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RESEARCH ARTICLE

INNOVATION OF IFGRP AND PERFORMANCE ASSESSMENT OF OLSR, GRP AND IFGRP

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Abstract— A MANET network is assembly of sensor nodes, where each node acts as router. MANETs are not based on centralized structure; therefore each node is responsible for routing the data packets from source to destination. This is done by implementing a routing protocol. Routing plays very influential role in MANETs. In this paper work an attempt has been made to compare the OLSR with GRP routing protocol on the basis of Network load, Delay and Throughput using OPNET. An attempt has also been made to improve the performance of GRP routing protocol by increasing the number of initial floods, effort is to set the new standard routing protocol say IFGRP i.e. Initial flooded Geographic Routing Protocol. This protocol is same as GRP, but little changes are done to make this advance. The comparative study shows that OLSR perform superior than GRP, but IFGRP perform better than OLSR and GRP.

Key Terms: - GRP; MANET; OLSR; OPNET; IFGRP; ROUTING

I. INTRODUCTION

MANETs are cluster of mobile nodes, which are distributed randomly over the area within range. Each node has wireless communication capability. There is no fixed topology of the nodes because of the high mobility of the nodes. The most popular routing protocols in MANET are OLSR which is proactive in nature GRP which is hybrid in nature .Proactive routing is based upon table driven approach which find routes before they need it. Hybrid routing protocols offer an efficient framework that can simultaneously draw on the strengths of proactive and reactive routing protocols. In this paper, three MANET routing protocols, OLSR, GRP and IFGRP are evaluated on the basis of delay, network load and throughput. The organization of the paper is as follows. We explain routing protocols in section II, related works are discussed in section III, section IV explains the simulation and performance metrics, section V explains the results of simulations and finally section VI concludes the paper.

II. ROUTING PROTOCOLS IN MANETS

Two routing protocols are considered in this paper, namely; OLSR and GRP. Below is a brief description of each protocol:

a. *Optimized Link State Routing (OLSR*): OLSR is a proactive routing protocol for mobile ad hoc networks. The protocol inherits the stability of the link state algorithm and has the advantage of having routes immediately available when needed due to its proactive nature. OLSR minimizes the overhead caused by flooding of control traffic by using only selected nodes, called Multi-Point Relays (MPR), to

retransmit control messages. The protocol is particularly suited for large and dense networks, as the optimization is done by using MPRs which work well in this context. The larger and more dense a network, the more optimization can be achieved as compared to the classic link state algorithm. OLSR uses hop-by-hop routing, i.e., each node uses its local information to route packets [7].

b. *Geographic Routing Protocol (GRP):* Geographic routing has become one of the most suitable routing strategies in wireless mobile ad hoc network mainly due to its scalability. That is because there is no need to maintain explicit routes. The principle approach in geographic routing is greedy forwarding, which fails if the packet encounters a void node (i.e., a node with no neighbour closer to the destination than itself). Geographic routing protocols scale better for ad hoc networks mainly for two reasons one is that there is no necessity to keep routing tables up-to-date and second is that there is no need to have a global view of the network topology and its changes. Therefore, geographic routing protocols have attracted a lot of attention in the field of routing protocols for MANETs. These geographic approaches allow routers to be nearly stateless because forwarding decisions are based on location information of the destination and the location information of all one-hop neighbours [5].

c. *Initial flooded Geographic Routing Protocol*- This protocol is same as GRP routing protocol. Some changes are made in it routing parameters to improve its efficiency. Changes are made to the value of number of initial flood and backtracking scheme is enabled. Value of number of flood plays a crucial role in performance. The value of number of flood must be set keeping in mind the network load. Suitable value of number of flood must be set to improve the efficiency of IFGRP.

