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Effect of Varying Source Node, Relay Node and Mobility in MANET

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Abstract— In this paper the effect of entering different routing protocol in a network is analyzed. To analyze this effect number of nodes are vary from 25 to 65 nodes. In this paper the 25 nodes are move at low speed and 65 nodes are moving at high speed. To analyze this effect opnet modeler14.5 is used. The performance is compared in terms of throughput, load and media access delay. Results show that when only aodv is used performance is good when other protocols enter into the network then performance decrease.

Keywords— MANET, AODV, OLSR and DSR

I. INTRODUCTION

MANETs are also called infrastructure less or non infrastructure wireless networks. The term ad hoc implies that it is used for special types of application. In Manet there is no central device to control the nodes which provide the nodes the unrestricted mobility and connectivity to others. Routing and network management are done cooperatively by each other nodes. It is an autonomous system where each node can send data and also act like a router [6] [10]. A MANET consists of mobile nodes, a router with multiple hosts and wireless communication devices. In Manet wireless nodes are used due to that it can free to move. The wireless communication devices are transmitters, receivers and smart antennas [7] [8].

A. Routing Protocol

An ad-hoc routing protocol is a standard, which allow the nodes to communicate. There are different types of protocol which is used in MANET like AODV, DSR and OLSR [9].

B. Ad Hoc On-Demand Distance-Vector Routing Protocol (AODV)

AODV is a reactive protocol, in which node which do not have route send a control message, which is used by AODV to find a route to the destination node in the network, it provide topology information for the node [2][5]. There are three types of control messages in AODV that are [3]:
  - Route Request Message (RREQ)
  - Route Reply Message (RREP)
  - Route Error Message (RERR).

C. DSR (Dynamic Source Routing)

DSR is a protocol which is reactive and relies on the theory of source routing. By finding some new routes, it updates its route cache. The cache is updated by discovering new route or a direct route exists between a source and destination node. Before the transmission of data, the node defines a route and then it transmits data through the route which is defined. The routing request (RREQ) packets are sending by source node by using flooding technology. Every packet contains source node address (Sid), destination address (Did) and the unique request sequence number (Request ID) [13] [14]. The benefit of DSR is that multiple routes can be stored in the route cache of nodes and before initiating route

discovery, route cache is checked by the node. Route discovery is not needed in case we find any valid route. This is very useful in the networks which have low mobility as the route which is stored in the cache will remain valid for long period. Apart from this, periodic beaconing (or HELLO messages exchanges) is not required by DSR and nodes turn to sleep mode to protect their power which further saves bandwidth in the network [4].

D. Optimized Link State Routing (OLSR)

OLSR is a protocol that make table. In this protocol the routes are stores and updates only during communication, the benefit of this protocol is that it make route without any delay. In OLSR, there are some nodes which is called multipoint relays (MPRs) are selected and it is used during flooding to broadcast the packet. Due to that overheads are reduced [1]. OLSR performs hop-by-hop routing, where each node uses its most recent routing information to route packets. MPR's is made in a way that it covers all nodes that are two hops away (i.e. neighbors of the neighbors). In this protocol MRP is selected by using hello packet called HELLO messages which is sent after some period.
Nodes broadcast "TC" or Topology control messages to determine it's MPRs [11].

