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Evaluation of Transmission Control Protocol to Study the Interaction with the Routing Protocols in MANETs

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Abstract- ***We present an optimized scalable simulation model for transmission control protocol with the help of opnet (optimized network simulator) and check the performance of routing protocols (reactive routing protocol, pro-active routing protocol and hybrid routing protocol). It is based on nodes and routes which exchange the data packets through the routes using routing protocol, we implement it on the three routing protocol ad-hoc on demand distance vector, optimized link state routing protocol, geographically routing protocol, with the help of opnet and find out the better performance of protocol for data drop rates for tcp model. it helps to increase the reliability and scalability of the model***

Keywords- manet, routing protocols, aodv, olsr, grp ,data drop parameter.

I. INTRODUCTION OF MANET

MANETs are self-forming, self-maintained and self-healing allowing for extreme network flexibility. MANETs consist of mobile nodes that are free in moving in and out in the network nodes are the systems or devices that are participating in the network. These nodes can act as host/router or both at same time. These nodes have the ability to configure themselves and because of their self configuration ability, they can be deployed urgently without the need of any infrastructure.

II. MANETs ROUTING PROTOCOL

Internet Engineering Task Force (IETF) has MANET working group (WG) that is devoted for developing IP routing protocols. Many routing protocols have been developed for MANETs. The protocols differ in terms of routing methodologies and the information used to make routing decisions. On the behalf of their different working methodologies, these routing protocols are divided into three different categories:

- Reactive Protocols
- Proactive Protocols
- Hybrid Protocols

1. REACTIVE PROTOCOL

Reactive Protocols are also known as On Demand Routing Protocols, because they establish routes between nodes only when they are required to route data packets. When a route required by a source node to a destination for which it does not have route information, it starts a route discovery process which goes from one node two another node until it arrives at the destination or a nodes in-between has a route to the destination. Reactive Protocols are generally considered efficient when the route discovery is less frequent that the data transfer because the network traffic caused by the route discovery step is low compared to the total communication bandwidth. This makes the reactive protocols more suitable to the network with light traffic and low mobility. Ad Hoc on Demand Vector Routing Protocol (AODV), Dynamic Source Routing (DSR) are the examples of Reactive Protocols.

2. PROACTIVE PROTOCOL

Proactive Protocols are also known as Table Driven Protocols. These protocols maintain constantly updated topology of the network. Every node in the network knows about the other nodes in advance keeping it simple, the whole network is known to all the nodes making that network. All the routing information is usually kept in number of different tables. Whenever there is a change in the network topology, these tables are update according to the changes. The nodes exchange topology information with each other; they can have route information any time when they needed. Optimized Link State Routing Protocol (OLSR), Destination-Sequenced Distance-Vector Routing (DSDV) Protocols are the examples of Proactive Protocols.

3. HYBRID PROTOCOL

Hybrid Routing Protocols combine proactive protocols with reactive protocols. They use distance-vectors for more precise metrics to establish the best paths to destinations networks, and report routing information only when there is a change in the topology of the network. Each node in the network has its own routing zone, the size of which is defined by

a zone radius, which is defined by a metric such as the number of hops. Each node keeps a record of routing information for its own zone. Temporary Ordered Routing Algorithm (TORA), Geographical Routing Protocol (GRP) are the examples of Hybrid Protocol.

AD-HOC ON DEMAND DISTANCE VECTOR ROUTING PROTOCOL (AODV)

Ad-hoc on demand distance vector routing protocol. Its known as on demand because it create routes between nodes only when strictly require by source node. It maintain these routes as long as source nodes needed that AODV create routes using a route request / route reply .when a source node need a route destination , then it broadcast a route request packet. Each RREQ contains a unique ID, source and destination node IP address, as well as sequence numbers, hop count and control flags. When the RREQ reaches the destination node a route reply packet is generated and unicast back to the originator of the RREQ. If the source later receives a RREP containing a greater sequence number or contains the same sequence number with a smaller hop count, it may update its routing information for that destination and begin using the better route

