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Effect of Packet Size on Various MANET Routing Protocols

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ABSTRACT

MANET is a peer to peer, multi-hop mobile wireless networks in which packets are transmitted in store and forward manner from source to destination. When processing the packets from one node to another node packet size is very important parameter because changing the packet size effect the performance of the MANET network. Aim of this research paper to analyze the effect of packet size in MANET network. We analyze the MANET network for three routing protocols AODV, OLSR & DSR. For this purpose we take 50 nodes MANET network & each node work as MANET station.

Keywords

MANET, AODV, PACKET SIZE, OLSR, DSR.

1. INTRODUCTION

MANET stands for Mobile Ad-hoc network. Ad-hoc network is a type of network in which packets are delivered to their destination through wireless multi-hop connectivity. Mobile nodes work as a hosts and also work as a router. These nodes relay the traffic to other nodes. MANET have high throughput because it is a type of WLAN which have WLAN sharing capacity and relatively higher bandwidth. In this research paper we discuss we discuss the processing of packets in MANET. In a MANET data is transmitted in form of packets. Packet contains the information of source node, their destination node and other information related to routing of packets. As the packet size increase the data contain in packet increases and overhead bits reduces with respect to data. It is also very important to note that when processing small packet size traffic increases and also network load to transfer same amount of data is also increases. As wireless environment is also very noisy so that whenever data loss takes place due to this noisy environment we need to retransmit of data and large packets more effected with respect small packets so that large packet loss causes more data loss. To analyzing the effect of packet size we vary the packet size of the nodes that generate the traffic and check its effect on various routing protocols. For analyzing we take 50 nodes MANET network and vary their packet size, finally we compare performance for different routing protocols.

2. ROUTING PROTOCOLS

There are various existing routing protocols that can be classified either as a proactive or reactive routing protocol. In case of proactive routing protocol routes are already known and data packets are transmitted through these routes. The advantage of this type of routing protocols is that data is transmitted without delay as the routes are already known, but the disadvantage is that because dynamic nature of MANET mobile nodes change their location every instant so that need regular updates and most of the capacity of channel is waste in routing information. It is very useful where the nodes are stationary or slow moving. On other hand proactive routing protocols are work on demand basis, routes are not already formed, whenever there is need of data transmission the route formation take place and then data transmitted so that there is delay in data transmission, but network load reduces and not need to perform regular updates. Here we discuss three routing protocols AODV, DSR are reactive routing protocols and OLSR is proactive routing protocol.

2.1 AODV (Ad-Hoc on Demand Distance Vector Routing Protocol)

Ad-hoc on demand distance vector routing protocol is a reactive routing protocol. It is having larger delay as compared delay as compared to OLSR routing protocol because OLSR is a proactive routing protocol so that AODV is not suitable for real time operations.

2.2 OLSR (Optimized link state routing protocol)

Optimized link state routing protocol is a proactive routing protocol and it has very less delay in packet transmission. As packet size increases throughput increases and delay also increases but it is not too large as in case of DSR. It is suitable for real time applications.

2.3 DSR (Destination source routing)

Destination source routing is a reactive routing protocol. It has larger delay as compared to the OLSR & AODV but when increasing packet size after specified limit delay in packets increases sharply.

3. WLAN PARAMETERS

Different wireless LAN parameters and all other important parameters are given below in table. We analyze the network for different routing protocols ad different packet size.

Table 1: Various important parameters set in different scenarios

SIMULATION PARAMETERS	
No. Of Nodes	50
Playground size	740m*370m
Simulation time	600 sec
ROUTING MAC PROTOCOL	
Routing Protocol	AODV,OLSR,DSR
MAC Protocol	802.11b
Data Rate	11Mbps
MOBILITY PATTERN	
Mobility type	--NA--
Speed	--NA--
Pause Time	--NA--
RADIO CHARACTERISTICS	
Transmitted Power	5mW
Packet Reception Power Threshold	-95dBm
MANET TRAFFIC GENERATION PARAMETERS	
Start Time	10 sec
Packet Inter Arrival Time	Exp(1) sec
Packet Size	256, 512, 1024, 2048, 3072, 4096, 8192 bits