II. EXPERIMENTAL SETUP

In this paper the effect of varying mobility and nodes is analyzed. In This work in first scenario 25 nodes are used at speed of 5m/s. in this scenario there are 10 source nodes and 4 have HTP, 3 have video and 3 have FTP application and other are relay nodes. In this scenario all nodes have AODV protocol. Then in second scenario some nodes are given with OLSR protocol and rest have AODV protocol. In this scenario 10 source nodes are used in which 4 have HTP, 3 have video and 3 have FTP application and other are relay nodes. In third scenario then some nodes are given DSR protocol and rest have AODV and DSR protocol. In this scenario 10 source nodes are used in which 4 have HTP, 3 have video and 3 have FTP application and other are relay nodes. Then these scenarios are repeated by using 65 nodes which are moving at the speed of 20m/s and have 25 source nodes in which 8 have HTP, 8 have video and 9 have FTP application and other are relay nodes.
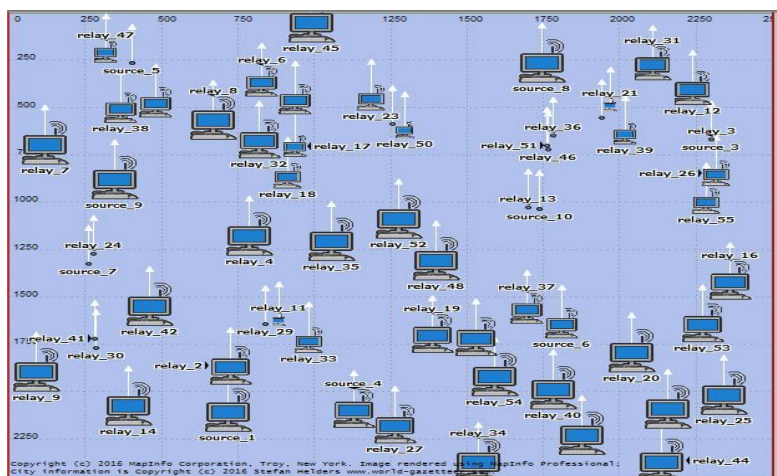

Fig. 1 Basic Scenario

III. RESULTS

A. THROUGHPUT

It represents the total number of bits (in bits/sec) forwarded from wireless LAN layers to higher layers in all WLAN nodes of the network [2].

Fig 2 shows the result for 25 nodes. Fig shows that when only aodv is used than throughput is more which is 2800000 bits/sec. when olsr nodes is inserted than throughput decrease which is now 1200000 bits/ sec. when aodv, olsr and dsr come together than performance decrease and become nearly zero.
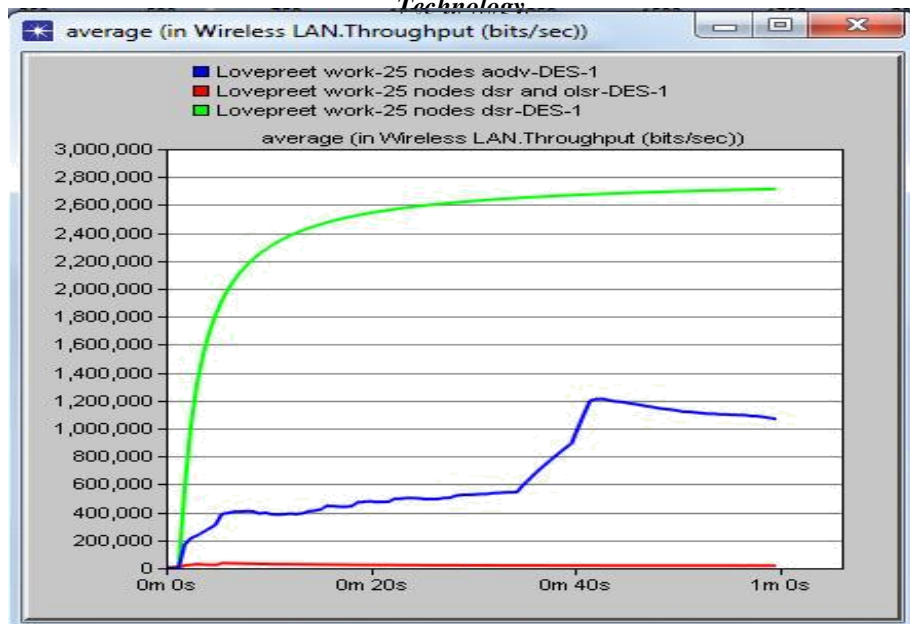
Fig. 2 Throughput of 25 Nodes

