iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** III **Month of publication:** March 2018

DOI: http://doi.org/10.22214/ijraset.2018.3512

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue III, March 2018- Available at www.ijraset.com

Analysis of an Optimized Trajectory in Mobile Ad Hoc Networks

Apurva Sharmaa[1], Piyush Anand[2]
[1]*Department of ComputerScience and Engineering, Apurva Sharma, Galgotias University, Greater Noida,Sec- 17A, UP,India.*
[2]*Department of Computer Science, Piyush Anand, Noida International University, Greater Noida, Sec- 17A, UP, India.*

Abstract: Mobile ad hoc network (MANET) is an auto-coordinated, framework less, auto-collecting and auto-controlling arrangement of mobile hubs associated by remote connections. The hubs move subjectively and may join or leave the network at their own. In the present work an endeavor has been made to give an examination on the portability models utilized as a part of an Ad Hoc network utilizing diverse steering conventions. Five distinctive versatility models, for example, Random waypoint, Random walk, Pursue, Pursue Smart and Group Mobility Model are actualized. The execution of three directing convention DSR, OLSR and GRP is thought about by utilizing diverse portability models. Reproductions have been done utilizing OPNET Simulator 14.0 and execution investigation has been done in view of the outcomes acquired by utilizing two diverse execution measurements, for example, Retransmission Attempts and Throughput utilizing network of 40 mobile hubs for every situation. Recreation comes about have shown that Hybrid conventions (GRP) beats every one of the conventions in all the versatility models as far as throughput.

Keywords: MANET, mobile nodes, Entity mobility model, group mobility model, Ad-Hoc Network

I. INTRODUCTION

A mobile ad hoc network (MANET) is a free, framework less, auto-designing and auto-controlling arrangement of mobile hubs associated by remote connections. The hubs move subjectively and may join or leave the network at their own. A noteworthy issue to be addressed in the outline of MANETs is, subsequently, the advancement of dynamic directing conventions that can proficiently discover courses between two imparting hubs. The development example of MANET hubs is portrayed by portability models and each steering conventions displays particular qualities for these models. Keeping in mind the end goal to locate the most adaptive and proficient directing convention for dynamic MANET topologies, the conduct of steering conventions should be broke down at different hub speeds, number of activity hubs, network estimate, and hub thickness .Mobility models speak to the development of mobile clients, and how their area, speed and increasing speed change after some time. Such models are every now and again utilized for reproduction purposes.

II. LITERATURE SURVEY

Impact of different portability models on the execution assessment of MANET directing conventions are considered by M.K. Jeya Kumar and R.S. Rajesh [4]. Three random based versatility models, for example, Random waypoint, Random walk and Random Direction portability show are actualized in the work. The two distinctive parameter limitations like parcel conveyance part and End-to-End bundle conveyance delay are contrasted with deference with portability speed, Traffic and Network measure. In view of the perceptions, it is inferred that AODV directing convention beats DSDV, TORA and DSR conventions and AODV can be utilized under high portability. Valentina Timcenko et al.[12] considers execution of mobile ad hoc network (MANET) directing conventions concerning gathering and substance portability models. The three steering conventions Destination Sequenced Distance Vector (DSDV), Ad-hoc On-demand Distance Vector (AODV) and Dynamic Source Routing (DSR) are analyzed. Portability models envelop: Reference Point Group Mobility (RPGM), Random Waypoint (RW), Gauss-Markov (GM). It is reasoned that the proactive convention, DSDV encounters the most stable execution with all portability models. This convention performs best with substance models that have bring down level of randomness (GM). AODV performs best with the gathering model RPGM. With element models, AODV encounter the most astounding directing overhead with the expansion of hub speed, however has adequate normal deferrals. DSR encounter the most reduced directing convention overhead, on the check of higher normal deferrals, especially with GM models, at higher hub speeds. This convention performs best with the RW display.

III. METHODOLOGY

A. Various versatility models have intended to characterize the developments for the hubs of MANETs as indicated by the situation in which the hubs are getting conveyed.

B. For particular kind of versatility models, particular steering conventions have demonstrated effective.
C. In the given work, different versatility models, with the end goal that directions for mobile hubs have composed by utilizing a direction planning instrument in OPNET.
D. Various MANET networks are composed and all the outlined directions are appointed to the hubs of the planned networks one by one to characterize the developments of the hubs.
E. To pick the appropriate steering conventions for the composed networks, every one of the networks are arranged by utilizing different responsive convention (DSR), proactive convention (OLSR) and half breed convention (GRP).
F. All the networks are arranged by utilizing upgraded steering parameters and general parameters to get the advanced outcomes.
G. To get the outcomes different execution assessment measurements, for example, media get to delay, network load, retransmission endeavors and throughput have picked.
H. After the total arrangement of the considerable number of networks, concentrated recreations are executed and the outcomes are assembled as diagrams.