4. DATA ANALYSIS THROUGH SIMULATION RESULTS

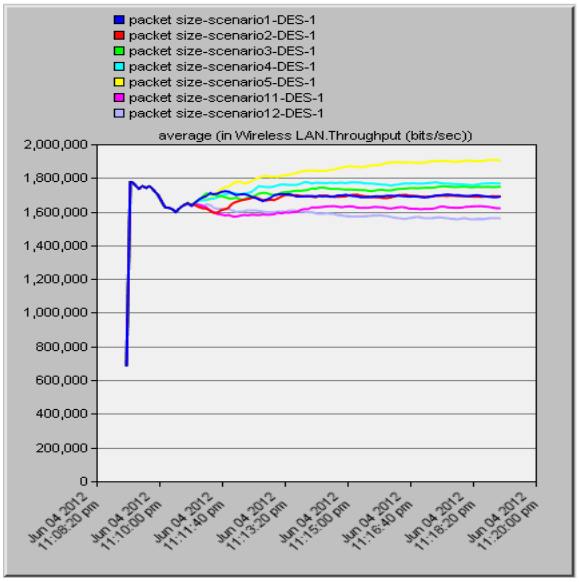

Fig 1: OLSR throughput for different packet size

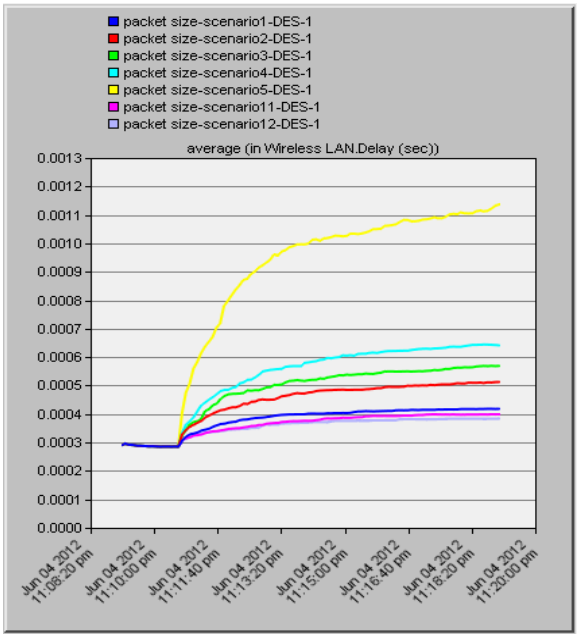

Fig 2: OLSR delay for different packet size

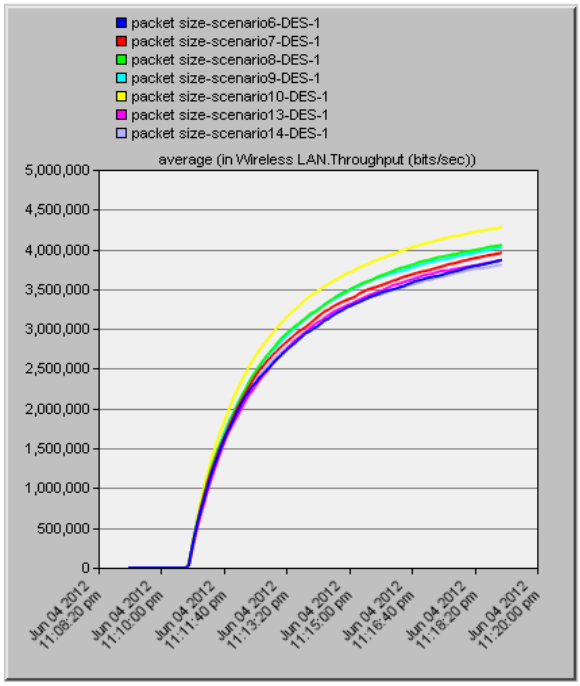

Fig 3: AODV Throughput for different packet size

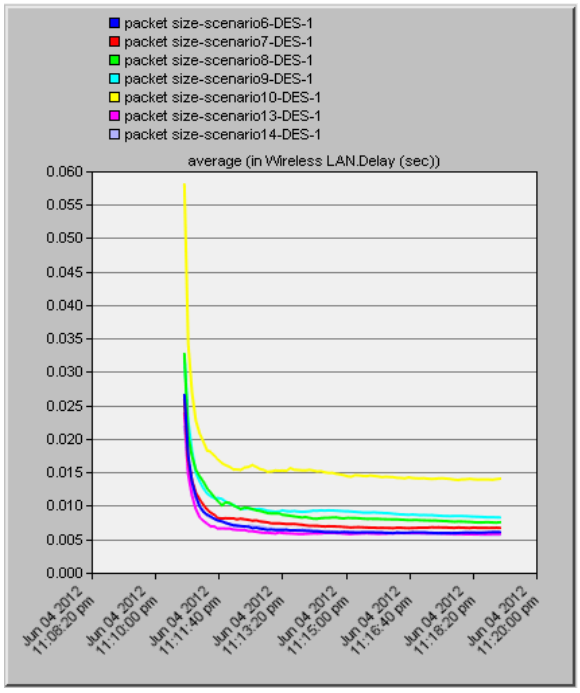

Fig 4: AODV Delay for different packet size

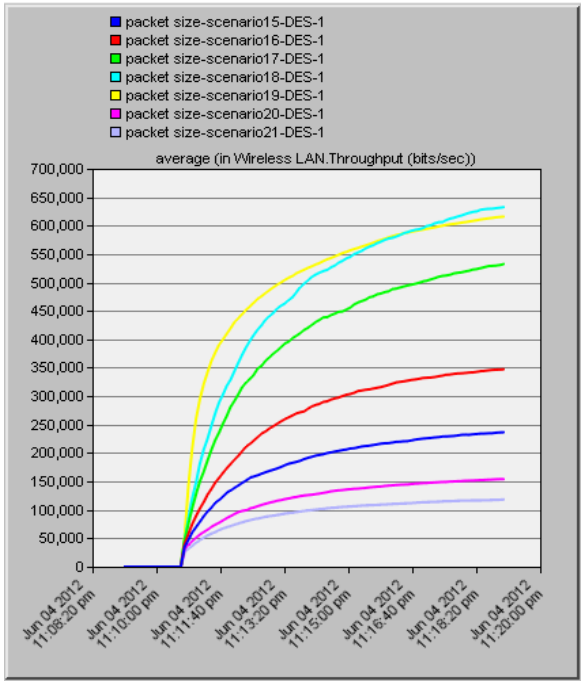

Fig 5: DSR Throughput for different packet size

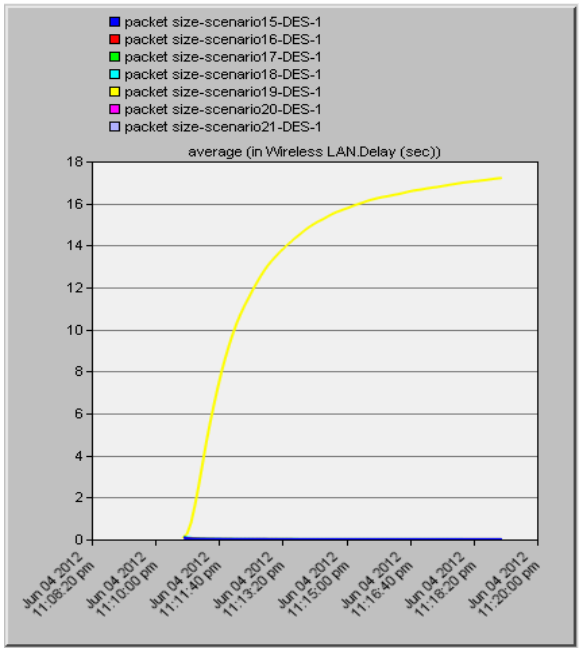

Fig 6: DSR delay for different packet size

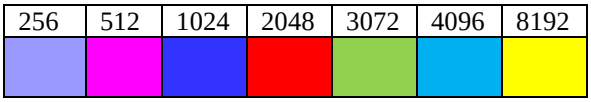

Fig 7: Color Code for different packet size

As shown in above results that packet size varies from 256 bits to 8192 bits. When processing small packets it takes less time to transmission but need to more packets to transfer same amount of traffic. When packet size is small it easily transfers at large distance. In congestion less medium as the load increases with packet size throughput also increases while in case of congested medium when load increases throughput decreases. Wireless environment is very noisy so if the packets corrupt due to noise environment, corrupted packets need to be retransmitted. So that as the packet size increases causes reduction in throughput when medium is congested.