Fig 3 shows the result for 25 nodes. Fig shows that when only aodv is used than throughput is more which is 1700000 bits/sec. when olsr nodes is inserted than throughput decrease which is now 900000 bits/ sec. when aodv, olsr and dsr come together than performance decrease and become 700000 bits/sec.
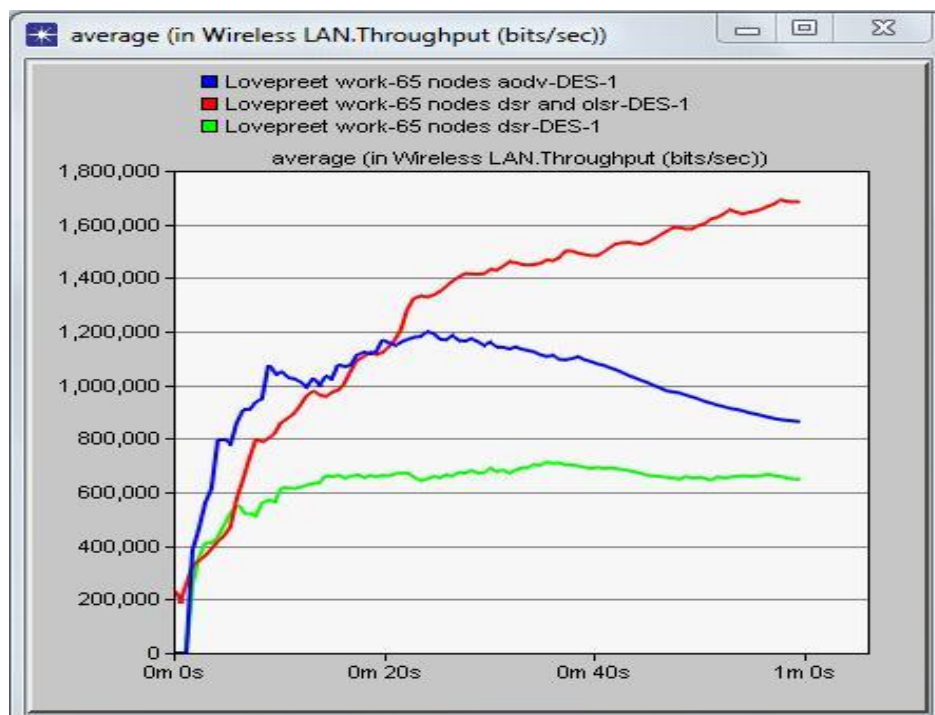

Fig. 3 Throughput of 65 Nodes

B. MEDIA ACCESS DELAY

Media access delay represents the global statistic for the total of queuing and contention delays of the data, management, delayed Block-ACK and Block-ACK Request frames transmitted by all WLAN MACs in the network. For each frame, this delay is calculated as the duration from the time when it is inserted into the transmission queue, which is arrival time for higher layer data packets and creation time for all other frames types, until the time when the frame is sent to the physical layer for

the first time. Hence, it also includes the period for the successful RTS/CTS exchange, if this exchange is used prior to the transmission of that frame. Similarly, it may also include multiple number of back off periods, if the MAC is 802.11e-capable and the initial transmission of the frame is delayed due to one or more internal collisions [12] .

Fig 4 shows the result for 25 nodes. Fig shows that when only aodv is used than delay is more which is 0.40 sec. when olsr nodes is inserted than delay decrease which is now .02 sec. when aodv, olsr and dsr come together than performance decrease .03.
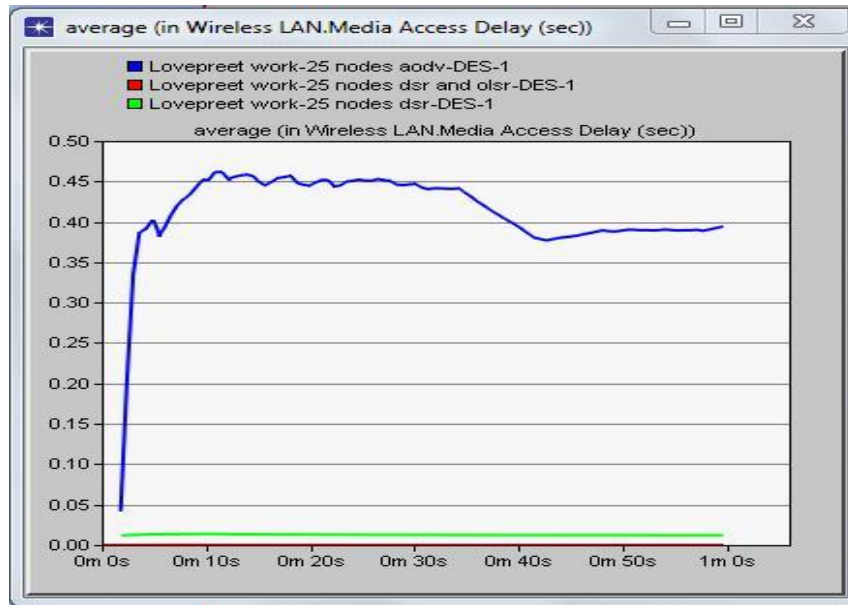

