



RESEARCH ARTICLE

IEEE 802.11a based Investigation and Simulation Evaluation of MANET GRP Routing Protocol using on Different QoS

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Abstract- Mobile Ad-Hoc network (MANET) is a network of mobile nodes that can communicate with each other without using any centralized control or fixed infrastructure .This paper using OPNET simulation tool for the performance of GRP routing protocol simulation, build a small scale the complexity of the mobile Ad-Hoc network model, the GRP routing algorithm, the average Total traffic sent and received in packet and bit per second form, MAC delay, Delay, Network Load and Throughput in scenario for the simulation analysis and performances. The simulation result of the research has practical reference value for further study.

KEYWORDS- MANET, hybrid protocols, GRP, OPNET

I. INTRODUCTION

Ad-Hoc networks (MANETs) have no infrastructure that is all the mobile nodes in MANET are free to join and left the network anytime as per their requirements. The nodes are

connected with each other through a wireless link. A node can serve as a router to forward the data to the neighbors' nodes. Therefore this kind of network is also known as infrastructure less networks [1]. These networks have no centralized administration. Ad-Hoc networks have the capabilities to handle any malfunctioning in the nodes or any changes that its experience due to topology changes. Whenever a node in the network is down or leaves the network that causes the breaking of links between other nodes [2] then the affected nodes in the network simply request for new routes and new links are established.

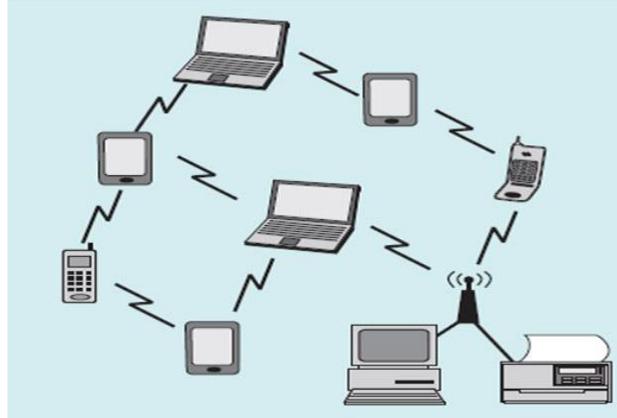


Fig 1. Mobile ad-hoc network

Several routing protocols have been suggested and used for MANET. Dynamic Source Routing (DSR), Ad Hoc On-Demand Distance Vector Routing (AODV) and Destination Sequenced Distance-Vector (DSDV) have been implemented.

For our work we are analyzing the performance of MANET through GRP routing protocol. Gathering based routing protocol is a Hybrid routing protocols and suitable for ad hoc networks. Hybrid routing protocols presents a new generation of protocols that combines the characteristics of both reactive and proactive routing protocols under different scenarios. These protocols are designed to increase scalability by allowing nodes with close proximity to work together to form some sort of a backbone in order to reduce the route discovery overheads. This novelty is mostly achieved by proactively maintaining routes to near nodes and determining routes to far away nodes using a route discovery strategy. Hybrid routing protocols are predominantly zone or cluster based.

GRP (Gathering based routing protocol) protocol is source initialized protocol in MANET routing protocol in which all the routing path is created by source node in Mobile Ad-hoc network [3]. In this protocol, source node collects all the information about the route to the designation. In this procedure, source node sends a destination Query toward the destination through network [4]. It works like AODV and DSR using RREQS (Reverse Request Query by Source). In it, when destination Query reached to the destination, destinations send a packet called Network Information Gathering (NIG) which approach through network. When NIG packet reached at a router, router gives it all the information about the network and its resources. There are many nodes called Effective Outgoing Links (EIL) where NIG packet does not reaches, routers send this information to these EILs. At last NIG reaches at source node and source node get all the information [5].