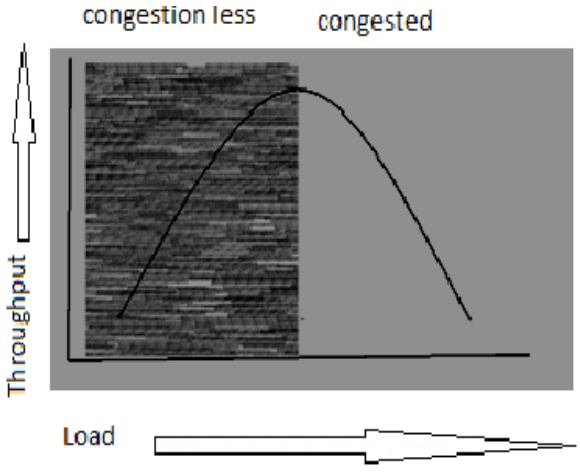

Fig 8: Graph between Load & Throughput in both congestion & congestion less medium

Table 2: Data analysis of different packet size for OLSR

Packet Size	Maximum Throughput (kbps)	Delay (ms)	Data Dropped (kbps)
256	1560	0.38	0.5
512	1640	0.40	1
1024	1700	0.42	2
2048	1700	0.51	12
3072	1740	0.56	24
4096	1780	0.65	39
8192	1900	1.10	108

Table 3: Data analysis of different packet size for AODV

Packet Size	Maximum Throughput (kbps)	Delay (ms)	Data Dropped (kbps)
256	3750	6	4
512	3800	6	6
1024	3800	6.5	10
2048	3950	7	22
3072	4050	7.5	41
4096	4000	8	61
8192	4250	14	165

Table 4: Data analysis of different packet size for DSR

Packet Size	Maximum Throughput (kbps)	Delay	Data Dropped (kbps)
256	110	5ms	0.1
512	150	5ms	0.5
1024	240	5ms	0.7
2048	350	5ms	2.6
3072	530	5ms	2.6
4096	620	5ms	4.2
8192	610	17s	118

From the results it is clear that for OLSR routing protocol have very less delay, when packet size is 1024 bits it is having optimized value of throughput, delay & data dropped. As when increasing packet size 2048 bits it have same throughput but data dropped increases 6 times. AODV routing protocol have much larger delay in comparison of OLSR and have higher data dropped. For packet size of 512 bits it has optimized value of throughput, delay & data dropped. Throughput of DSR is much smaller in comparison of OLSR & AODV.

5. CONCLUSION & FUTURE WORK

From the data analysis of results it is clear that OLSR having very less delay but AODV have higher throughput for same packet sizes. So for real time operations OLSR is best routing protocol and for high traffic AODV is best routing protocol. Each routing protocol has optimized value of packet size for which its performance is best. Such as in case of AODV 512 bits is best packet size and for OLSR 1024 bits is best packet size. These all values are f or congestion less medium, in congested medium higher packets causes high load and they are dropped so that wireless medium have very noisy environment packet size is very sensitive. In future we can analyze the packet size of Wi-MAX based MANET.

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