IV. MANET ROUTING PROTOCOLS

Routing is is the demonstration of moving data from a source to a goal in an internetwork. The principle goal of specially appointed directing conventions is the means by which to convey information bundles among hubs proficiently without foreordained topology or brought together control.

Routing protocols are divided into three different categories:

1) Reactive Protocols
2) Proactive Protocols
3) Hybrid Protocols

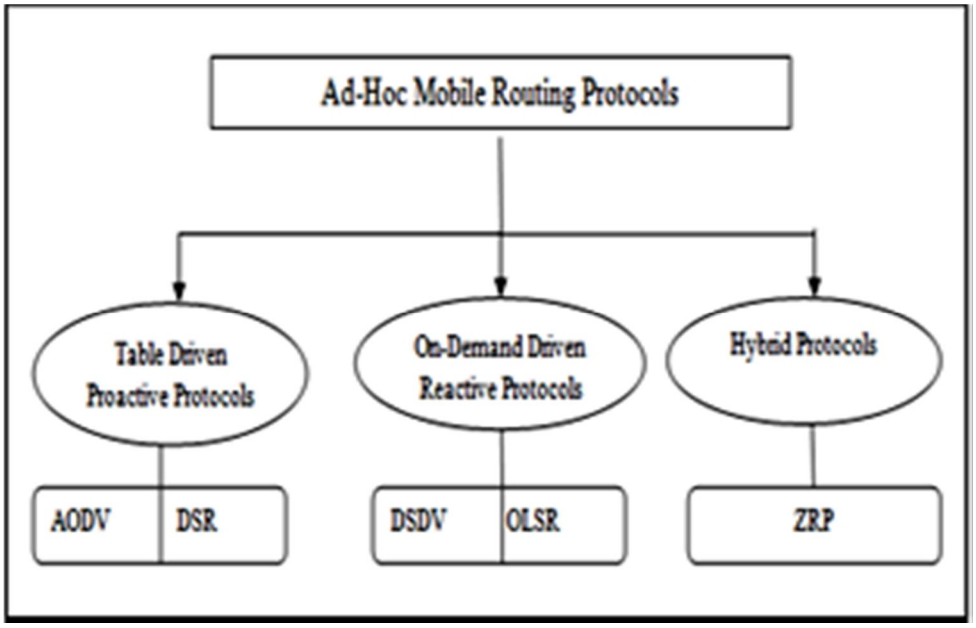


Fig 1 Types of Protocols

A. Reactive Routing Protocols

In reactive routing protocols (also known as on-demand routing protocols) a course is made on-request by hubs and it finds a course just when required. At the point when a source needs to send bundles to a goal, it utilizes the course revelation components to discover the way from source to the goal.

Example: Dynamic Source Routing (DSR).

1) *Dynamic Source Routing (DSR):* Dynamic Source Routing (DSR) is a reactive protocol. It figures the courses/ways when required and after that looks after them. Source directing is a steering method in which the sender of a bundle decides the total way through which the parcel needs to pass; the sender expressly records this way in the bundle's header. There are two critical stages in working of DSR:

a) Route Discovery
b) Route Maintenance.

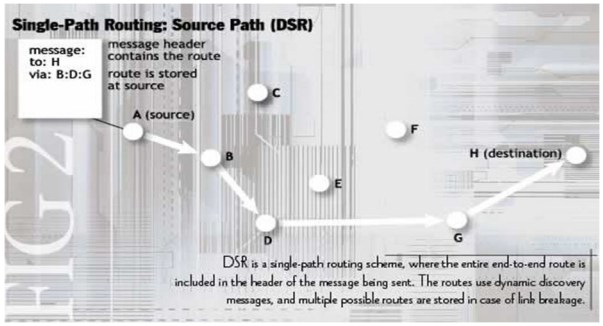


Fig 2 Entire End-to-End Node is Included in the Header

B. Proactive Routing Protocols:

In proactive routing protocols (also known as table- driven routing protocols) every hub keeps up at least one tables that contain a la mode steering data to each other hub in the system. At the point when the system topology changes, the hubs communicate refresh messages and the refreshed data is circled over the system.

Example: Optimized Link State Routing Protocol (OLSR)

1) *Optimized Link State Routing Protocol :* OLSR could be a proactive link-state routing protocol. It uses howdy and Topology management (TC) messages to find then broadcast link state info throughout the mobile ad-hoc network. Individual nodes use this topology info to seek out next hop destinations for all nodes within the network exploitation shortest hop forwarding ways. Routes to all or any destinations among the network ar noted and maintained before use by exploitation MRP

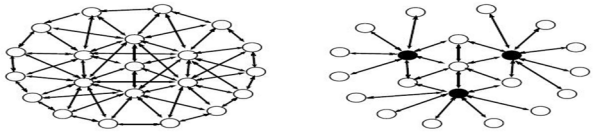

's.