OPTIMISED LINK STATE ROUTING PROTOCOL (OLSR)

The optimized link state routing protocol is a proactive protocol. In OLSR, the routes will be created with the help of nodes. Within the network all the routes will be maintained by the nodes. The nodes exchange information periodically when sending data or moving from one network to another network. OLSR is a table-driven protocol & its main purpose is to update & maintained the table which having information regarding the control traffic generated & received by the nodes. OLSR protocol is not responsible for route traffic its mainly Purpose to maintain the routing table [4]The OLSR Protocol is based on the two major concerns. First, HELLO message & second the topology control message. The neighbor nodes are finding with the help of exchanging HELLO message between the nodes. HELLO message also gives information about the topology used by the nodes. HELLO message also selects MPR (Multipoint Relay) from the neighbor. Second, the TC(Topology Control) message, the TC message contains the information of the MRP node that retransmits the data to further nodes. From MPR nodes all the nodes received the TC message. So that all the nodes having the information of the network topology and route will be created with the help of nodes [5][6].

GEOGRAPHIC ROUTING PROTOCOL (GRP)

Geographic routing also called geo-routing or position-based routing is a routing principle that relies on geographic position information. It is mainly proposed for wireless networks and based on the idea that the source sends a message to the geographic location of the destination instead of using the network address .Geographic routing requires that each node can determine its own location and that the source is aware of the location of the destination. With this information a message can be routed to the destination without knowledge of the network topology or a prior route discovery.

III. SIMULATION

We have created a network with three routing protocols aodv, olsr and grp in opnet and checked which protocol is perform better than other .we compare each other protocols by using data drop parameter.

MOBILE AD-HOC NETWORK WITH OLSR, GRP AND AODV PROTOCOLS

A Manet network is created with three different protocols i.e. OLSR protocol, GRP protocol and AODV protocol. The network is same for all these protocols in order to find the ratio of data loss by using these three different protocols. The reason is to check the performance of a manet network by finding the data loss ratio. This network is created with the different parameters of these three protocols.

MANET NETWORK WITH OLSR PROTOCOL

We have created a network with OLSR protocol in OPNET & checked that how much data is lost by OLSR protocol. For this a simple network is created with the OLSR protocol which is shown in Fig 1.and various parameters that are used by this is shown in table 1.

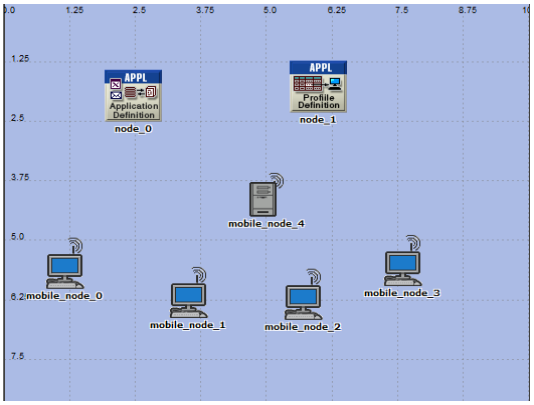

Fig.1. Manet Network

By using these parameters this network will help to find out, how much data is lost by using OLSR protocol so that it will help to improve the performance of the network. In this Manet network with 4 nodes and a mobile server is created in which all the nodes are connected to them. In this, two other nodes such as Application Configuration & Profile Configuration have been used. These are used to define the application definition & profile definition. All these are connected with topology 802.11.

