Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 2, Issue. 7, July 2013, pg.413 – 421

RESEARCH ARTICLE

Performance Comparison of Routing Protocols for Remote Login in MANETs

VIKAS GOYAL[1], SHAVETA RANI[2], PARAMJIT SINGH[3]

[1]Giani Zail Singh Punjab Technical University Campus, BATHINDA (P.B), India
[2]Giani Zail Singh Punjab Technical University Campus, BATHINDA (P.B), India
[3]Giani Zail Singh Punjab Technical University Campus, BATHINDA (P.B), India

[1] vikasbti.1986@gmail.com; [2] garg_shavy@yahoo.com; [3] param2009@yahoo.com

Abstract— Wireless networks are those networks, in which devices are connected without using cables. The best example, which comes across in our daily life is mobile phones. MANET has mobile nodes in network, which transfer data packets from source node to destination node; this is possible by routing protocols. In this paper, the routing protocols used are - Ad hoc On-Demand Distance Vector (AODV) Protocol, Geographical Routing Protocol (GRP) and Optimized Link State Routing (OLSR) Protocol. The performance is evaluated by using "OPNET MODELER 14.5" Simulator. The simulation performance parameters are - Data Dropped, Delay, Load, Media Access Delay, Network Load, Retransmission Attempts and Throughput for comparing protocols.

Key Terms: - AODV; GRP; MANET; OLSR; OPNET

I. INTRODUCTION

When the nodes communicate without any physical media, the network is called wireless network. Ad hoc networks consist of mobile or stationary nodes that communicate over wireless links. Mobile Ad hoc Network (MANET) is a collection of wireless mobile nodes that dynamically create a temporary network without any established infrastructure or centralized administration [1].Wireless Networks communicate with devices like mobile computers, notebooks, laptops, web cameras etc. Another important use of wireless networks is in the disaster management where telephone lines are totally disconnected, and then one can communicate by using wireless network. Every node in the network acts as router [2], [3] forwarding data packet for other nodes. MANETS are used in a military environment, preservation of security and recovery from failure of significant concern.

II. ROUTING PROTOCOLS

When we need to transfer the data from source to destination, we need a dedicated path or a route that is decided by various routing protocols. In this paper, we have used the AODV, GRP and OLSR Routing Protocols.

A. Ad hoc On-Demand Distance Vector (AODV) Protocol

Ad hoc On-Demand Distance Vector Protocols is a Mobile Ad hoc Network (MANET) protocol that is used for routing purpose. It is category of reactive wireless protocols, which means it works on demand when source wants to transfer data packets over networks. When a node wants to communicate in the network then, there is a requirement of establishment of connection to broadcast a message. If any node or link failure [4] occurs, a

route error is passed to transmitter node and the process is repeated. Source node and intermediate nodes store the next hop information regarding every other flow for data packet transmission. AODV uses a destination sequence number (DestSeqNum) to determine path to destination that is up to date. In the AODV Routing Protocols, there is a destination sequence number [5], [6], which corresponds to a destination node that is requested, by a routing sender node.

B. Geographical Routing Protocol (GRP)

Geographic routing is a routing protocol that is based on position-based information. It is a wireless network routing protocol, in which the source node sends a message to geographic location of the destination instead of network address [7]. Each node finds out its own location and information sent to the source about location of destination and associated neighbors, by broadcasting the "HELLO" message. From the sender node to the destination node sends the "HELLO" message for the broadcast purpose. If destination node responds back, then sender transmits the data packets over all networks. The control message [8] is used to minimize overhead for fast transmission. A Packet "Destination Query" [9] is used by the source node and sent to the destination through the network. The DQ packet consists of Network Information Gathering [9] used by router in the network. The intermediate node uses the next hop geographic forwarding process. By using intermediate neighbors and control packets, there is no need for creation and maintenance of routing tables for the routing purpose when there is lack of route creation. The data traffic conditions and node's own requirements [10] are adjusted by the protocol parameter values independently.