Fig 3 Two hop neighbors and multipoint relays (solid circles) of a node

C. Hybrid Protocols

Hybrid Protocol is the mixture of reactive and pro-active routing protocols

Example is Geographic Routing Protocol (GRP).

1) *Geographic Routing Protocol (GRP):* Geographic routing (also called geo routing or position-based routing) is routing principle that relies on geographic position information. The source sends a message to the geographic location of the destination. In Geographic routing each node determine its own location. Every source node knows its destination node for transmitting the data packets.

V. MOBILITY MODELS FOR AD HOC NETWORKS

Mobility models represent the development of portable hubs. Portability Models speaks to alter in the speed and course of versatile hubs w.r.t time. To mimic another convention for a specially appointed system, portability show is utilized on the grounds that versatility demonstrate precisely decide if the proposed convention will be helpful when actualized.

As of now there are two sorts of versatility models utilized as a part of the reproduction of systems.

1) Traces models
2) Synthetic models

Entity mobility models for ad hoc networks are:

A. Random Walk

In this mobility model, Mobile Nodes (MN) moves from one location to another location by randomly choosing a direction and speed in which to travel.

B. Random Waypoint

The distinction between Random Waypoint and random walk Mobility Model is of pause times because random waypoint mobility model includes pause time between changes in direction or speed. An Mobile node pauses for a specified time, after the specified pause time expires the MN starts moving with random speed in random direction.

Group mobility models for ad hoc networks are:

C. Pursue Mobility Model

All the nodes are following the motion sample of 1 node, such that chasing one node. This mobility model simulates a state of affairs wherein crowd is chasing a thief.

D. Pursue Smart Mobility Model

Pursue Smart Mobility Model is an optimization of Pursue Mobility Model. In Pursue Mobility Model, all the nodes except the pioneer node have to start from the same point from where the pioneer node has started. But in Pursue Smart Mobility Model, all nodes will start from their nearest segment when the pioneer node reached to the segment.

E. Reference Point Group Mobility Model

The Reference Point Group Mobility (RPGM) model represents the random motion of a group of Mobile nodes as well as the random motion of each individual Mobile node within the group. Group movements are based upon the path traveled by a logical center for the group.

VI. PERFORMANCE METRICS

A. Throughput

Throughput is defined as; the ratio of the total data reaches a receiver from the sender. The time it takes by the receiver to receive the last message is called as throughput [22].

B. Retransmission Attempts

It is the total number of retransmission attempts by all WLAN MACs in the network until either packet is successfully transmitted or it is discarded as a result of reaching short or long retry limit.

VII. PERFORMANCE RESULT

The analysis of Random Walk Mobility Model, Random Waypoint Mobility Model, Pursue Mobility Model, Pursue Smart Mobility Model and Group Mobility Model has done by using given performance evaluation metrics. The performance of different Mobility Models is analyzed by using three different routing protocols DSR, GRP, OLSR using different scenarios designed in OPNET modeler 14.0.

A. Random Walk Mobility Model

1) *Retransmission Attempts:* Acc to fig 4 DSR Random Walk Mobility Model has highest retransmission attempt, and retransmission attempt of GRP and OLSR Random Walk Mobility Model have almost same retransmission attempt at the end of simulation.

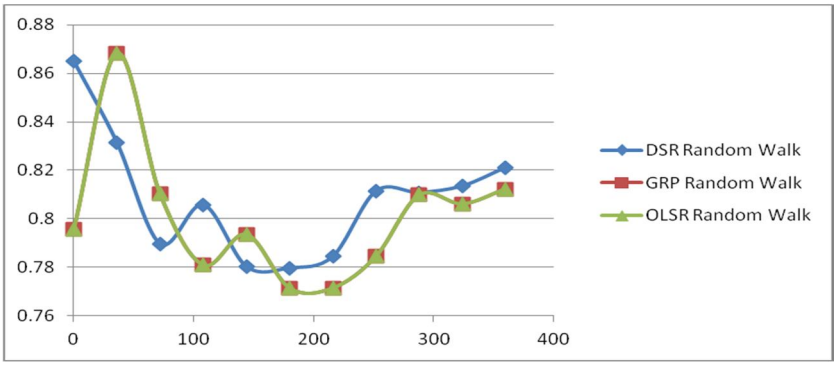


Fig 4 Retransmission Attempts (packets)

2) *Throughput*

Acc to Figure 5 GRP and OLSR gives the highest throughput because of its hybrid nature, for the neighbor nodes, GRP act as a reactive protocol and for the nodes other than the neighbor nodes; it works like the proactive protocol. Due to this nature, the protocol has to send less control packets than the other protocols to reconstruct the routes. Reactive protocol DSR shows good throughput but less than Proactive protocol and hybrid because it has prior routing tables and can send more data packets in unit time.