GRP does not require maintenance of routing tables or route construction prior to or during the forwarding process. Moreover GRP offers a number of advantages over convention ad hoc routing strategies. The forwarding process also allowed a packet to adopt to change in the topology by selecting the next best choice if an intermediate node used by previous packets

becomes unavailable. These approaches do not require table maintains other hand immediate neighbor or dissemination of topology information even without the need for route construction [6]. Routes can be altered node by node and packet by packet simply by considering additional Quality -of- Services (QoS) parameters relating to the next-hop neighbors, such as delay or available bandwidth [7].

II. OPNET MODELER

OPNET Modeler is a commercial research oriented network simulation environment tool for network modeling and simulation. It allows the users to design and study communication networks with proper flexibility and scalability. It simulates the network graphically and gives the graphical structure of actual networks and network components. The users can design the network model visually [8].

In this paper, the network simulations are implemented using OPNET modeler (version 14.5).

III. MODEL DESCRIPTION

In this paper we have evaluated performance of MANET using GRP routing protocol by considering FTP application type and IEEE 802.11a and 802.11g WLAN Standards in two scenarios. In first scenario we have taken 100 mobile nodes and in second scenario 150 mobile nodes and in both scenarios IEEE 802.11a and IEEE 802.11g standards are considered to simulate the environment and evaluate the performance of MANET. Thus, in total we ran four scenarios. Two scenarios ran for IEEE 802.11a WLAN Standard, one for 100 nodes and other for 150 nodes and similarly two scenarios for IEEE 802.11g WLAN Standard. Each scenario was simulated for 1000 seconds. After successful completion of the simulations, results are selected according to the problem solution. Results are collected in the form of graphs, with overlaid data displaying.

Fig. 2 shows the simulation environment of one scenario containing 100 WLAN mobile nodes.

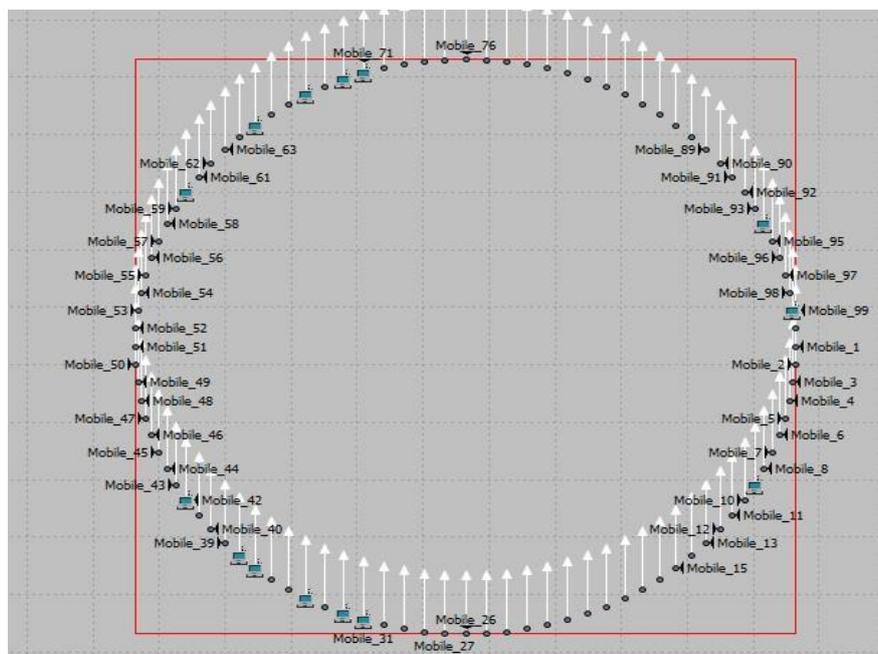


Fig 2 Network model.

IV. PARAMETER SETUP

The network designed consists of basic network entities with the simulation parameters summarized in table 1, 2 and 3.