III. RELATED WORK

Performance Evaluation of MANET Routing Protocols with Scalability and Node Density issue for FTP Traffic done by Bhalinder kaur and Sonia. They have concluded that out of GRP and OLSR, the OLSR routing protocol outperform in term of delay and the throughput [10]. Analysis of AODV, OLSR, TORA, DSR and DSDV Routing Protocols in Mobile Ad-Hoc Networks is done by Dilpreet Kaur and Naresh Kumar [8]. AODV has maximum throughput under low traffic and DSDV has maximum throughput under high traffic. As network becomes dense OLSR, DSR and DSDV perform well in terms of Throughput than AODV and TORA. TORA performs well in dense networks in terms of packet delivery fraction but at the same time Normalized Routing load of TORA is maximum among all the protocols in both the networks. DSDV has least Normalized Routing load in both low and high traffic. OLSR and DSDV give the least Jitter and Average Delay. Comparison of OLSR and TORA is done by Pankaj Palta and Sonia Goyal in [2] which shows that OLSR is better in those scenario where bandwidth is large as OLSR always updated their nodes so large bandwidth is used than TORA on same conditions. The Performance comparison of OLSR, GRP and TORA using OPNET is done by Harmanpreet Kaur and Er. Jaswinder Singh [4]. They have concluded that with regards to overall performance of OLSR is better in term of throughput from all. However, TORA showed better efficiency to deal with high congestion and it scaled better by successfully delivering packets over heavily trafficked network compared to OLSR and GRP. The maximum related work in this field has shown that the OLSR routing protocol perform best in term of throughput and load.

IV. SIMULATION PARAMETERS AND PERFORMANCE METRICS

MAXIMUM SIMULATION SIZE	1800 SEC
ENVIRONMENT SIZE	100 * 100 METER
NO. OF NODES	35 , 75
ROUTING PROTOCOL	OLSR, GRP, IFGRP
DATA RATE	1024
SPEED	10 m/s
TRAFFIC TYPE	FTP
SIMULATOR	OPNET
No. of initial flood	60 for IFGRP

- Important simulation parameter for IFGRP protocol- This protocol is an attempt to improve the performance of GRP. The name IFGRP is given to this; because the “number of initial flood” option is increased .The value must be set as per environment size and simulation time. The term initial flooding means “To bootstrap the network, all nodes initiate a full flooding throughout the network. The number

of initial floods sent out by each node is specified as the (Number of Initial Floods) attribute". In this paper the value is set to 60.this improves the throughput to a higher extent. This change done in GRP protocol, so the name IFGRP is given to the protocol i.e. "INITIAL FLOODING GEOGRAPHICAL ROUTING PROTOCOL".

The performance of the simulated results is analysed according to different performance metrics. The following performance metrics are employed in this study:

- Throughput-Throughput is total packets successfully delivered to individual destination over total time divided by total time.
- Delay- It is the ratio of time difference between every packet sent and received to the total time difference over the total number of packets received.
- Load- Load represents the total load in bit/sec that all higher layers submit to wireless LAN layers in all WLAN nodes of the network.

V. RESULTS

a) DELAY- The fig. 1, 2 showing the delay for all the protocol with nodes 25 and 75. The load increase with the throughput. The IFGRP shows the maximum load. A closer look at GRP in contrast with OLSR. The GRP showed the least load. The performance of the GRP is shows most proficient results.