Fig. 4 Media Access Delay for 25 Nodes

Fig 5 shows the result for 25 nodes. Fig shows that when only aodv is used than delay is more which is 0.06 sec. when olsr nodes is inserted than delay decrease which is now .01 sec. when aodv, olsr and dsr come together than performance decrease .01.
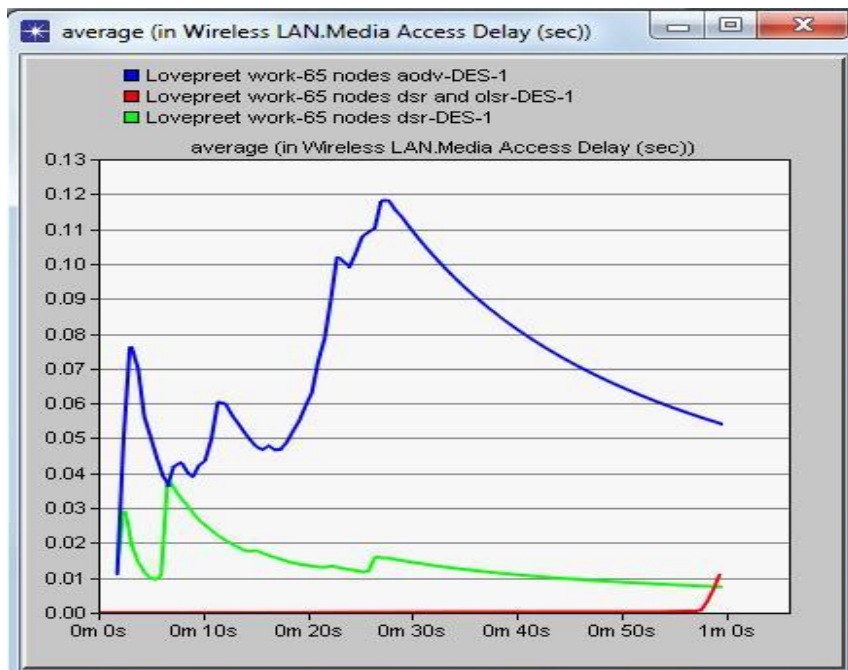

Fig. 5 Media Access Delay for 65 Nodes

C. LOAD

Represents the total load (in bits/sec) submitted to wireless LAN layers by all higher layers in all WLAN nodes of the network [5].

Fig 6 shows the result for 25 nodes. Fig shows that when only aodv is used than throughput is more which is 8000000 bits/sec. when olsr nodes is inserted than throughput decrease which is now 2900000 bits/ sec. when aodv, olsr and dsr come together than performance decrease which is 2900000bits/sec.
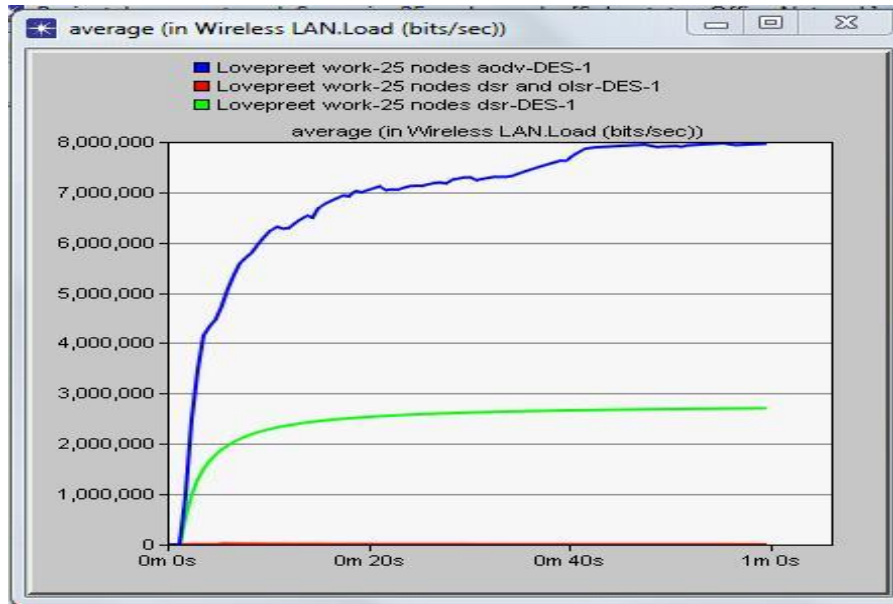
Fig. 6 Load for 25 Nodes