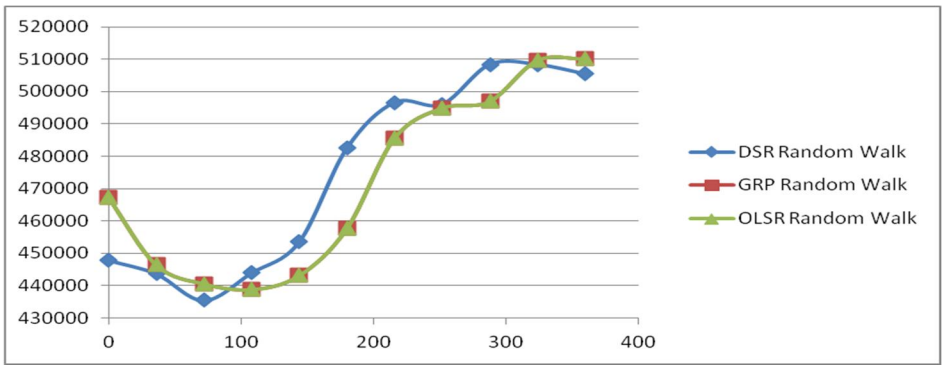


Fig 5 Throughput (bits/sec)

B. Random Waypoint Mobility Model

1) Retransmission Attempts

Random way point model possess retransmission attempts almost similar to random walk mobility model with a little improvement seen for DSR protocol because of the introduction of pause times. Due to the pause times the nodes get time to refresh the routes and thus the timer does not expire before a transmission occurs.

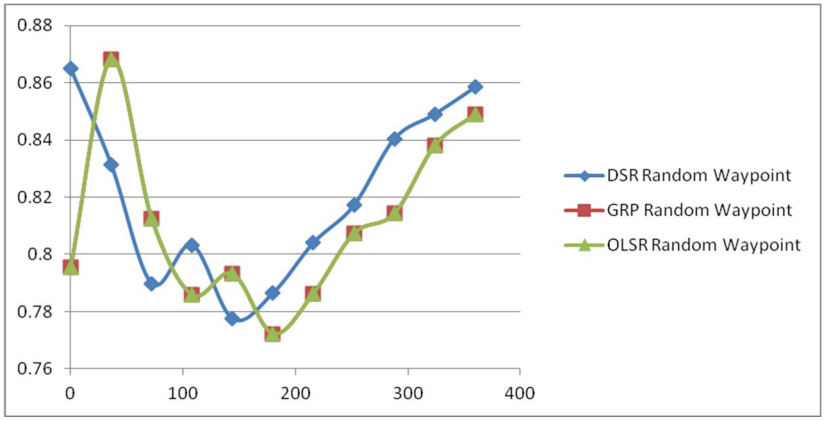


Fig 6 Retransmission Attempts (packets)

2) Throughput

According to Figure 7 DSR Random Waypoint Mobility Model shows throughput is highest than other two protocols because of the pause time present in the mobility model. On the other hand, no effect has seen on the throughput of the OLSR and GRP protocols.

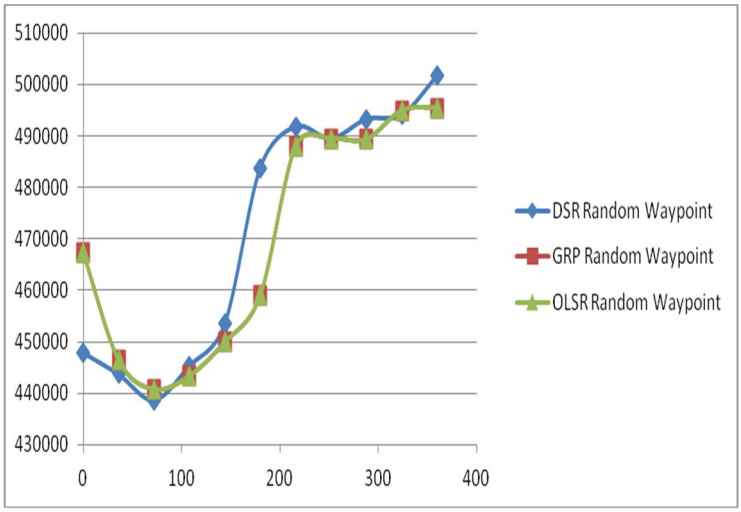


Fig 7 Throughput (bits/sec)

C. Pursue Mobility Model

1) Retransmission Attempts

Average retransmissions attempts have been decreased in this model as compared to other mobility models for all the protocols because every node will follow the same trajectory with same pause time and moving speed and the control messages will be exchanged only periodically to update the routing caches of the nodes and find out the optimized path towards the destination, such that very less number of control messages will be exchanged between the nodes due the unexpected change in the position of a node. Due to its hybrid nature, GRP protocol posses a steep decrease in number of retransmission attempts and due to its proactive nature, OLSR protocol posses maximum number of retransmission attempts.