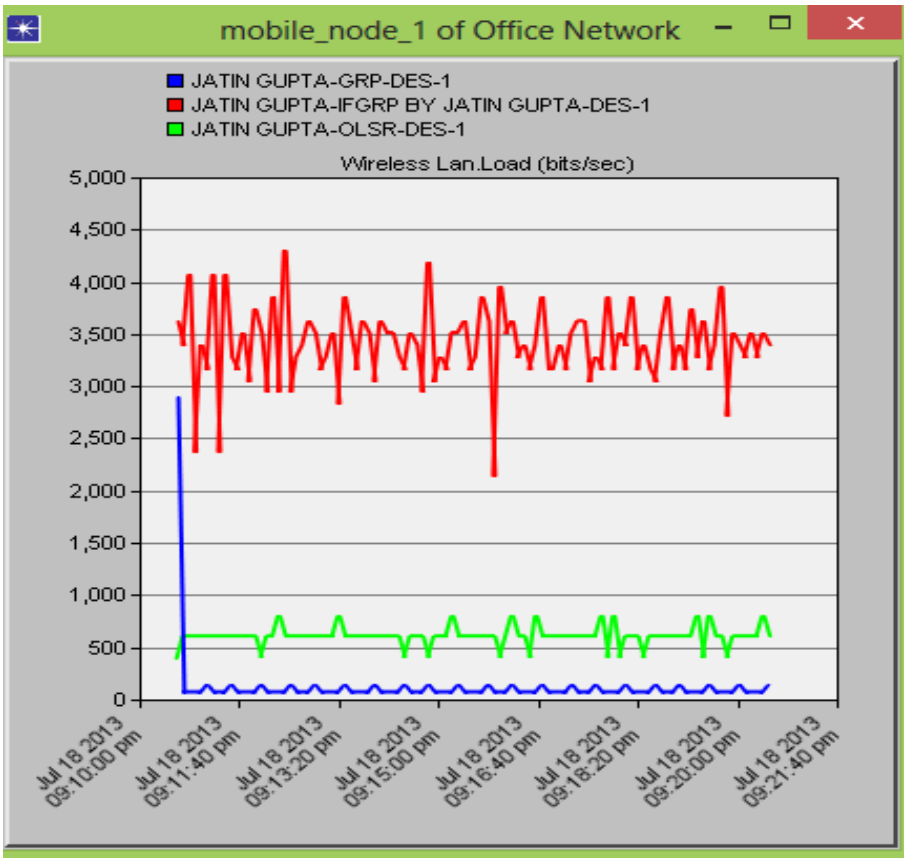

Fig. 1 Load (25 nodes)

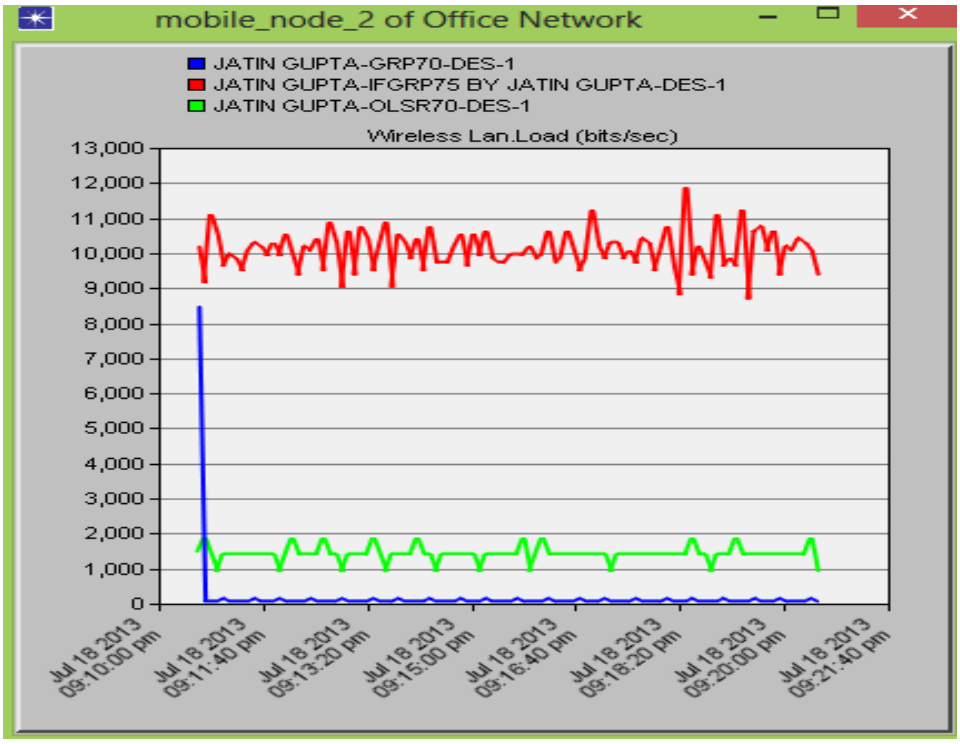

Fig. 2 Load (75 nodes)