Fig 7 shows the result for 65 nodes. Fig shows that when only aodv is used than throughput is more which is 450000 bits/sec. when olsr nodes is inserted than throughput decrease which is now 350000 bits/ sec. when aodv, olsr and dsr come together than performance decrease which is 150000bits/sec.
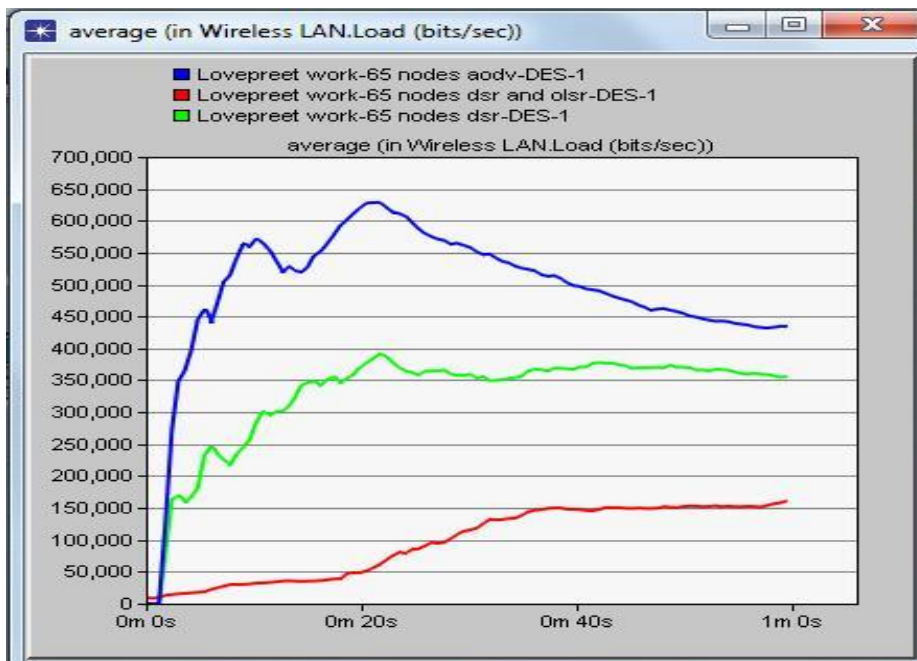
Fig. 7 Load for 65 Nodes

IV. **CONCLUSION AND FUTURE SCOPE**

In this paper the effect on AODV is analyzed in the presence of different nodes. To analyze this effect number of nodes are vary from 25 to 65 nodes. In this paper the 25 nodes are move at low speed and 65 nodes are moving at high speed. The performance is compared in terms of throughput, load and media access delay. Results show that when only aodv is used performance is good when other protocols enter into the network then performance decrease. In future one can increase their work by adding more protocols, analyze their effect on other protocol, can move nodes by using different mobility patterns.

TABLE I
THROUGHPUT

Throughput For 25 Nodes			
AODV previous	**AODV**	**AODV, DSR**	**AODV, DSR and OLSR**
200	2700000	1100000	0
Throughput For 65 Nodes			
AODV previous	**AODV**	**AODV,DSR**	**AODV, DSR and OLSR**
200	1700000	900000	700000

TABLE II
LOAD

Load For 25 Nodes			
AODV previous	**AODV**	**AODV, DSR**	**AODV, DSR and OLSR**
400	8000000	2900000	0
Load For 65 Nodes			
AODV previous	**AODV**	**AODV, DSR**	**AODV,DSR and OLSR**
250	450000	350000	150000

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