Table1: Simulation Parameters

Parameters	Value
Number of nodes	100
Simulation speed(m/sec)	15
Simulation area(sq. meter)	10000
Altitude(m)	0.10
Transmit Power(W)	0.02
Simulation time(sec)	1000
Memory used(Mbps)	55

Table 2: GRP attributes

Attribute	Value
Hello interval(sec)	Uniform(4.9,5.0)
Number of initial flood	2
Neighbor expiry time(sec)	Constant(1.0)
Backtrack option	Enabled
Position Request Timer(Sec)	10.0

Table 3: Wireless LAN parameters

Attribute	Value
Physical characteristics	OFDMA(802.11a)
Data rate(Mbps)	54
Short retry limit	9
Long retry limit	7
Buffer size(bits)	1024000
Maximum receive lifetime(sec)	1.0

V. SIMULATION RESULTS

While comparing the performance of GRP in four scenarios, we focus on four performance measures Load, Delay, Media Access Delay, and Throughput, Total traffic sent and received.

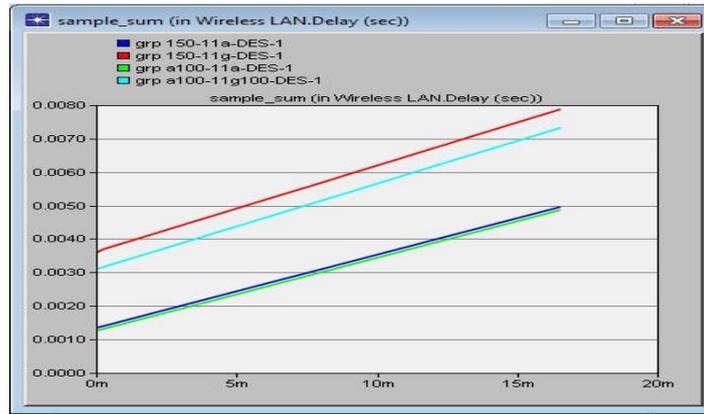


Fig 2 WLAN delay

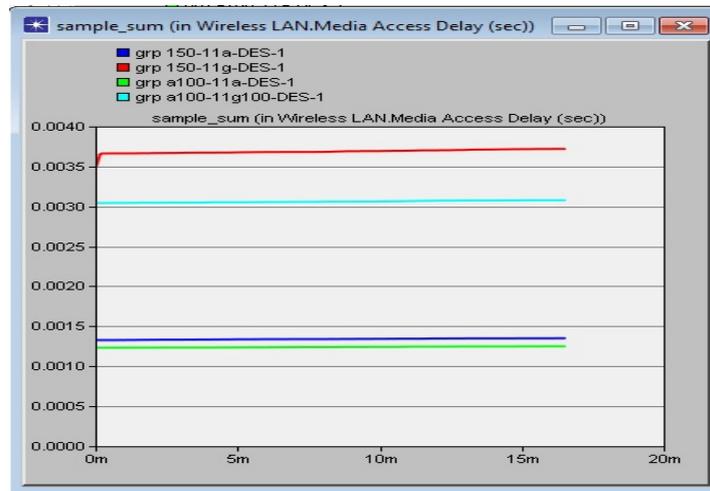


Fig 3 WLAN media access delay

From figures 2 and 3, we can see that WLAN end to end delay and MAC delay are higher for IEEE standard 802.11g and smaller for IEEE standard 802.11a.