b) *Total traffic received and sent by a node* –The IFGRP exhibit the most striking results in term of traffic received and send by a node. The OLSR shows average case. Most inferior results shown by GRP. Wrapping up all , simulation shows that the IFGRP performance is splendid .

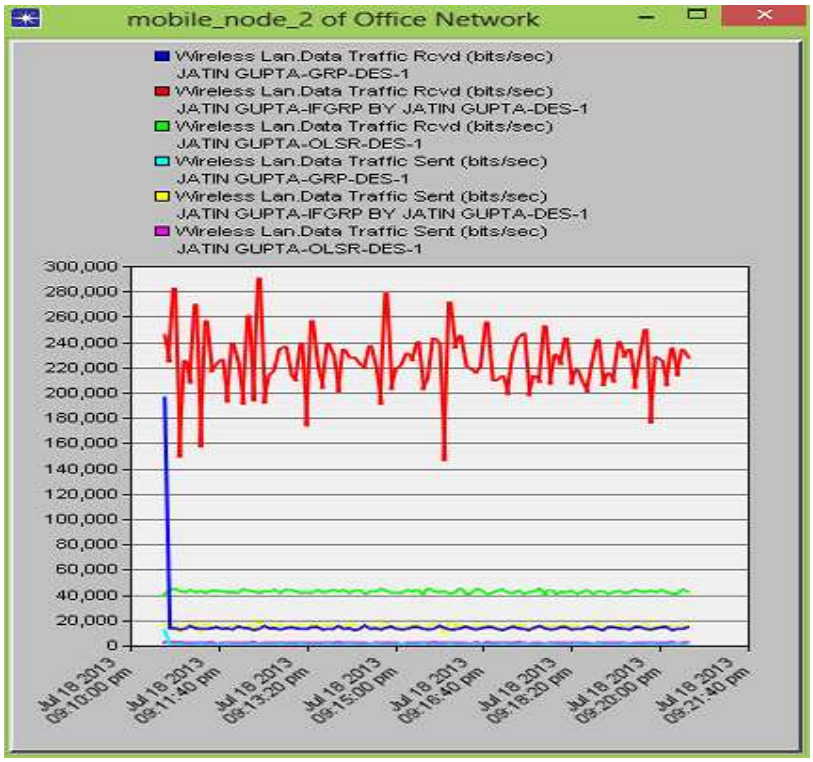

Fig. 3 Data bits received and sent (25 nodes)