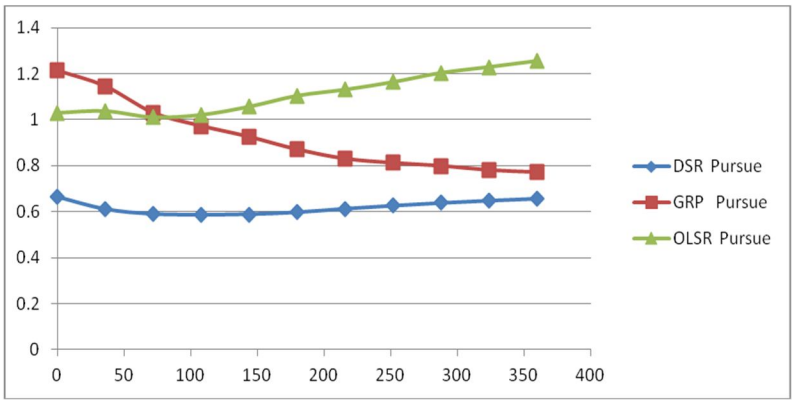


Fig 8 Retransmission Attempts

2) Throughput

According to Figure 9 OLSR Pursue Mobility Model has highest throughput, GRP Pursue Mobility Model has medium throughput and throughput of DSR Pursue Mobility Model is low after end of simulation time.

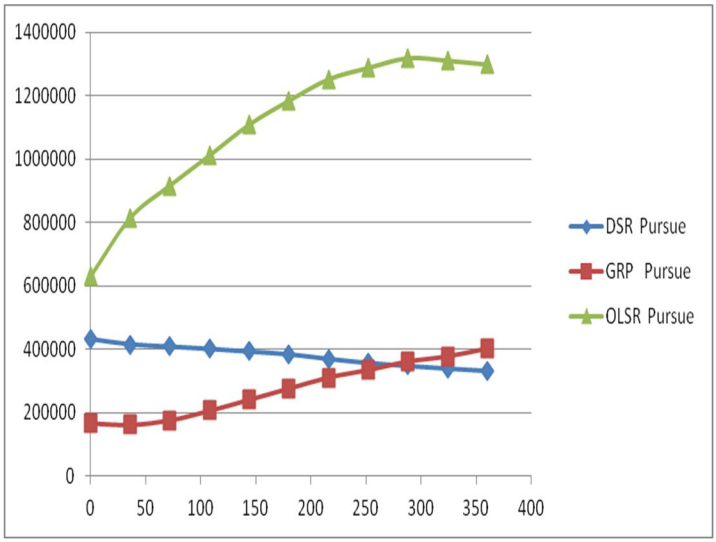


Fig 9 Throughput (bits/sec)

D. Pursue Smart Mobility Model

1) Retransmission Attempts

Acc to Fig 10 GRP due to its hybrid nature has to done less retransmission attempts to send a data packets than the other nodes, because every node has a route cache. For the neighbor nodes these route caches are not used because at that instance the protocol will act like a reactive protocol. But for the other nodes the protocol has the alternative of the route cache. DSR possess high retransmission attempts, due to their reactive nature. Each time nodes have to create routes to send data packets and most of the time the timer (TTL) associated with each packet gets expired during the route creation. So the node has to make another attempt to send the same packet. If the nodes is the network moves rigorously then every sending nodes has to send more routing updates to refresh

its routing information. Due to which the attempts to send the data packets will be increased. That's why the proactive protocol (OLSR) possesses the highest retransmission attempts.

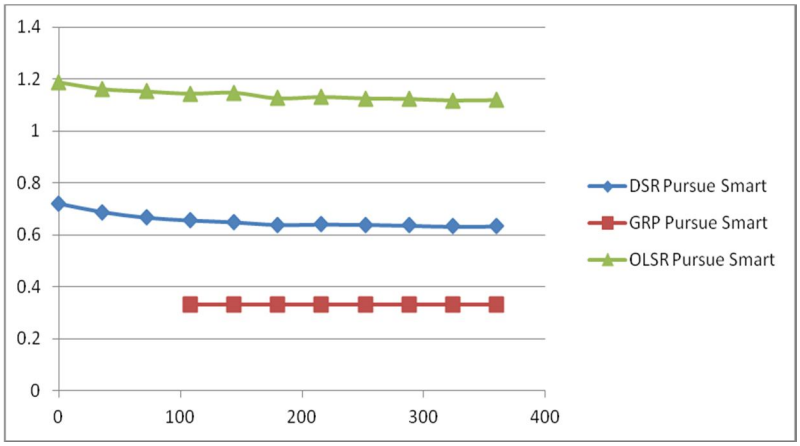


Fig 10 Retransmission Attempts(packets)

2) Throughput

Acc to Fig 11 OLSR outperforms all the routing protocols due to its proactive nature because whenever a nodes need to send data, it will choose route towards its nearest MPR by using the routes present in its route cache and begin to send data to the destination. On the other hand hybrid protocol, GRP possess least throughput than both the reactive protocol, DSR and proactive protocol, OLSR

