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Analyzing the Performance of Proactive and Reactive Routing Protocols in MANET using QualNet 5.0 Simulator

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Abstract: A Network is a combination of nodes and links .Nodes can be mobile and static, links can be wired and wireless. So there can be different combination of networks. MANET is one of the combination that is nodes are mobile and links are wireless in nature and no central infrastructure is required. Due to mobility in nodes, different topology will be in result at different time so different routing protocols are required. Here in this paper we evaluate simulation and analysis based performance comparison of proactive and reactive routing protocols. We use the performance metric for simulation avg-end to end delay, total packet received, throughput and avg jitter. The above routing protocol has been carried out in QualNet 5.0 simulator. The result shows that IARP (proactive) protocol is better than IEPR (reactive) protocol.

Keywords: MANET, IERP, IARP, QualNet 5.0.

I) Introduction

As we know that a network is a combination of nodes and links .A node can be mobile and static in nature and similarly links are wire and wireless in nature. so we are having 4 different combination of network and MANET [3][4] is one of them. MANET is Mobile Adhoc Network. Here mobile means nodes are mobile in nature and adhoc means temporary and network means combination of nodes. Same scenario is also happens in cellular network but the main difference between Cellular and MANET is that cellular network have infrastructure that is base station among mobile nodes but on the other hand MANET does not have any infrastructure between nodes. So nodes in MANET acts as sink and source. So a node in MANET also acts as Router. Who takes the packet and forward it to next node on the basis of some calculation.MANET also known as NEED based Network.eg of Manet is Bluetooth which does not require any central infrastructure. So due to mobility in nodes make a network very much complex, because after a certain amount of time Topology of network get change[10].so different routing protocol are required to route the packet in network. so different routing protocol have been proposed by scientist. Three main categories of routing protocol is Reactive protocol, Pro-active and Hybrid routing protocol. Eg.:

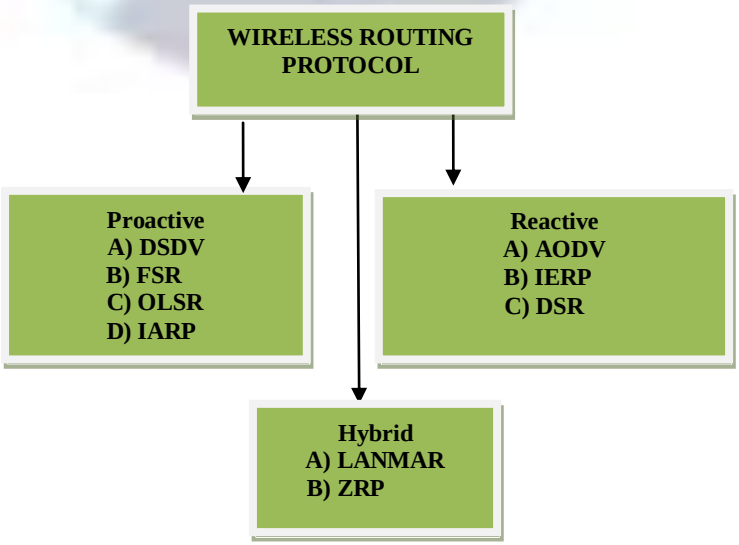


Fig: 1 - MANET Routing Protocol

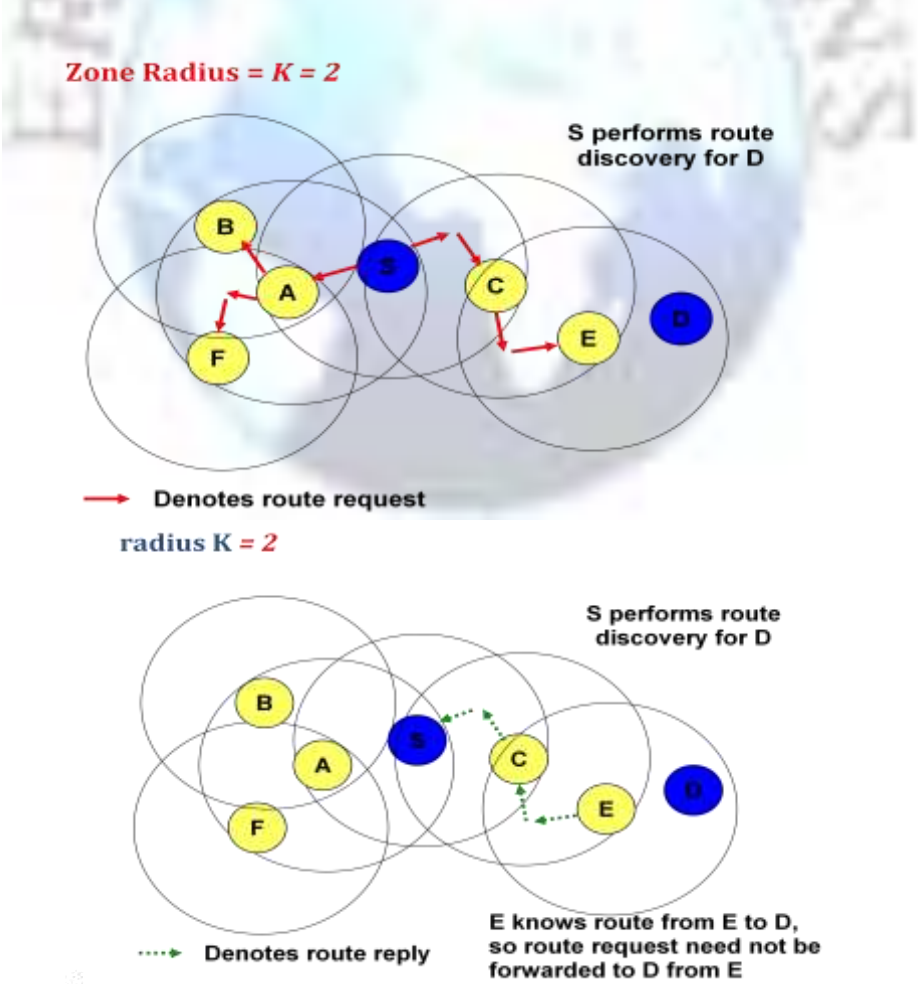
1. Proactive Routing protocol-[3] As the name suggests that they are pro active means before any action occour for route finding they already have all the route info in their table.They at a rerular interval of time share their info(routing table) to their neighbour nodes and take theirs and this way they always remain prepare to send data to any node in the network. Some of the Example of Proactive routing protocol is DSDV (Dynamic Source Distance Vector Routing), IARP (IntraZone Routing Protocol)

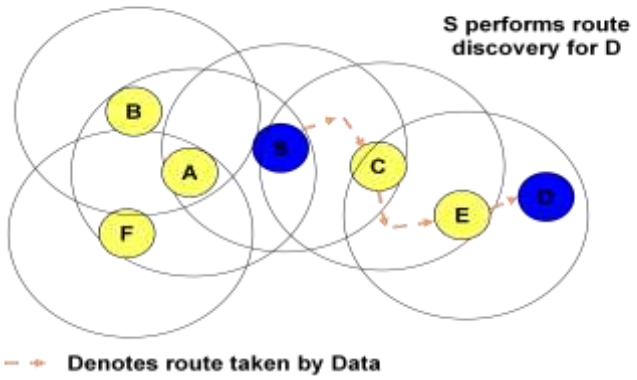
2. Reacive Routing Protocol:- They involve Route Discovery when any action happens means when any node required to send data then only they find the route by sending RREQ packet to their neighbouring nodes and when the destination node find this packet and send RREP packet to source node and then path is conform between source and destination node and data is traverse between source and destination node. Some of the example if reactive routing protocol is IERP(Inter Zone Routing Protocol) ,AODV[9] (Adhoc On Demand Routing Protocol).[4][3]

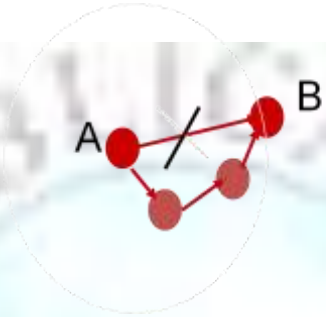
3. Hybrid Routing Protocol:- Hybrid routing protocol which uses the properties of both the routing protocol i.e proactive and reactive. Means between the networks it use reactive routing protocol and inside the network it uses proactive routing protocol.eg are LANMAR and ZRP (Zone Routing Protocol). It reduce the latency in route discovery and also reduces the overhead of control message.

II) Brief Description of Routing Protocol in MANET(IERP,IARP)

1. IntraZone Routing Protocol:-It is a limited scope Proactive Routing Protocol which is basically used inside the network. Each node collects the routing information about all the nodes in the routing zone. This strategy is similar to DSDV protocol in proactive protocols. Each node maintain a routing information for its routing zone so that it can find any route to destination from its routing table. The scope of IARP is define by the Routing Zone Radius. Each node send a hello message called zone notification message. Suppose we have zone radius is 1 then a hello message dies after 1 hop. If the radius is grater than 1 then each node who will get this msg will decrease the hop by 1 and forward the message to next neighbor node. The message is not forward to next when hop count become 0.[6][1]







III) SIMULATION SETUP AND ENVIRONMENT

The aim is to simulation and analysing of various routing protocol performance with the help of Simulator that is QualNet 5.01 [7]. The main difference between Simulation and real scenario is that in real scenario it takes long time in setup of nodes and link creation.so when in any emergency if we require to setup a a network then we need not to waste time to do experiments and check that which protocol is best in which environments we can directly take the results from the simulator and implements the network. Althought simulator is not the reality but it can be somewhat equivalent to reality.The accuracy of simulator is very much imp factor before predicting any real scenario. Here in the simulation we compare different protocol (IARP) and (IEPR) on the basis of throuhput,avg jitter,total packet received,avg end to end delay etc.In our scenario we have done different simulaiton with 30, 50, 70 nodes placed randomly in area (1500 X 1500) m2, source node (21) and destination node (30). Total byte sent is 12200 bytes. Simulation was run for 30 sec for each scenario.

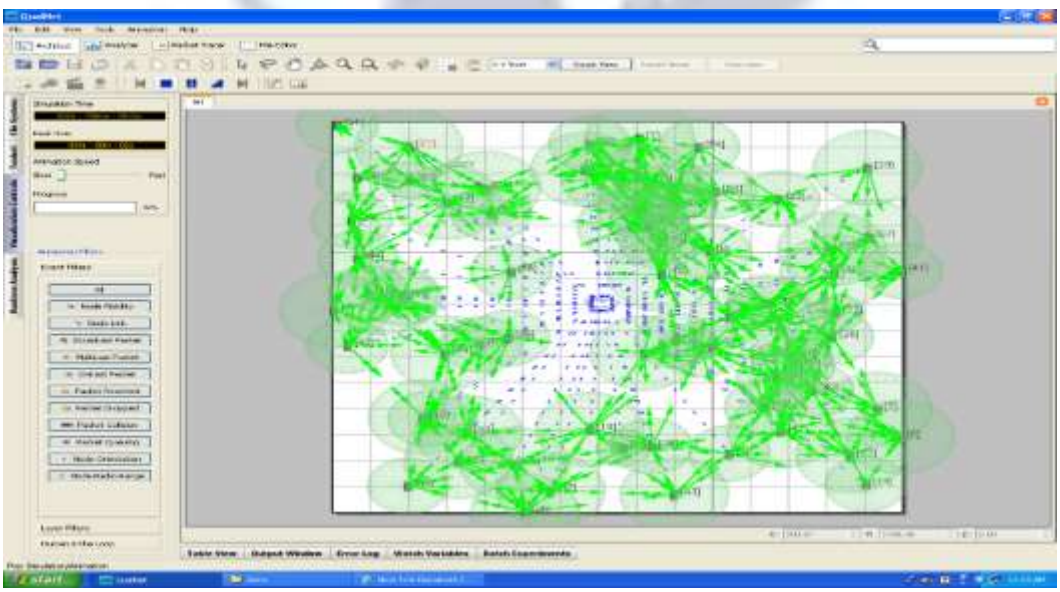


Fig:6- snapshot of simulation for IARP (Intra Zone) Rrouting protocol (Proactive routing protocol)

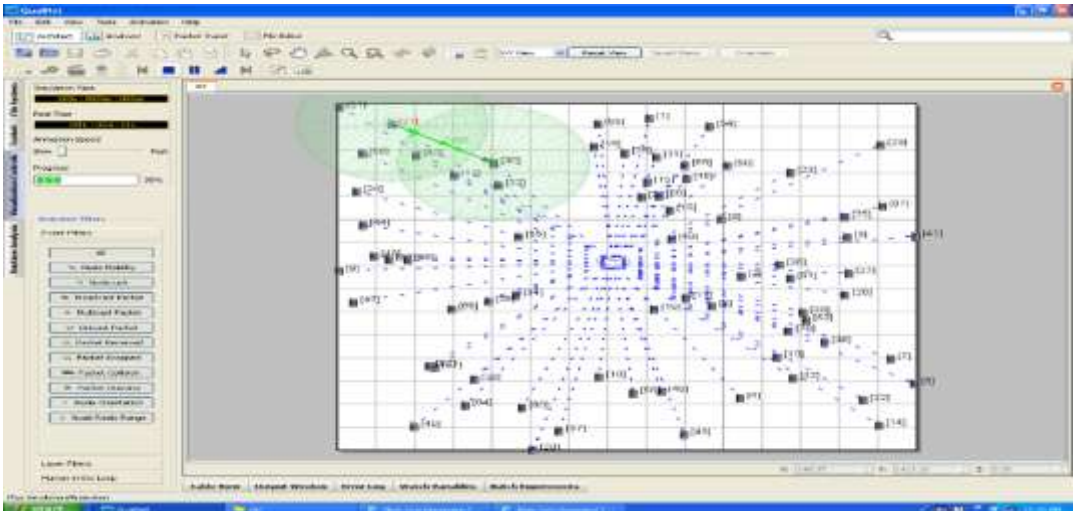


Fig 7:- Snapshot of simulation for IERP (InterZone) Routing Protocol (Reactive routing protocol).

TABLE 1

Configured Parameter for simulation	
Parameter	Value
Physical Layer Protocol	IEEE802.11
Routing protocol	IARP,IERP
Energy Model	Mica Motas
Battery Power	Simple Linear
Area	1500X1500
Mobility	Random way point[8]
Application Layer	CBR Traffic
Total Power	1200 ma
Antenna Model	Omni Directional Antenna

1V) RESULTS

Snap shot of IEPR protocol:
Throughput:-

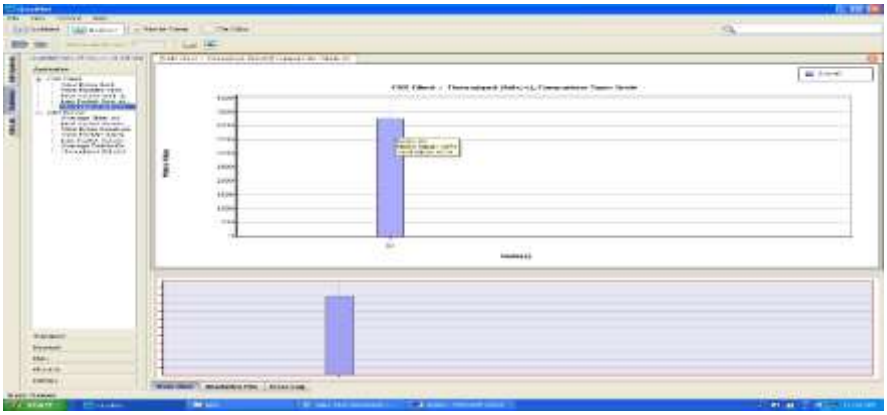


Fig:- 8

Avg Jitter:-

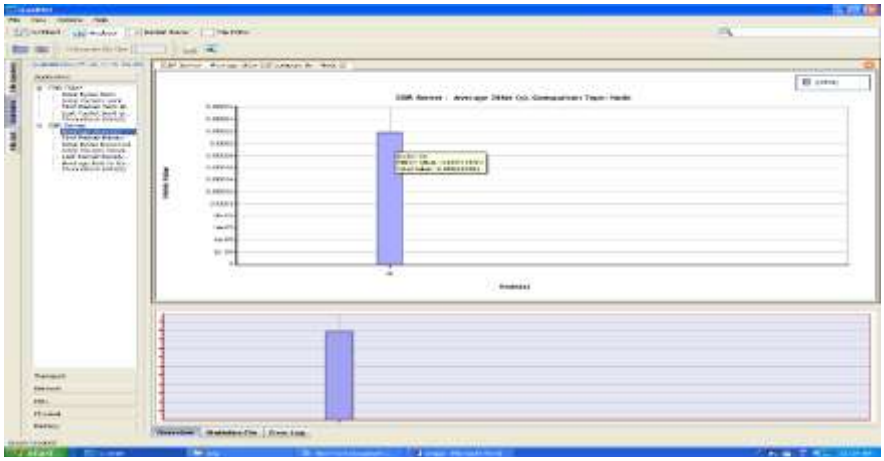


Fig:-9

Total Byte Received:-

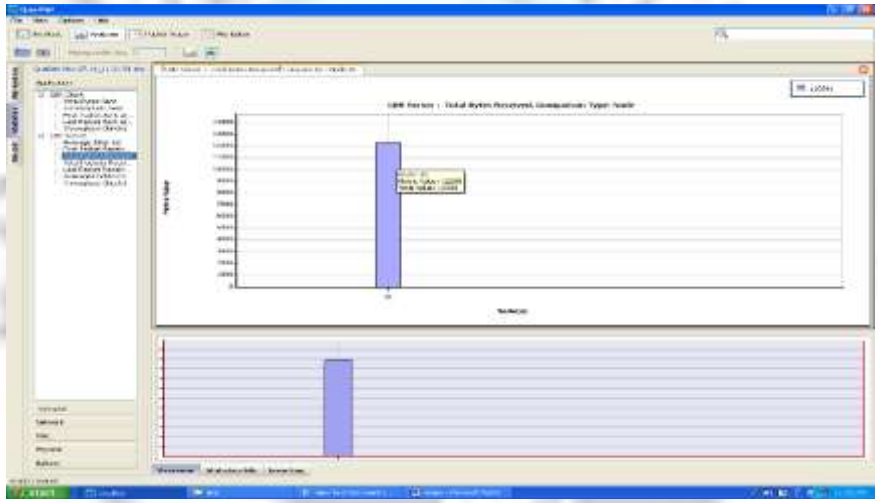


Fig:-10

Avg end to end delay:-

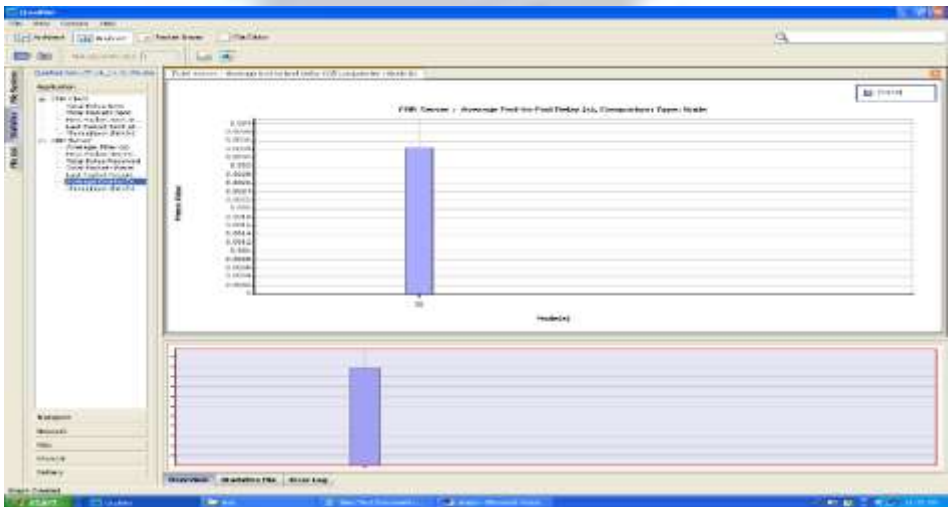


Fig:-11

Snap shot of IARP protocol:-

Throughput:-

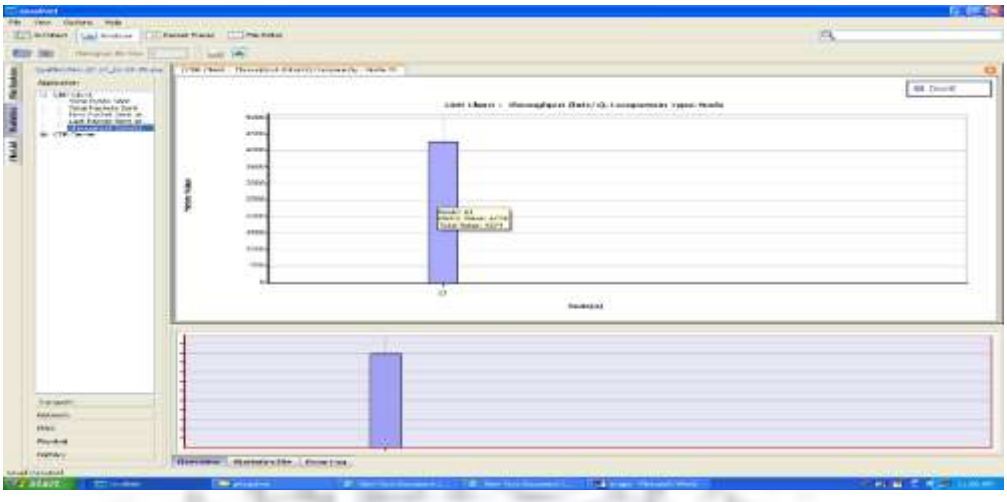


Fig:-12

Avg Jitter:-

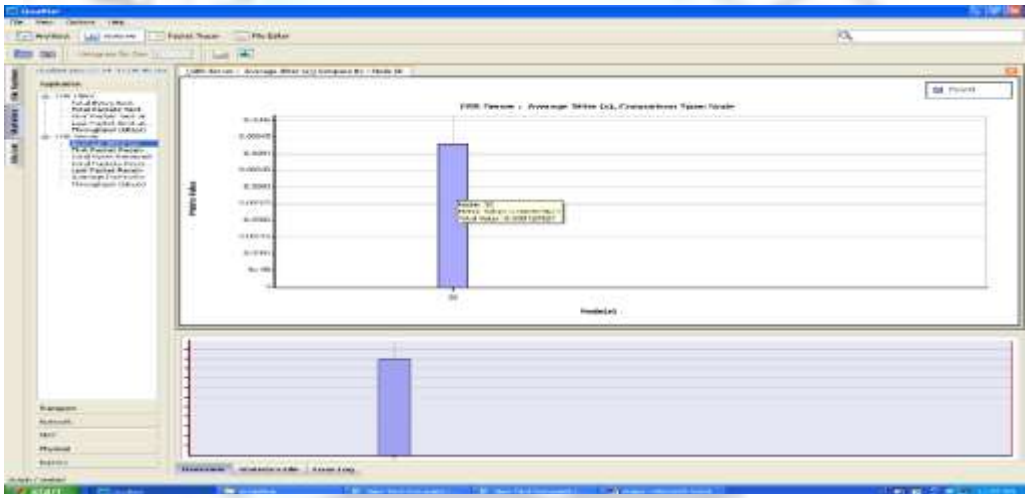


Fig:-13

Total Byte Received:-

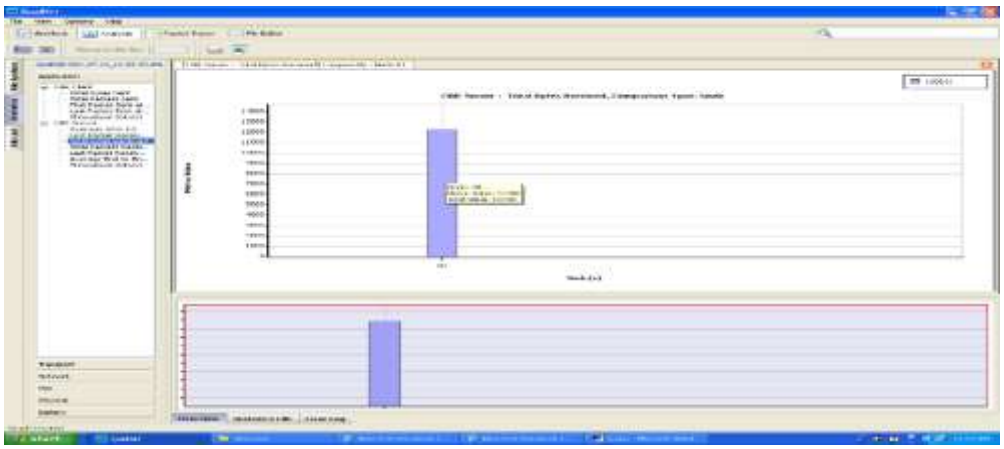


Fig:-14

Avg end to end delay:-

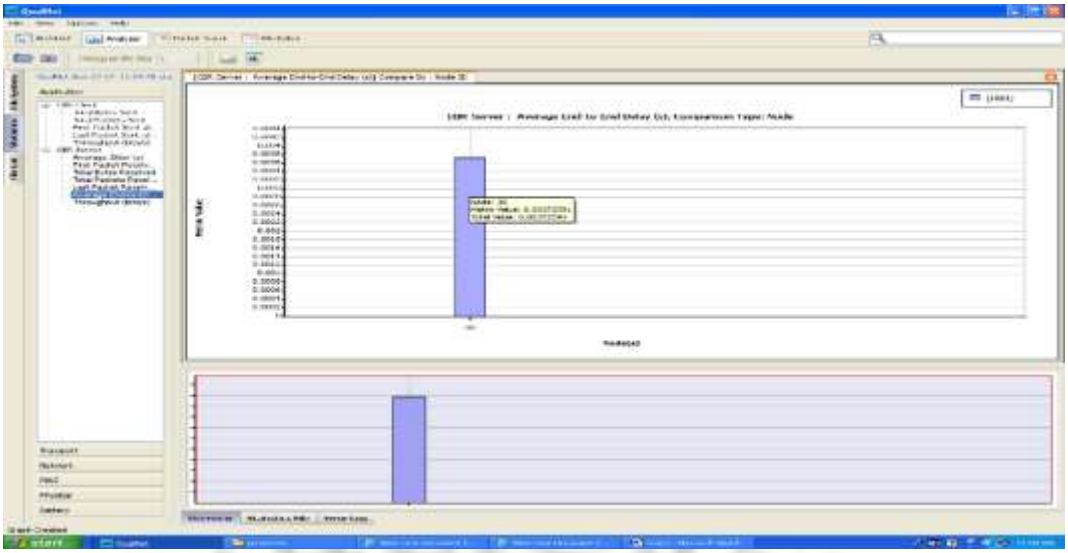


Fig: 15

Different Result is Get by using Line graph:

Avg Jitter:-

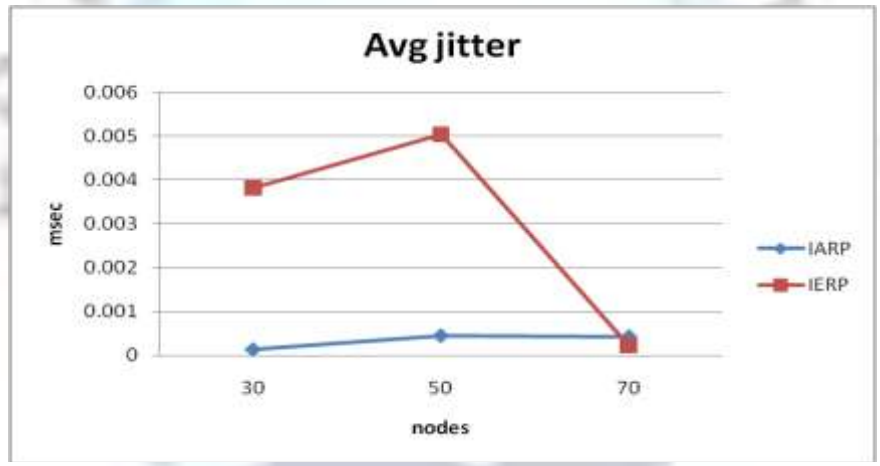


Fig:- 16

Total Bytes received:-

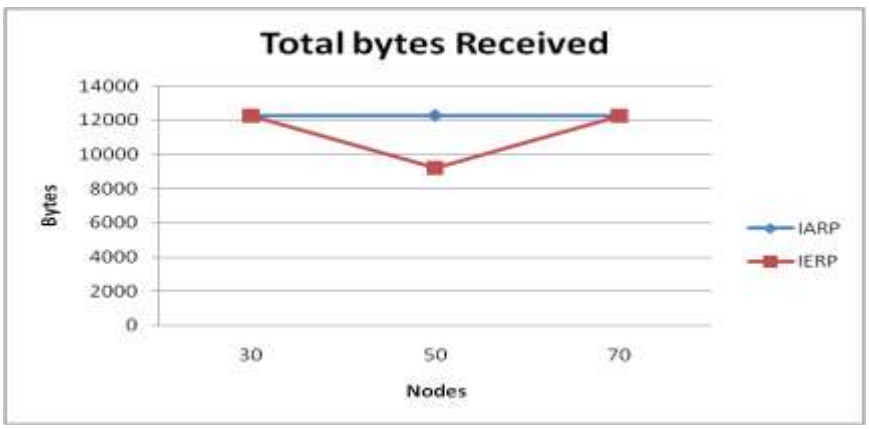


Fig:-17

Avg End to End delay:-

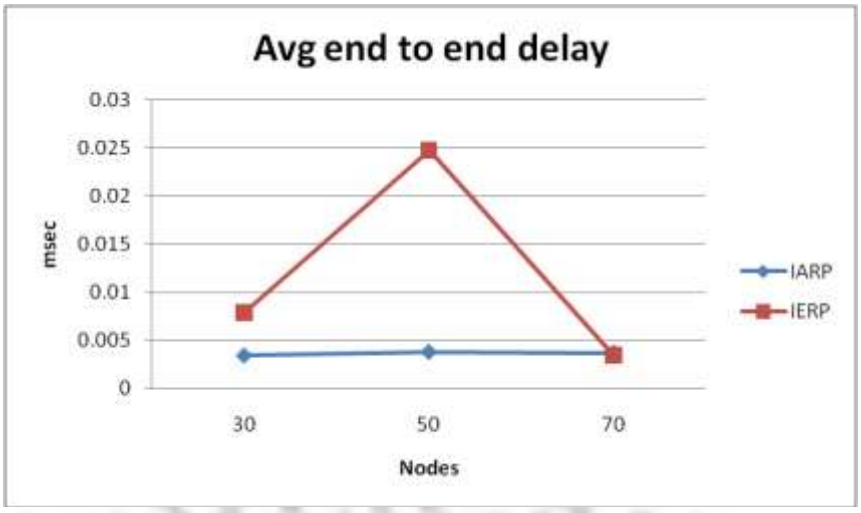


Fig:- 18

Throughput:-

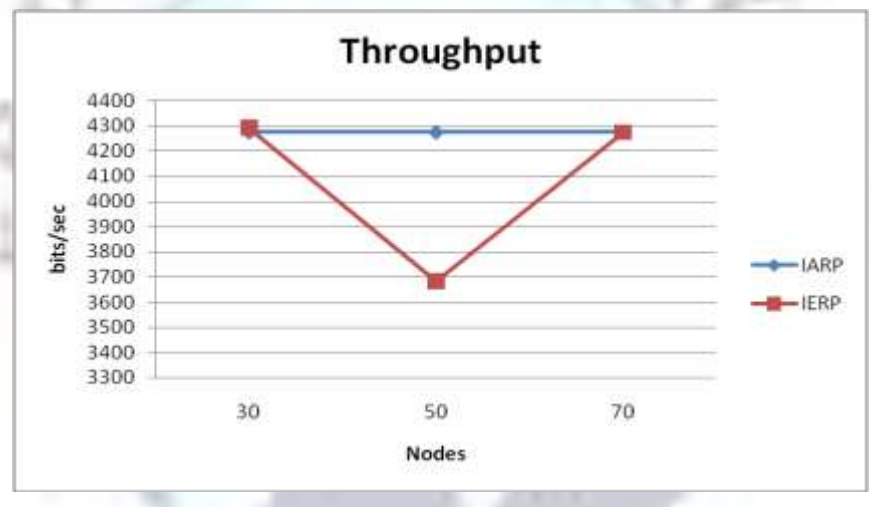


Fig:- 19

Comparison between IERP and IARP

TABLE-2

Comparison Between IERP and IARP		
Parameters	IERP	IARP
Avg Jitter	HIGH	LOW
Throughput	CHANGE RAPIDLY	CONSTANT
Avg End to End delay	HIGH	LOW
Total Byte Received	LARGE DROP	SMALL DROP

V) CONCLUSION AND FUTURE WORK

The paper compares IERP and IARP routing protocols in different scenarios. Means no. of nodes were different in every simulation. The evaluation shows that in the case of avg jitter, it was high in case of ierp but less in iarp. and throughput is change rapidly in ierp, means when we did simulation for 50 nodes then throughput drops .Bytes drops in ierp protocol is more than that of iarp means if we send packets, then chances that most of the data will be drop at router itself. Table 2 is very much useful for people who are doing research in this area. so overall performance of iarp protocol is better than that of ierp protocol. In the future we and anybody can do a lot of research in these protocol with different parameters and can find more results .these results also throw challenges and an good opportunities to explore these protocols.

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