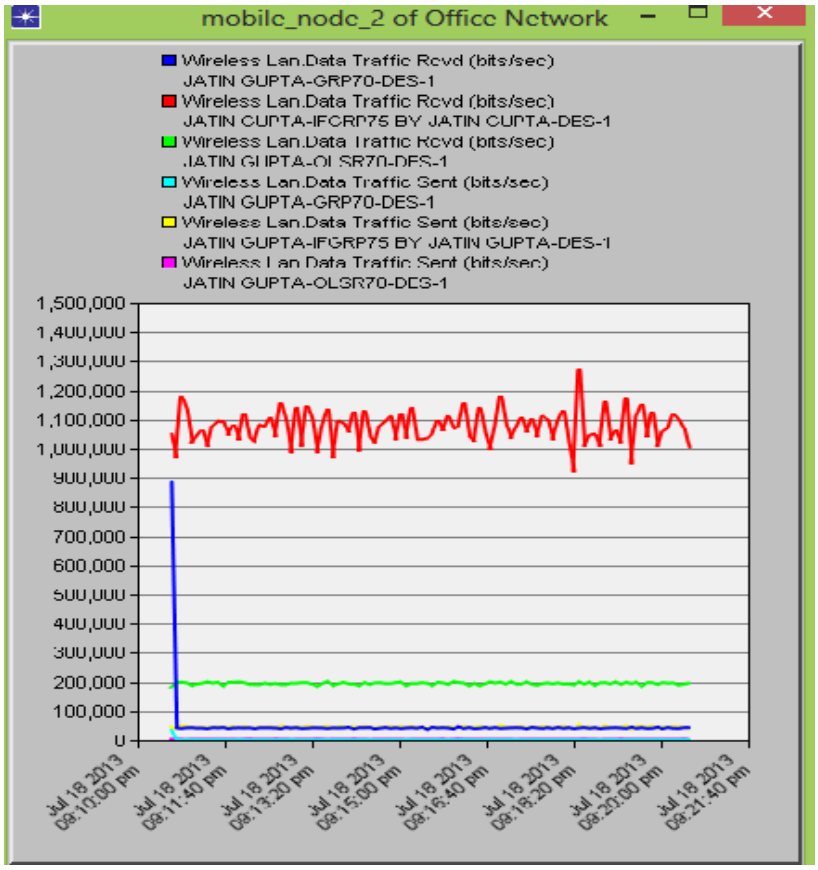

Fig. 4 Data bits received and sent (75 nodes)

c) *Delay* – GRP shows least delay, GRP shows the unsurpassed results in term of delay. The delay for IFGRP and OLSR is almost constant throughout the simulation, where as it is seen there is abrupt diminution in GRP. The delay shown by the IFGRP s the maximum.

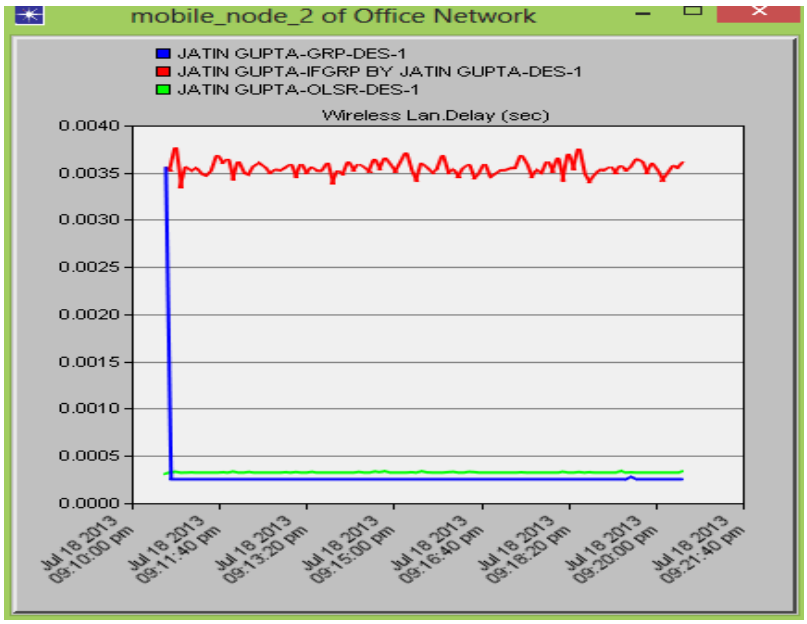

Fig. 5 Delay (25 nodes)

