appears with increase the control packets. By Fig. 5, the normal case is increasing the TO by increasing the number of senders, this comparison gives an indicator to say the enhanced protocol is better than the old one.

Fig. 6 is the result of comparing TO for both protocols, increasing the number of receivers gives a decreasing of TO values, the important here is the difference between the TO for each protocol, by this figure the enhancement of the TO for the E-MAODV is clear, the difference between them decreased slowly by increasing the number of receivers, this because the decreasing in TO in general, but the enhanced protocol still better.

## CONCLUSION

Some experiments were done to compare the results between the original MAODV and the E-MAODV. There are three parameters that have been changed; the mobility speed, the number of senders, and the number of receivers. There are four metrics that have been used to evaluate the protocol before and after enhancing; packet delivery ratio (PDR), Latency, CO, and the TO. The CO and TO decreased in better values, both of them decreased between 0.25 and 0.3 more than in the original MAODV, and this enhanced reliability. The final result of this enhancing is that the increasing of latency is opposed by a decreasing of CO and TO, but the advantage gained from decreasing the CO and TO is more than the loss of increasing the latency, so the reliability of the MAODV protocol is enhanced.

## REFRENCES

1. Marina, M.k. and S.R. Das, 2002. Routing performance in the presence of unidirectional links in multihop wireless networks. Proceedings of MOBIHOC EPFL, Lausanne, Switzerland.
2. Lee, S., W. Su, J. Hsu, M. Gerla and R. Bagrodia, 2000. A performance comparison study of ad hoc wireless multicast protocols. Proceeding of IEEE INFOCOM, Tel Aviv, Israel.
3. Varshney, U., 2002. Multicast over wireless networks. Communications of ACM.
4. Ilyas, M., 2003.The hand book of ad hoc wireless network. CRC press LLC.
5. Tarawneh, E. K., 2004. Mobile ad hoc network's route maintenance analysis in reactive routing protocols. Master thesis, University of Jordan, Amman, Jordan.
6. Al-Mimi, H. M., 2005. Performance evaluation of multicast ad hoc on demand distance vector protocol. Master thesis, University of Jordan, Amman, Jordan.
7. Cheng, E., 2001. On-demand multicast routing in mobile ad hoc networks. Master thesis. Carleton University, Ontario, Canada.
8. Zhu, Y. and T. Kunz, 2004. MAODV implementation for NS-2.26. Technical report.
9. Cavin, D., Y. Sasson and A. Schiper, 2002. On the accuracy of MANET simulators, Proceedings of ACM POMC, Toulouse, France.