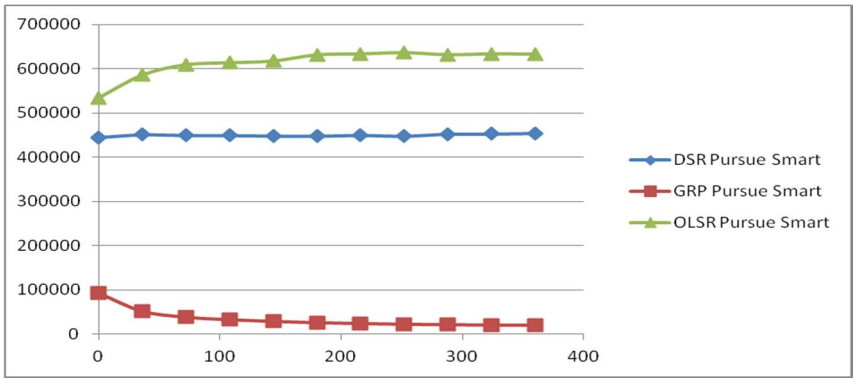


Fig 11Throughput (bits/sec)

E. Group Mobility Model

1) Retransmission Attempts

Acc to Fig 12 Average retransmission attempts for group mobility model (figure 8.19) is almost similar to pursue mobility model due the pause time, same trajectory and less number of control messages. Due to its hybrid nature, again GRP protocol outperforms all the routing protocol and OLSR protocol possesses maximum retransmission attempts.

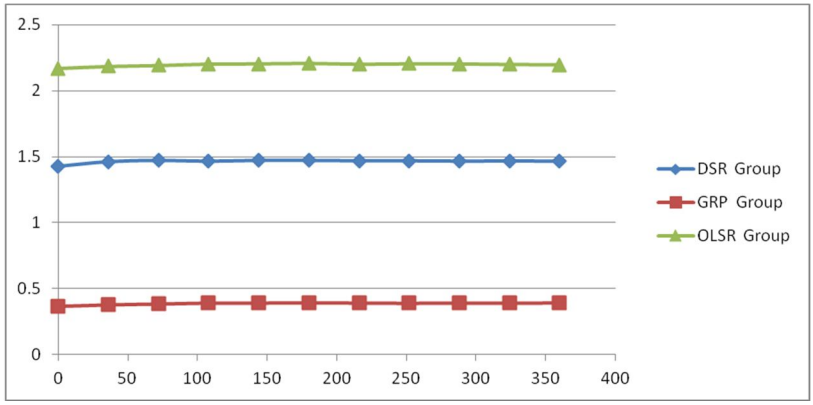


Fig 12 Retransmission Attempts (packets)

2) Throughput

Acc to fig 13 the OLSR protocol shows the highest throughput because of its proactive nature and the pause are imposed in group mobility model and nodes configured by using proactive protocols will get enough time to transfer data before the occurrence of the updation of the routing caches. DSR shows the least throughput as seen for other scenarios as well.

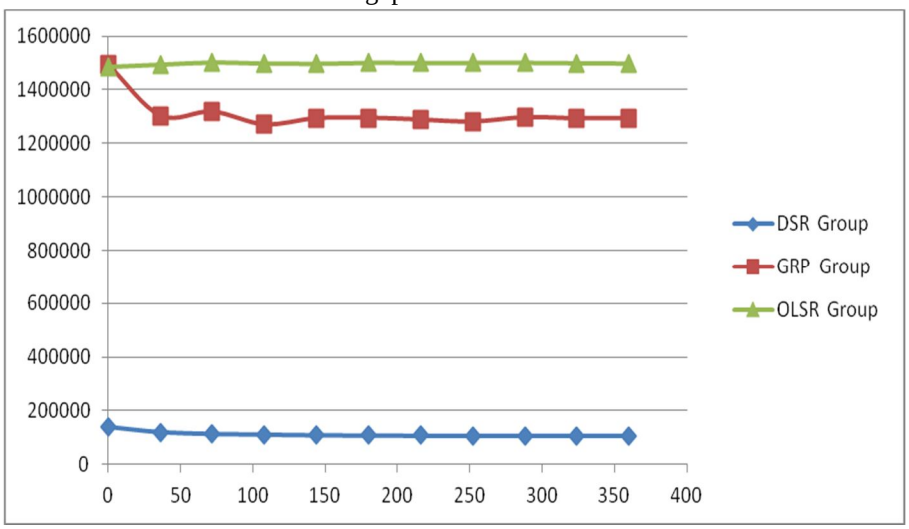


Fig 13 Throughput (bits/sec)

VIII. CONCLUSION AND FUTURE SCOPE

The performance evaluation of the MANET routing protocols with respect to various mobility models with two different performance matrices i.e. Throughput and Retransmission Attempts has been done. Simulation results have indicated that the relative ranking of routing protocols may vary depending on mobility model. From the figures and tables it has been concluded that reactive protocols for e.g. DSR are very less prone to the mobility of the nodes and shows very less variations in the results whereas lots of variations are seen in the results of proactive protocols for e.g. OLSR, such that, the movement patterns of the nodes in a MANETs cause high degradation over the performance of the protocol. Hybrid protocols for e.g. GRP outperforms all the protocols in almost all the mobility models. Pursue smart mobility model out performs the pursue mobility model in retransmission attempts. Group mobility model shows highest throughput whereas retransmission attempts are least for pursue mobility model.