Table .1 Parameters used by OLSR for Manet Network

S. No	Factor	Scenario
1	Willingness	Default
2	Hello Interval	2.0 sec
3	Tc Interval	5.0 sec
4	Neighbor Hold Time	6.0 sec

MANET NETWORK WITH AODV PROTOCOL

We have created a network with AODV protocol in OPNET & checked that how much data is lost by AODV protocol. For this a simple network is created with the AODV protocol which is shown in Fig 2. and various parameters that are used by this is shown in table 3. By using these parameters this network will help to find out, how much data is lost by using AODV protocol so that it will help to improve the performance of the network. In this Manet network with 4 nodes and a mobile server is created in which all the nodes are connected to them. In this, two other nodes such as Application Configuration & Profile Configuration have been used. These are used to define the application definition & profile definition. All these are connected with topology 802.11.

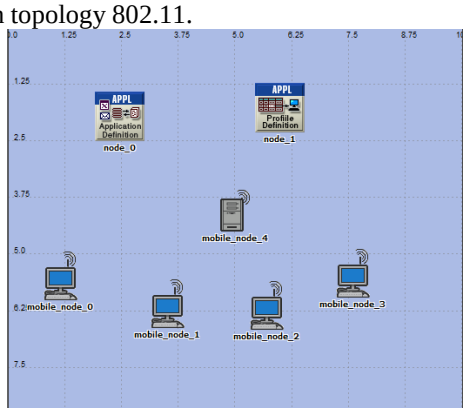

Fig 2 .Manet Network

Table 2. Parameters used by AODV for Manet Network

S. No	Factor	Scenario
1	Hello Interval	1 sec
2	Active route time	3 sec
3	Node traversal time	0.04sec

MANET NETWORK WITH GRP PROTOCOL

We have created a network with GRP protocol in OPNET & checked that how much data is lost by GRP protocol. For this a simple network is created with the GRP protocol which is shown in Fig 3 and various parameters that are used by this is shown in table 3. By using these parameters this network will help to find out, how much data is lost by using GRP protocol so that it will help to improve the performance of the network. In this Manet network with 4 nodes and a mobile server is created in which all the nodes are connected to them. In this, two other nodes such as Application Configuration & Profile Configuration have been used. These are used to define the application definition & profile definition. All these are connected with topology 802.11.

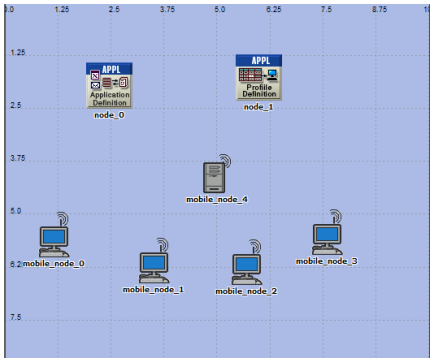

Fig 3Manet Network

Table 3 Parameters used by GRP for Manet Network

S. No	Factor	Scenario
1	Hello Interval	5.0 sec
2	Neighbor Expiry Time	10.0 sec

RESULT ANALYSIS

In this data loss value will be discussed as a result by using these three different protocols i.e. AODV protocol, OLSR protocol and GRP protocol. These results are shown in form of graph in which data loss value can be easily find out.

DATA DROP VALUE OF OLSR PROTOCOL

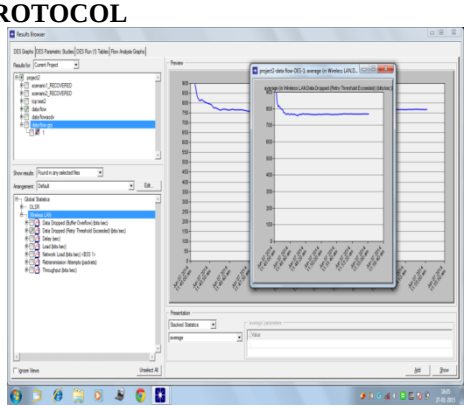

Fig 4 Result of OLSR Protocol

From this graph it is concluded that if there is a use of OLSR protocol in Manet network then the chances of loss of data is near about 750 bits/sec.

DATA DROP VALUE OF AODV PROTOCOL

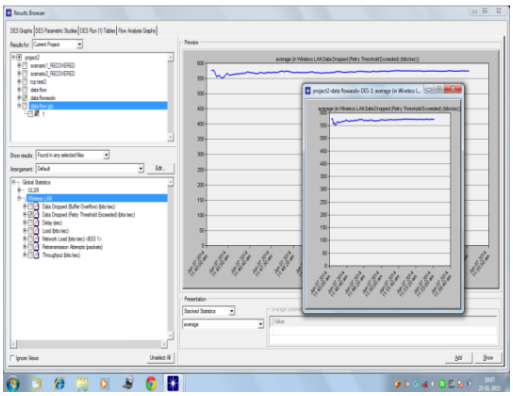

Fig 5 Result of AODV Protocol

From this graph it is concluded that if there is a use of AODV protocol in Manet network then the chances of loss of data is near about 575 bits/sec.

DATA DROP VALUE OF GRP PROTOCOL

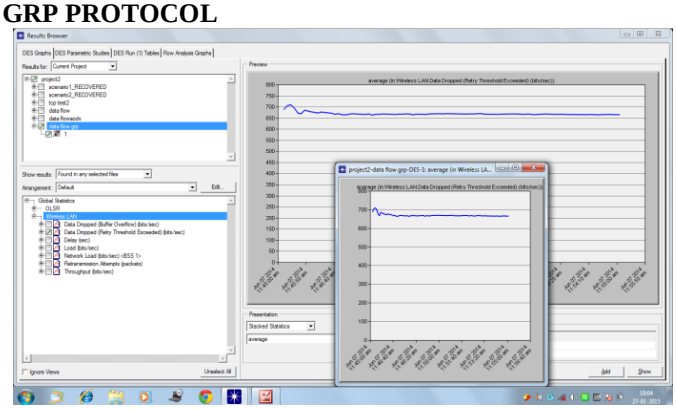

Fig 6 Result of GRP Protocol

From this graph it is concluded that if there is a use of GRP protocol in Manet network then the chances of loss of data is near about 660 bits/sec.

COMPARISON OF OLSR PROTOCOL, AODV PROTOCOL AND GRP PROTOCOL

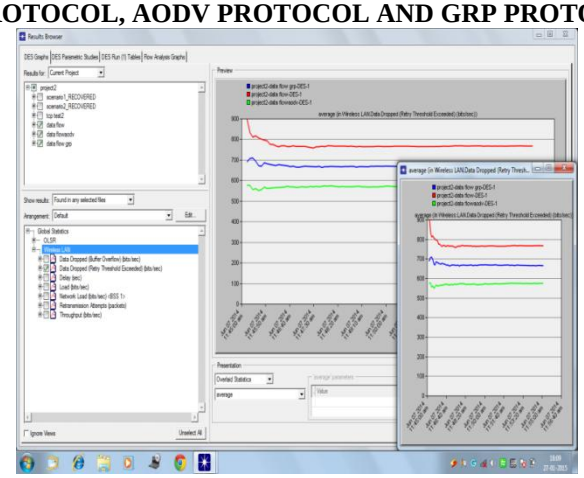

Fig 7 Data loss ratio of OLSR, AODV and GRP protocol

From the results of all these three protocols, it has been find out that if there is a use of AODV protocol, OLSR protocol and GRP protocol on the same network then the chances of data loss is less in AODV protocol as compared to OLSR and GRP protocol and by using OLSR data loss is more as compared to AODV and GRP protocol. And if we use GRP protocol then the data loss rate is high as compared to AODV and data loss rate is low as compared to OLSR.

IV. CONCLUSION

In this paper after discussion and results it is concluded that if we use AODV protocol, OLSR protocol and GRP protocol on the same network then the chances of data loss is less in AODV protocol as compared to OLSR and GRP protocol and by using OLSR data loss is more as compared to AODV and GRP protocol. And if we use GRP protocol then the data loss rate is high as compared to AODV and data loss rate is low as compared to OLSR.

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