C. *Optimized Link State Routing (OLSR) Protocol*

Optimized Link State Routing (OLSR) [11] protocol is a proactive routing approach, which means it is table driven. When the source node retransmits the data packet periodically then "Flooding" over networks occurs. The Multi Point Relays (MPRs) [12] eliminate the traffic congestions by distributed data packets over network. In this approach, the MPR Selectors before transmitting data packets from source node ensures in advance, which node is ready to receive data packet from the destination. MPR selector enables sender to send data packets to the destination node when the destination node is ready. MPR has control message that is "HELLO" used by sender node to connect to the destination node over network. An MPR approach has another Topology control used for broadcasting information to the associated neighbors.

III. PERFORMANCE PARAMETERS

TABLE 1
PERFORMANCE PARAMETERS

Performance Parameters	**Description**
Data Dropped (bit/sec)	When source node transfers data then how many data packets have been successfully sent and received by the receiver and also data dropped in the way `before reaching destination node due to interruption of other devices is known as Data Dropped.
Delay (sec)	The time taken to transmit data packet from source node to destination node is known as Delay.
Load (bit/sec)	It is represented as the traffic over Wireless LAN (WLAN).
Media Access Delay (sec)	The Time taken by a node to access a media in order to transfer a data packet from source node to destination node is known as Media Access Delay.
Network Load (bits/sec)	When there is excess traffic in the network which is unable to be controlled is known as Network Load. When all higher layers [13] in WLAN nodes have load of the whole network, it is called Network Load.
Retransmission Attempts (packets)	Total no of retransmission attempts used to respond the data packets from source node to destination node by WLAN MACs in the network are known as Retransmission Attempts.
Throughput (bits/sec)	The ratio of total data received by receiver from sender over the network is known as Throughput.

IV. OPNET SIMULATION ENVIRONMENT

In this paper, the network is created by using OPNET Modeller 14.5 simulator, a wireless Ad hoc network with size 2000×2000 Meters scale Campus type. In the fig. 1, the project setup consists of 60 mobile nodes (workstations), Application Configuration, Profile Configuration, Wireless LAN Server (Mobile), Mobility Configuration (Default Random Waypoint Mobility). There have been three scenarios for Remote Login.

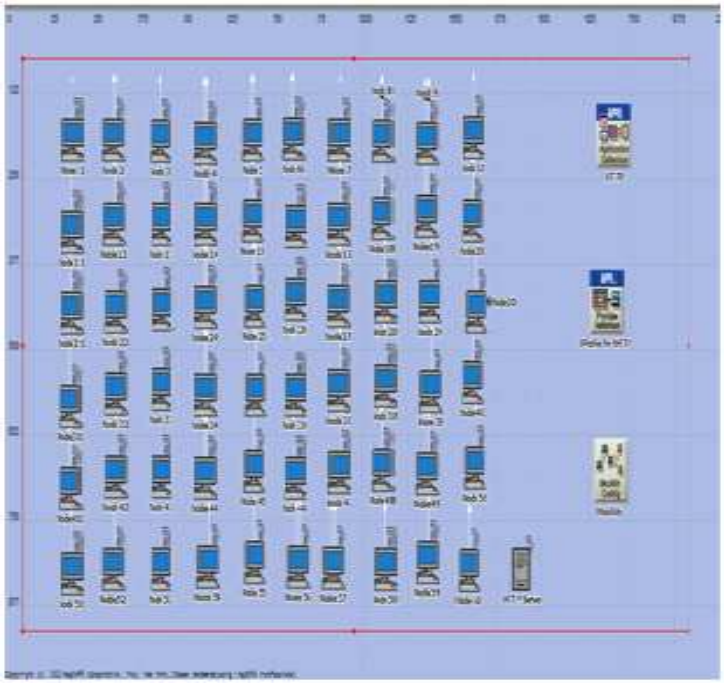

Fig. 1: Simulator setup having 60 Mobile nodes

TABLE 2
SIMULATION PARAMETERS

Simulation Parameters	**Values**
Simulator Version	OPNET Modeller 14.5
Network Scale	Campus Type
Network Size	2000×2000 Meters
Technology Used	MANET
Routing Protocols	GRP, AODV and OLSR
Number of Mobiles nodes	60
Traffic Type	Remote Login
Simulation Time	600 Sec
Physical characteristics	Direct Sequence
Data Rate (bps)	11 Mbps

V. RESULTS AND DISCUSSIONS

In this paper, we have analyzed the performance of protocols-GRP, AODV and OLSR w.r.t Remote Login Service.

Wireless LAN Remote Login

When the source node wants to send the data packets to destination node through Remote Login service, it enables the remote locations servers' data accessibity from client to server. The Wireless LAN performance parameters are as following:

A. Data Dropped

Fig. 2 represents the graph of Data dropped for AODV, GRP and OLSR routing protocols. In the AODV routing protocol, the peak value of data dropped, that is almost 180 bits/sec after 600 second. In the GRP routing protocol, the peak value of data dropped that is almost 1000 bits/sec and it gradually drops down and reaches to almost 990 bits/sec after 600 second. In the OLSR routing protocol, the peak value of data dropped that is almost 160 bits/sec and it gradually drops down and reaches to almost 100 bits/sec after 600 second. The peak value of data dropped of OLSR routing protocol has been lowest than AODV and GRP, because MPR Selector node controls the flooding. Therefore, OLSR routing protocol takes lowest data dropped.

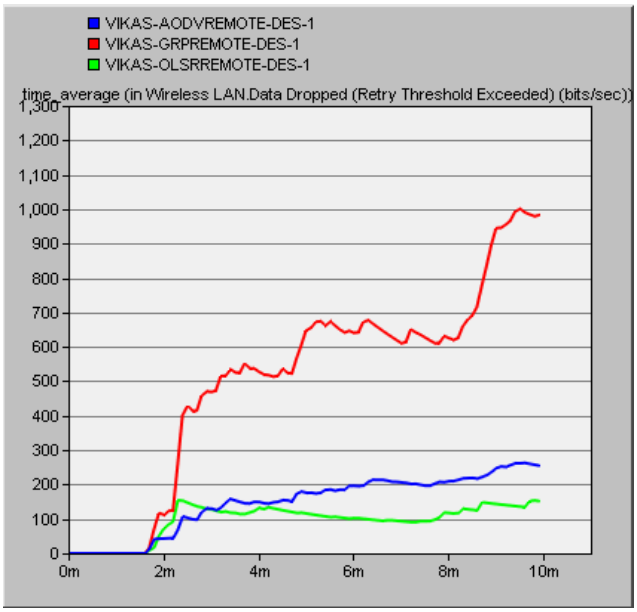

Fig. 2: Data Dropped for Remote Login

B. Delay

Fig. 3 represents the graph of Delay for AODV, GRP and OLSR routing protocols. In the AODV routing protocol, the peak value of delay that is almost 0.0033 sec and it gradually drops down and reaches to almost 0.0021 sec after 600 second. In the GRP routing protocol, the peak value of delay that is almost 0.0073 sec and it gradually drops down and reaches to almost 0.0007 sec after 600 second. In the OLSR routing protocol, the peak value of delay is almost 0.0006 sec after 600 second. The peak value of delay of OLSR routing protocol has been lowest than GRP and AODV, because MPR Selector node controls the flooding. Therefore, OLSR routing protocol takes lowest delay.

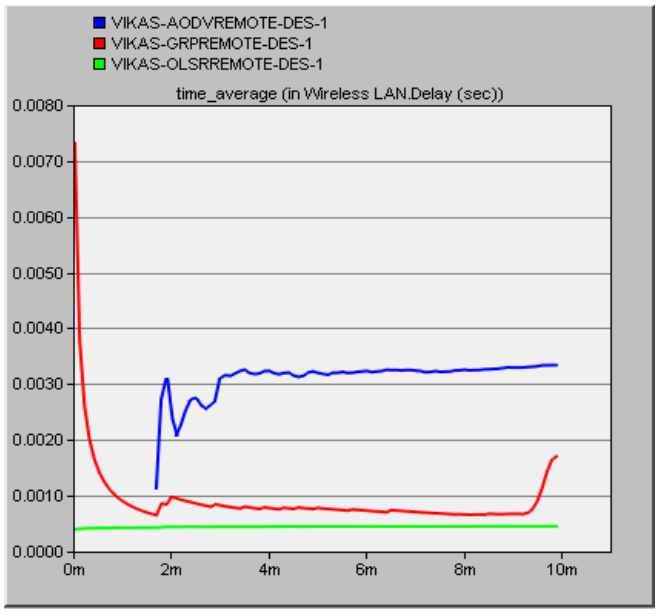

Fig. 3: Delay for Remote Login

C. Load

Fig. 4 represents the graph of Load for AODV, GRP and OLSR routing protocols. In the AODV routing protocol, the peak value of load that is almost 51,000 bits/sec after 600 second. In the GRP routing protocol, the peak value of load that is almost 431,100 bits/sec and it gradually drops down and reaches to almost 25,000 bits/sec after 600 second. In the OLSR routing protocol, the peak value of load is almost 58,700 bits/sec after 600 second. The peak value of load of AODV routing protocol has been lowest than OLSR and GRP, because routing tables are up to date with dedicated path of source to destination. Therefore, AODV routing protocol has lowest load.

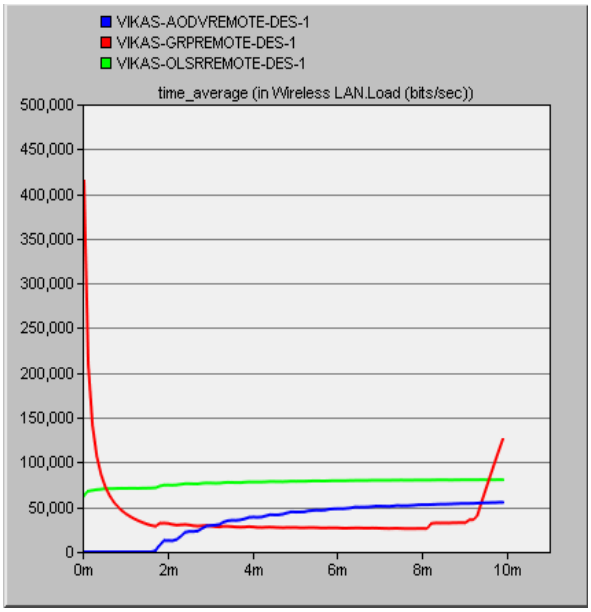

Fig. 4: Load for Remote Login

D. Media Access Delay

Fig. 5 represents the graph of Media Access Delay for AODV, GRP and OLSR routing protocols. In the AODV routing protocol, the peak value of media access delay that is almost 0.0051 sec and it gradually drops down and reaches to almost 0.0032 sec after 600 second. In the GRP routing protocol, the peak value of media access delay that is almost 0.0066 sec and it gradually drops down and reaches to almost 0.0004 sec after 600

second. In the OLSR, routing protocol, the peak value of media access delay is almost 0.0003 sec after 600 second. The peak value of media access delay of OLSR routing protocol has been lowest than GRP and AODV, because the MPR selector selects all destinations directly to receive media data packets that help to reduce the delay of media access.

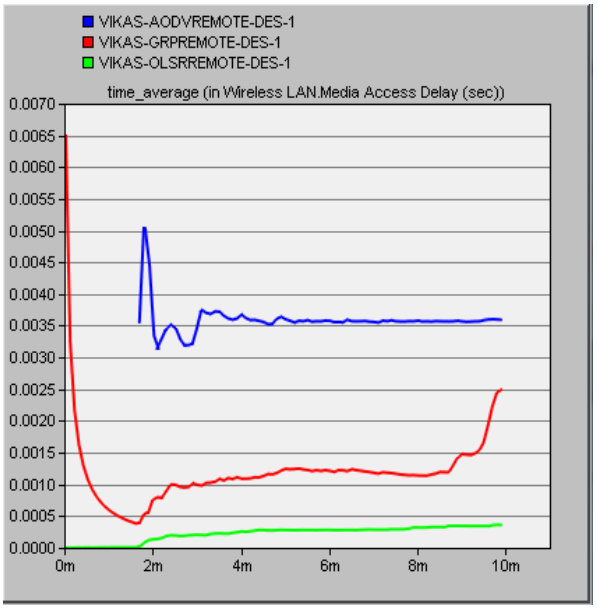

Fig. 5: Media Access Delay for Remote Login

E. Network Load

Fig 6 represents the graph of Network Load for AODV, GRP and OLSR routing protocols. In the AODV routing protocol, the peak value of network load that is almost 51,200 bits/sec after 600 second. In the GRP routing protocol, the peak value of network load that is almost 431,120 bits/sec and it gradually drops down and reaches to almost 35,000 bits/sec after 600 second. In the OLSR routing protocol, the peak value of network load that is almost 58,700 bits/sec after 600 second. The peak value of network load of AODV routing protocol has been lowest than OLSR and GRP, because dedicated path have decided by route discovery phase. Therefore, AODV routing protocol has lowest network load.

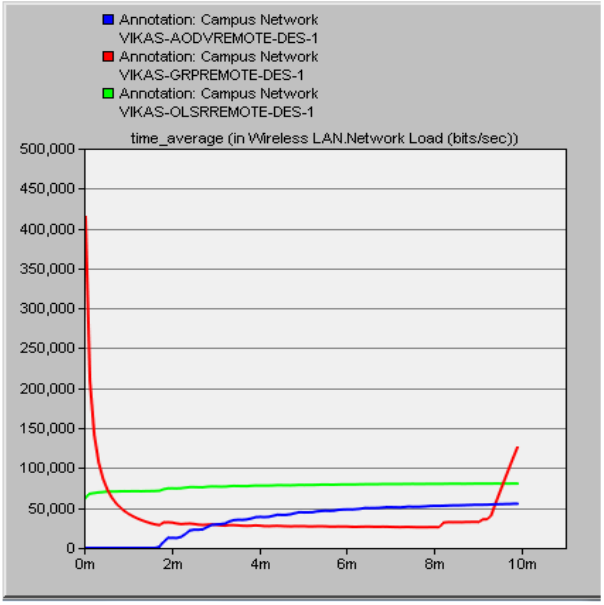

Fig. 6: Network Load for Remote Login

F. Retransmission Attempts

Fig 7 represents the graph of Retransmission Attempts for AODV, GRP and OLSR routing protocols. In the AODV routing protocol, the peak value of retransmission attempts that is almost 0.58 packets and it gradually drops down and reaches to almost 0.43 packets after 600 second. In the GRP routing protocol, the peak value of retransmission attempts that is almost 0.79 packets and it gradually drops down and reaches to almost 0.5 packets after 600 second. In the OLSR routing protocol, the peak value of retransmission attempts is almost 1.01 packets and it gradually drops down and reaches to almost 0.3 packets after 600 second. The peak value of retransmission attempts of AODV routing protocol has been lowest than OLSR and GRP, because dedicated path have decided by route discovery phase and route maintenance phase, there no need to acknowledgment by destination node to source node after receiving data packets. Therefore, AODV routing protocol has lowest retransmission attempts.