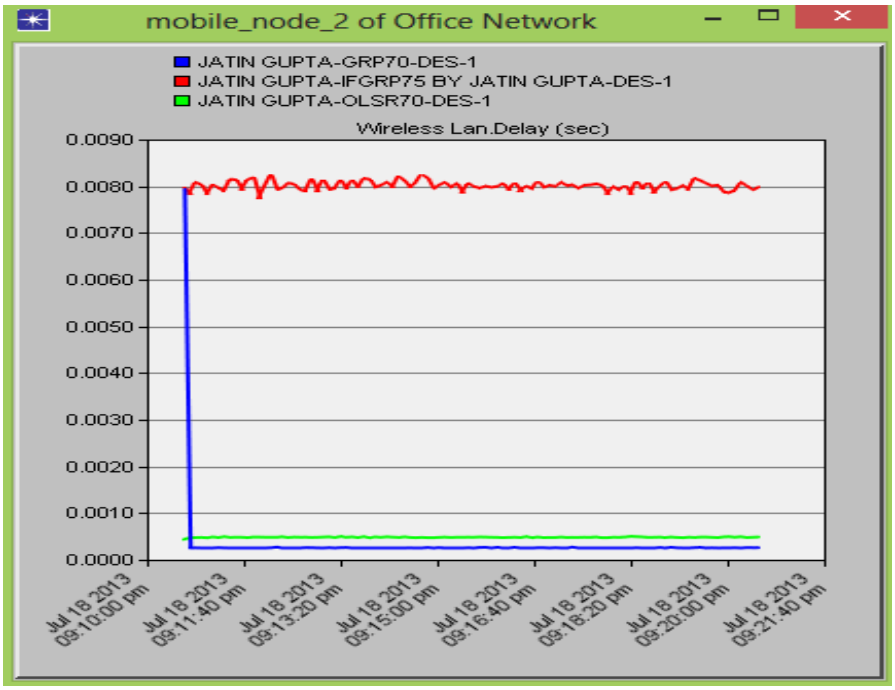

Fig. 6 Delay (75 nodes)

d) *Throughput*- Analogy shows that the IFGRP has unmatched throughput. The simulation study has shown that the OLSR throughput remain almost constant for the any simulation time , whereas the throughput of IFGRP shows big variations in the throughput , and the throughput depend on the simulation time , after certain time it shows sharp decrease in throughput. In IFGRP the value of "NUMBER OF INITIAL FLOOD" must be set as per simulation. Long simulation need big value of initial flooding.

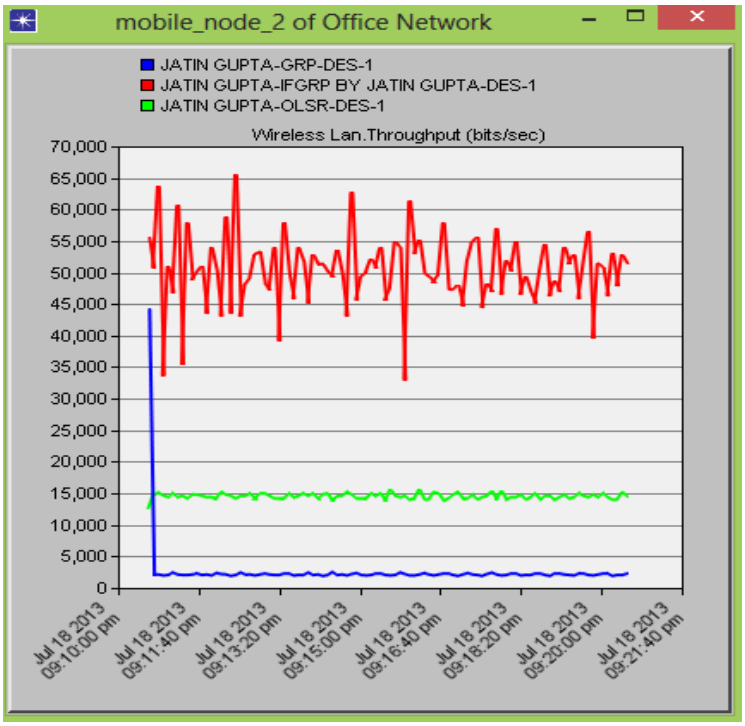

Fig. 7 Throughput (25 nodes)

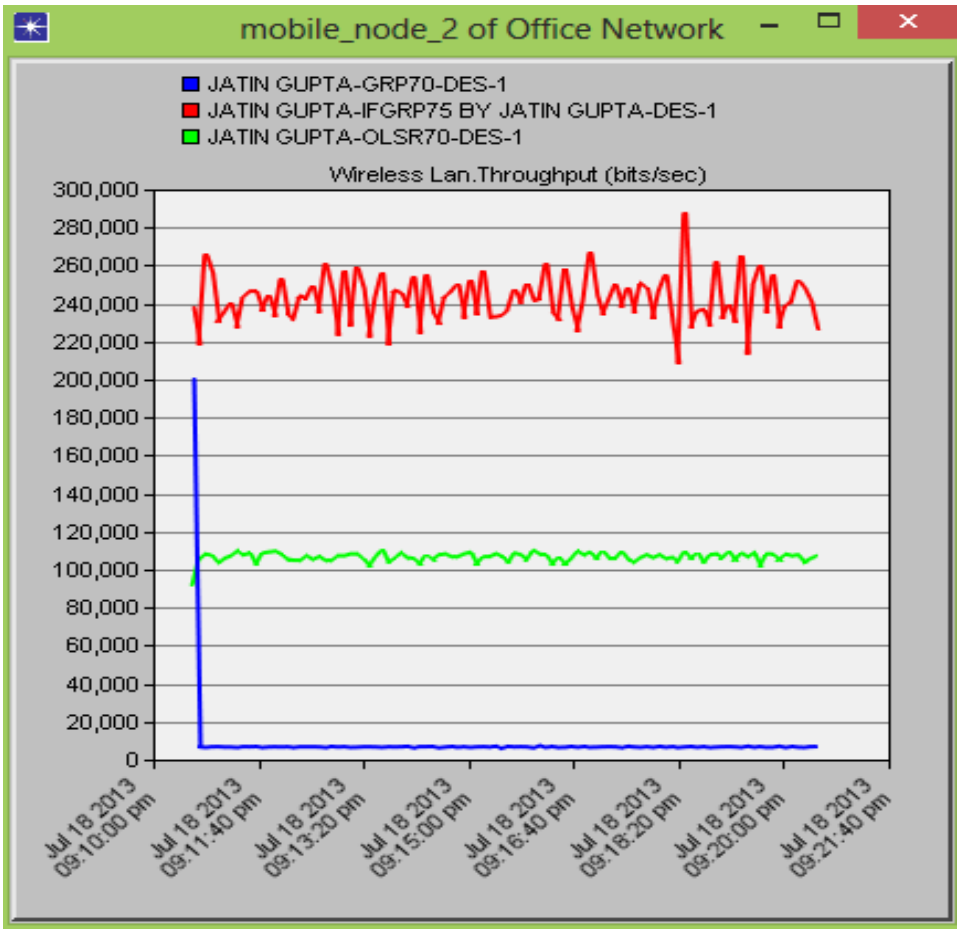

Fig.8 Throughput (75 nodes)

VI. CONCLUSION

The simulation study has shown the OLSR routing protocol perform better in term of load and delay. In contrast with IFGRP routing protocol the GRP perform better than the IFGRP in term of Load and Delay. The performance of OLSR is average case in term of Load and Delay. IFGRP protocol shows good results for the number of packets received and sent. Again the OLSR place at average place. The most important performance metric is Throughput. The new protocol discussed in the paper i.e. IFGRP shows the excellent throughput. The attempt to improve the GRP protocol in term of throughput is successfully shown by the Initial Flooded Geographical Routing Protocol. The throughput achieved by IFGRP is unmatched. The load increase with the throughput, but performance is not degraded. The conclusion is that where IFGRP protocol catch eye because of its throughput, but it require special attention for setting the value of Number of initial floods, to minimize the load and delay also.

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