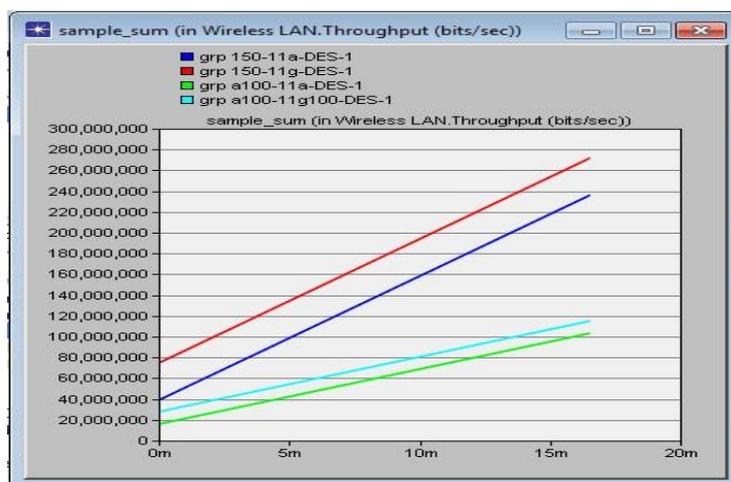


Fig 4 WLAN throughput

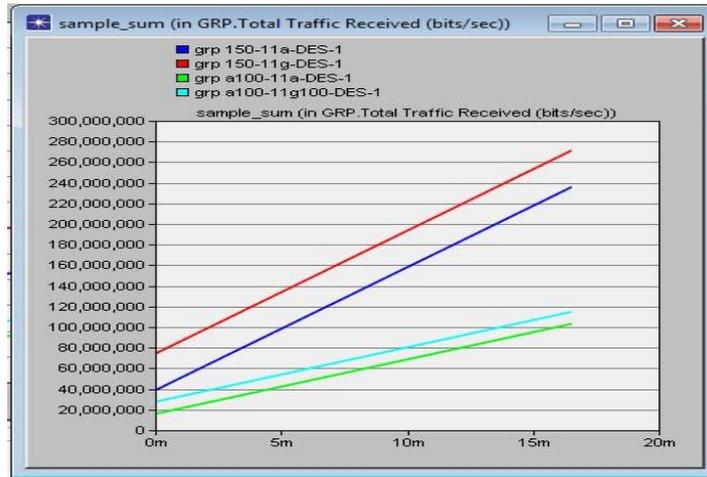


Fig 5 Total traffic received.

From figure 4 and 5, it is clear that Wireless LAN throughput and total traffic received is maximum with larger network and IEEE standard 802.11g and minimum with small network and IEEE standard 802.11a.



Fig 6 Total traffic sent.

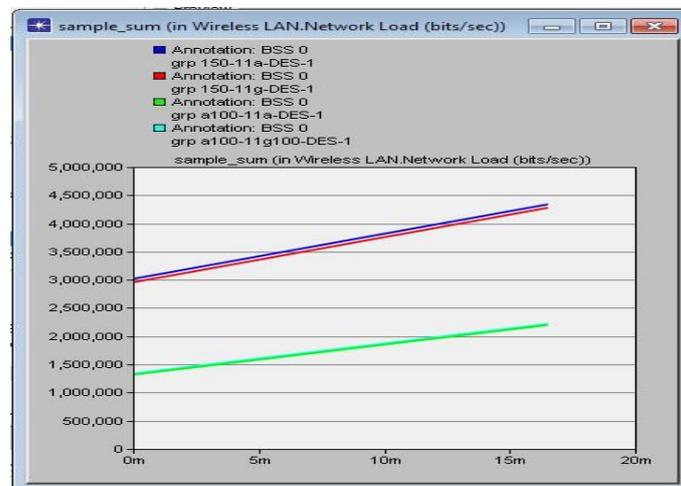


Fig 7 WLAN network load

As from figure 6 and 7, total traffic sent and network load increases with the increase in no. of nodes.

VI. CONCLUSION

In this paper, we analyze the performance of mobile Ad-hoc network in GRP routing protocol. The simulation results shows GRP protocol has better performance in the term of delay, total traffic sent and received, routing traffic sent and received in packet and bit form, Throughput, MAC Delay, load. The same result also holds good for other networking applications. On the basis of this simulation we can deploy the network in all over the world with efficiently and provide the platform for location based security because security is the primary concern for any ad-hoc network

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