In the given work, five different mobility models are simulated. To simulate other real life situations, other mobility models need to designed and simulated by using various other routing protocols. The concluded results could be more justified by running simulation for longer periods and by configuring the networks with more optimized configuration parameters.

REFERENCES

[1] Anjali and Maninder Singh, “Performance Analysis of Proactive, Reactive and Hybrid MANET Routing Protocols on IEEE 802.11 Standard” International Journal of Computer Applications, Vol. 54, pp.1-8, September 2012.

[2] Amir R. Das, Charles E. Perkins and Elizabeth M. Royer, “An Implementation Study of the AODV routing protocol” Proceedings of the IEEE Wireless Communication and Networking Conference, pp. 3-12, 200l.

[3] Arvind Kumar Shukla, Ck Jha and Deepak Sharma, “The Efficiency Analysis of Mobility Model using Routing Protocols” International Conference on Advances in Computer Applications, pp. 6-10, September 2012.

[4] Asad Amir Pirzada, Saad Khan and Marius Portmann, “Performance Comparison of Reactive Routing Protocols for Hybrid Wireless Mesh Networks” IEEE International Conference on Wireless Broadband and Ultra Wideband Communications, Vol. 2, pp. 1-6, 2007.

[5] Ashish Shrestha and Firat Tekiner, “On MANET Routing Protocols for Mobility and Scalability” IEEE International Conference on Parallel and Distributed Computing, Applications and Technologies, pp. 451-456, 2009.

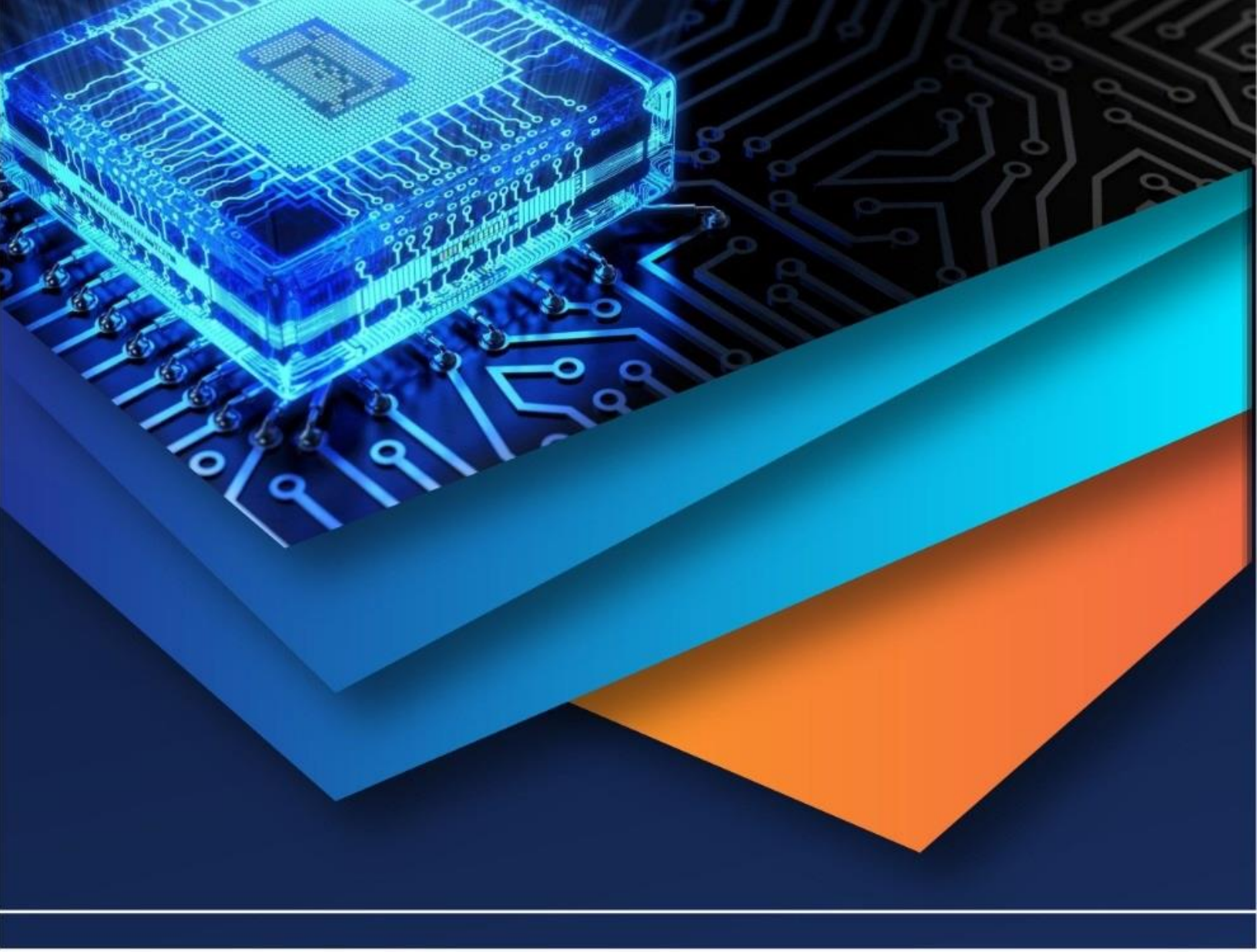
[6] C.P. Agrawal and M.K Tiwari, "Evaluation of AODV protocol for varying mobility models of MANETs for ubiquitous computing" IEEE International Conference on Convergence and Hybrid Information Technology, pp. 769-774, 2009.