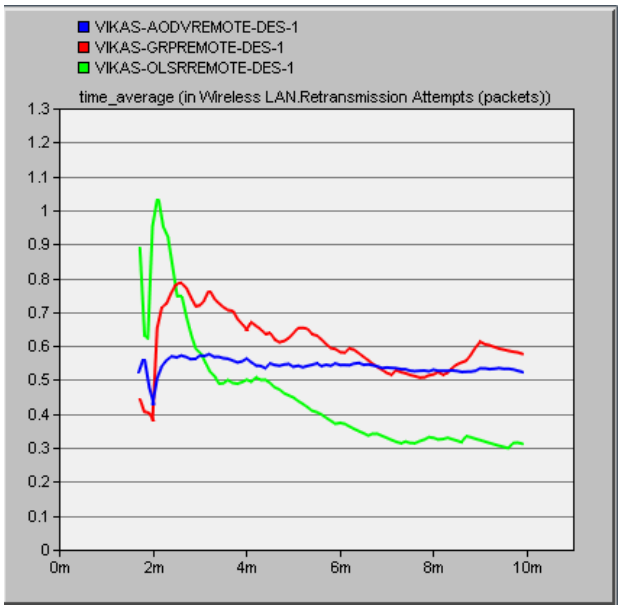

Fig. 7: Retransmission Attempts for Remote Login

G. Throughput

Fig. 8 represents the graph of Throughput for AODV, GRP and OLSR routing protocols. In the AODV routing protocol, the peak value of throughput that is almost 1,600,000 bit/sec after 600 second. In the GRP routing protocol, the peak value of throughput that is almost 9,000,100 bit/sec and it gradually drops down and reaches to almost 4,00,000 bit/sec after 600 second. In the OLSR routing protocol, the peak value of throughput that is almost 4,200,000 bit/sec after 600 second. The peak value of throughput of GRP routing protocol has been highest than AODV and OLSR, because intermediate neighbors and control packets have no need for creation and maintenance of routing path during data transmission that increases the throughput. Therefore, GRP routing protocol has highest throughput.

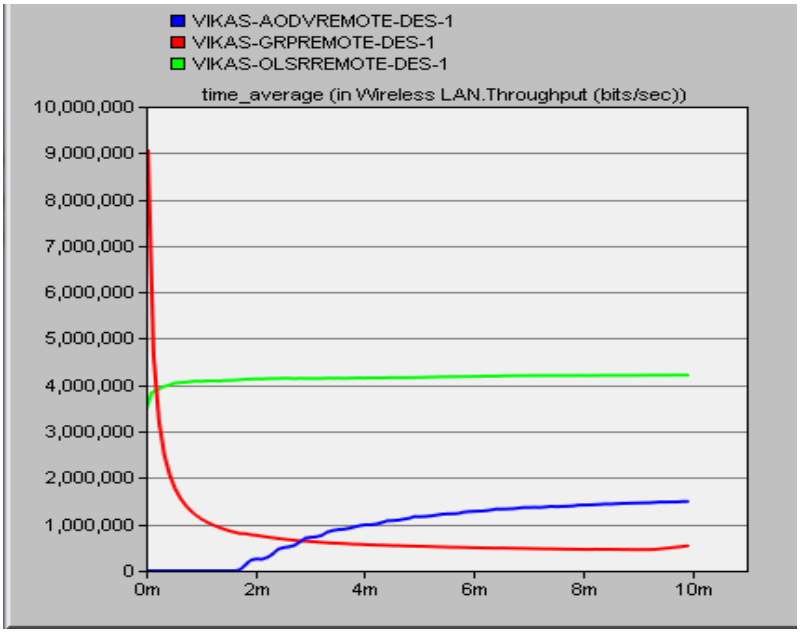

Fig. 8: Throughput for Remote Login

In the Table 3, the performance comparison of routing protocols AODV, GRP and OLSR w.r.t Remote Login is done. The performance parameters are: Data Dropped, Delay, Load, Media Access Delay, Network Load, Retransmission Attempts and Throughput etc. The peak value of each parameter is approximation value.

TABLE 3
PERFORMANCE COMPARISON FOR REMOTE LOGIN

Parameters	**Protocols**		
	AODV	**GRP**	**OLSR**
Data Dropped	180	1000	160
Delay	0.0033	0.0073	0.0006
Load	51,000	431,100	58,700
Media Access Delay	0.0051	0.0066	0.0003
Networks Load	51,200	431,120	58,700
Retransmission Attempts	0.58	0.79	1.01
Throughput	1,600,000	9,000,100	4,200,000

VI. CONCLUSION

In this paper, we have analyzed performance evaluation of routing protocols AODV, GRP and OLSR with remote login service. In case of Remote login service, AODV routing protocol has performed best in term of performance parameters: Load, Network Load and Retransmission Attempts. The OLSR routing protocol has performed best in term of performance parameters: Data Dropped, Delay and Media Access Delay. GRP routing protocol has performed best in term of traffic parameter: Throughput.

REFERENCES

[1] Parulpreet Singh, Ekta Barkhodia, and Gurleen Kaur Walia "Evaluation of various Traffic loads in MANET with DSR routing protocol through use of OPNET Simulator" International Journal of Distributed and Parallel Systems (IJDPS) Vol.3, No.3, May 2012

[2] Suchita Baxla, Rajesh Nema "A Review Paper on Performance Analysis of AODV, OLSR, DSR and GRP Routing Protocols of Ad hoc Networks" International Journal of Science and Research (IJSR), India Online ISSN: 2319-7064

[3] M. Kumar and R. Rajesh "A survey of mobile Ad-hoc reactive routing protocols in two different mobility models" International Journal of Engineering and Technology, Vol. 1, No. 1, April 2009.

[4] G. Vijaya Kumar, Y. Vasudeva Reddyr, Dr. M. Nagendra "Current Research Work on Routing Protocols

for MANET: A Literature Survey" International Journal on Computer Science and Engineering (IJCSE) Vol. 02, No. 03, 2010, 706-713

[5] Paramjit Singh, Ajay K Sharma & T S Kamal "Performance Analysis of routed Adhoc Networks using different routing algorithms" International Journal of Computer Networking, Wireless and Mobile Communications (IJCNWMC) ISSN 2250-1568 Vol. 3, Issue 1, Mar 2013, 117-122

[6] S. Meenakshi Sundaram, Dr. S. Palani, Dr. A. Ramesh Babu " Performance Evaluation of AODV, DSR and OLSR Mobile Ad hoc Network Routing Protocols using OPNET Simulator" International Journal of Computer Science & Communication Networks, Vol 3(1), 54-63 ISSN:2249-5789

[7] A. Tamizhselvi and Dr. R.S.D. Wahida Banu "Performance Evaluation of Geographical Routing Protocol under Different Traffic Scenario" International Journal of Computer Science and Telecommunications Volume 3, Issue 3, March 2012

[8] Kuldeep Vats, Mandeep Dalal, Deepak Rohila, Vikas Loura, "OPNET Based Simulation and Performance Analysis of GRP Routing Protocol" in International Journal of Advance Research in Computer Science and Software Engineering Volume 2, Issue 3, March 2012

[9] Anjali, Maninder Singh "Simulation and Performance Analysis of AODV,OLSR,GRP Routing Protocol by considering IEEE 802.11Standard" International Journal of Advanced Research in Computer Science and Software Engineering Volume 2, Issue 6, June 2012 ISSN: 2277 128X

[10] Upasna, Jyoti Chauhan, Manisha "Minimized Routing Protocol in Ad-Hoc Network with Quality Maintenance Based on Genetic Algorithm: A Survey "International Journal of Scientific and Research Publications, Volume 3, Issue 1, January 2013 1 ISSN 2250-3153

[11] Hossein Ashtiani, Hamed Moradi Pour, Mohsen Nikpour "A Survey of MANET Routing Protocols in Large-Scale and Ordinary Networks" Vol. 10 Issue 13 (Ver. 1.0) October 2010

[12] Sunil Taneja and Ashwani Kush "A Survey of Routing Protocols in Mobile Ad Hoc Networks" International Journal of Innovation, Management and Technology, Vol. 1, No. 3, August 2010 ISSN: 2010-0248

[13] Suhaimi Bin Abd Latif, M.A. Rashid, F.Alam, ''Profiling Delay and Throughput Characteristics of Interactive Multimedia Traffic over WLANs using OPNET'', School of Engineering Institute of Technology & Engineering, Massey University, Auckland, New Zealand