[7] M.K. Jeya Kumar and R.S. Rajesh, “Performance Analysis of MANET Routing Protocols in Different Mobility Models.” In IJCSNS International Journal of Computer Science and Network Security, VOL.9, pp. 22-29, February 2009.

[8] M. Sanchez and P. Manzoni,” Java-based Ad-Hoc Networks simulator” In Proceedings of the SCS Western Multiconference Web-based Simulation Track, Jan 1999.

[9] Murat Yuksel, Ritesh Pradhan, Shivkumar Kalyanaraman , “An implementation framework for trajectory-based routing in ad hoc networks” Ad Hoc Networks ,Vol.4, pp.125-137, January 2006 .

[10] Guolong Lin, Guevara Noubir and Rajmohan Rajaraman, "Mobility Models for Ad hoc Network Simulation" In Proceedings of IEEE INFOCOM , Vol.1, pp. 7-11, 2004.
[11] Jie Wu , Fei Dai ,"Mobility-sensitive topology control in mobile ad hoc networks" IEEE Transactions on Parallel and Distributed Systems, Vol. 17, pp. 522-535, 2006.
[12] Julian Hsu, Sameer Bhatia, Ken Tang, Rajive Bagrodia, ''Performance of Mobile Ad Hoc Networking Routing Protocols in Large Scale Scenarios" IEEE Military Communications Conference, Vol. 1, pp. 21-27 , 2004.
[13] N Vetrivelan and A V Reddy, "Performance Analysis of Three Routing Protocols for Varying MANET Size" In Proceedings of the International Multi Conference of Engineers and Computer Scientists , Vol. II, pp.19-21 March 2008.
[14] Qingting Wei and Hong Zou, "Efficiency Evaluation and Comparison of Routing Protocols in MANETs." In International Symposium on Information Science and Engineering, p.p. 175-177, November 2009.
[15] Sabina Barakovic and Jasmina Barakovic, "Comparative Performance Evaluation of Mobile Ad Hoc Routing Protocols." In the proceeding of MIPRO, p.p. 518-523, May, 2010.
[16] Sarfraz Khokhar, Arne A. Nilsson, "Estimation of Mobile Trajectory in a Wireless Network: A Basis for User's Mobility Profiling for Mobile Trajectory Based Services" Third International Conference on Sensor Technologies and Applications, pp.69-74, 2009.
[17] Sohajdeep Singh, Parveen Kakkar "Investigating the Impact of Random Waypoint AND Vector Mobility Models on AODV, OLSR and GRP Routing Protocols in MANET " Vol. 63 , pp. 30-34, February 2013.
[18] Suhaimi Bin Abd Latif and M.A. Rashid, F. Alam, "Profiling Delay and Throughput Characteristics of Interactive Multimedia Traffic over WLANs Using OPNET," 21st International Conference on Advanced Information Networking and Applications Workshops , Vol.2, pp.929-933, 2007
[19] Stojmenovic, Ivan "Position based routing in ad hoc networks". IEEE Communications Magazine , Vol. 40, pp. *128-134* July *2002*.
[20] Takagi, H.; Kleinrock, L. "Optimal transmission ranges for randomly distributed packet radio terminals". IEEE Transactions on Communications, Vol.32, pp. 246–257, 1984.
[21] T. Camp, J. Boleng, and V. Davies "A Survey of Mobility Models for Ad Hoc Network Research" In Wireless Communication and Mobile Computing (WCMC): Special issue on Mobile Ad Hoc Networking: Research, Trends and Applications, Vol. 2, pp. 483-502, 2002.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY