PERFORMANCE ANALYSIS OF MANET AND WLAN USING DSR PROTOCOL

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Abstract

Dynamic Source Routing (DSR) is an efficient on-demand routing protocol for mobile ad-hoc networks (MANET). It depends on two main procedures: Route Discovery and Route Maintenance. Route discovery is the procedure used at the source of the packets to discover a route to the destination. Route Maintenance is the procedure that discovers link failures and repairs them. In this research paper the comparison of WLAN and MANET is done using DSR protocol.

Keywords- MANET; WLAN; Routing protocols; DSR

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1. Introduction

Mobile Ad-hoc Network (MANET)

MANET is a kind of wireless ad-hoc network and it is a self-configuring network of mobile routers (and associated hosts) connected by wireless links – the union of which forms an arbitrary topology. The routers, the participating nodes act as router, are free to move randomly and manage themselves arbitrarily; thus, the network's wireless topology may change rapidly and unpredictably. Such a network may operate in a standalone fashion, or may be connected to the larger Internet [1]. A Mobile Ad-hoc Network (MANET) [2] is a temporary wireless network composed of mobile nodes, in which an infrastructure is absent. Nodes in these networks utilize the same random access wireless channel, cooperating in a friendly manner to engaging themselves in multihop forwarding. The node in the network not only acts as hosts but also as routers that route data to/from other nodes in network. Generally there are two distinct approaches for enabling wireless mobile units to communicate with each other:

Infrastructure

 Wireless mobile networks[3] have traditionally been based on the cellular concept and relied on good infrastructure support, in which mobile devices communicate with access points like base stations connected to the fixed network infrastructure. Typical examples of this kind of wireless networks are GSM, WLL, WLAN, etc.

Infrastructure less

 In infrastructure less approach, the mobile wireless network is commonly known as a mobile ad hoc network (MANET). A MANET[3] is a collection of wireless nodes that can dynamically form a network to exchange information without using any pre-existing fixed network infrastructure. This is very important part of communication technology that supports truly pervasive computing, because in many contexts information exchange between mobile units cannot rely on any fixed network infrastructure, but on rapid configuration of

wireless connections on the fly. Wireless ad hoc networks themselves are an independent, wide area of research and applications, instead of being only just a complement of the cellular system

The main features of MANET are listed some as below:

1. MANET can be formed without any pre-existing infrastructure.

2. It follows dynamic topology where nodes may join and leave the network at any time and the multi-hop routing may keep changing as nodes join and depart from the network. It does have very limited physical security, and thus increasing security is a major concern.

3. Every node in the MANET can assist in routing of packets in the network.

4. Limited Bandwidth & Limited Power.

TYPES OF ROUTING IN MANET:-

- Proactive routing protocols

- Reactive routing protocols

- Hybrid routing protocols

2. Dynamic Source Routing Protocol(DSR)

Dynamic source routing protocol abbreviated as DSR[7] is also a reactive protocol. The Dynamic Source Routing (DSR)[3], [4] is one of the purest examples of an on-demand routing protocol that is based on the concept of source routing's used to updates its route caches by finding new routes. It updates its cache with new route discovered or when there exist a direct route between source and destination node [5]. When a node wants to transmit data, it defines a route for the transmission and then starts transmitting data through the defined route [3]. In the DSR protocol, source node sends the routing request (RREQ) packets by means of flooding technology [3]. Each RREQ packet includes source node address (Sid), destination node address (Did) and the unique request sequence number (Request ID) [5]. An advantage of DSR is that nodes can store multiple routes in their route cache, which means that the source node can check its route cache for a valid route before initiating route discovery, and if a vali route is found there is no need for route discovery [5]. This is very beneficial in network with low mobility [5]. Since they routes stored in the route cache will be valid longer. Another advantage of DSR is that it does not require any periodic beaconing (or hello message exchanges), therefore nodes can enter sleep node to conserve their power [5]. This also saves a considerable amount of bandwidth in the network [6]. The Dynamic Source Routing protocol (DSR) [6] is a simple and efficient routing protocol designed specifically for use in multi-hop wireless Ad- hoc networks of mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is composed of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to arbitrary destinations in the ad hoc network.

3. SIMULATION

In this paper the comparison of WLAN and MANET is done using DSR with the help of OPNET MODELER 14.0.The OPNET SIMULATOR is used to analyse the parameters like throughput and delay on 50 nodes

SIMULATION ON DIFFERENT NETWORKS

3.1 DSR Protocol in WLAN

Variation of Data Packet End-to-End Delay for DSR Protocol

Fig1. shows variation of data packet delay for DSR protocol .the variation in voice packet delay is around 0.0058 seconds
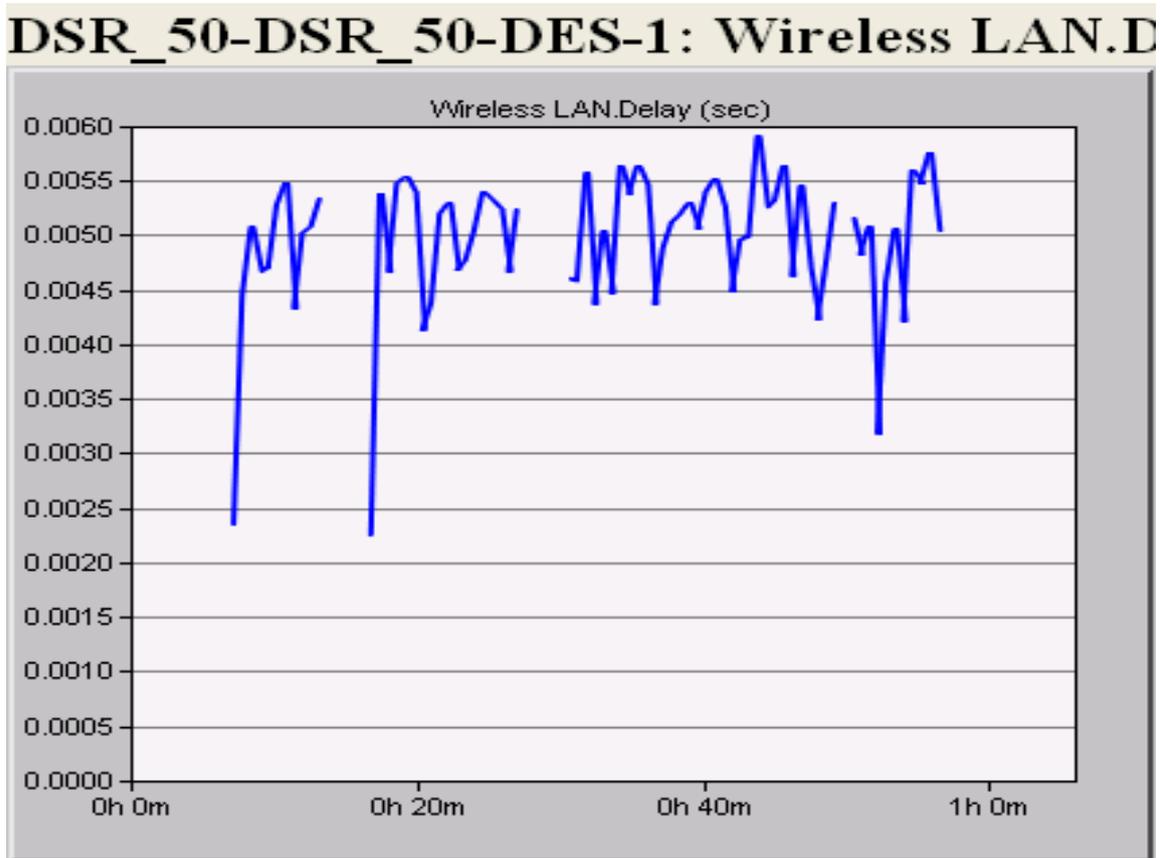

Fig1: Figure Variation of Data Packet End-to-End Delay for DSR Protocol

Variation of WLAN Throughput in bits/sec for DSR Protocol

Fig.2 variation in throughput in bits per second, it has been concluded that maximum value of throughput comes out to be 19000 bits per second for DSR protocol..
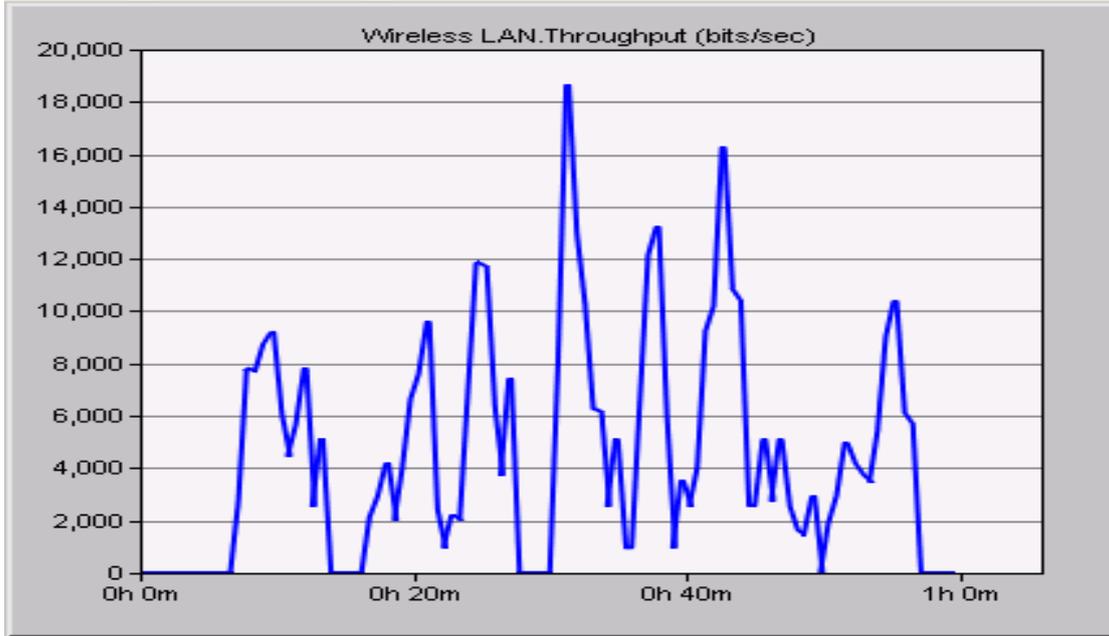
Fig2: Variation of WLAN Throughput in bits/sec for DSR Protocol

3.2 DSR Protocol in MANET:-

Variation of Data Packet End-to-End Delay for DSR Protocol

Fig3.shows variation of data packet delay for DSR protocol .the variation in data packet delay is around 0.0063 seconds.
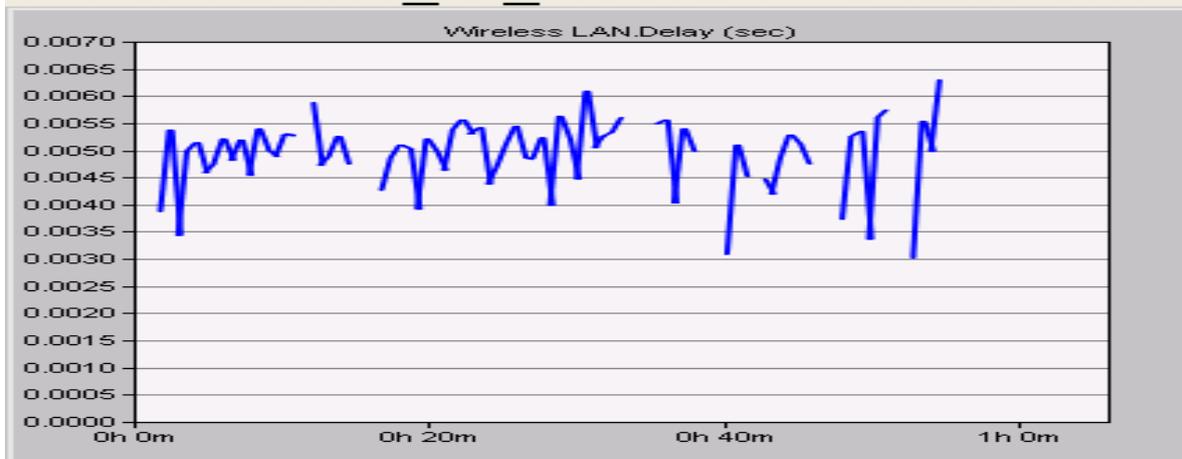

Fig.3: Variation of Data Packet End-to-End Delay for DSR Protocol

Variation of MANET Throughput in bits/sec for DSR Protocol

Fig.4 shows throughput in bits per second and packets per second for DSR protocol. its maximum
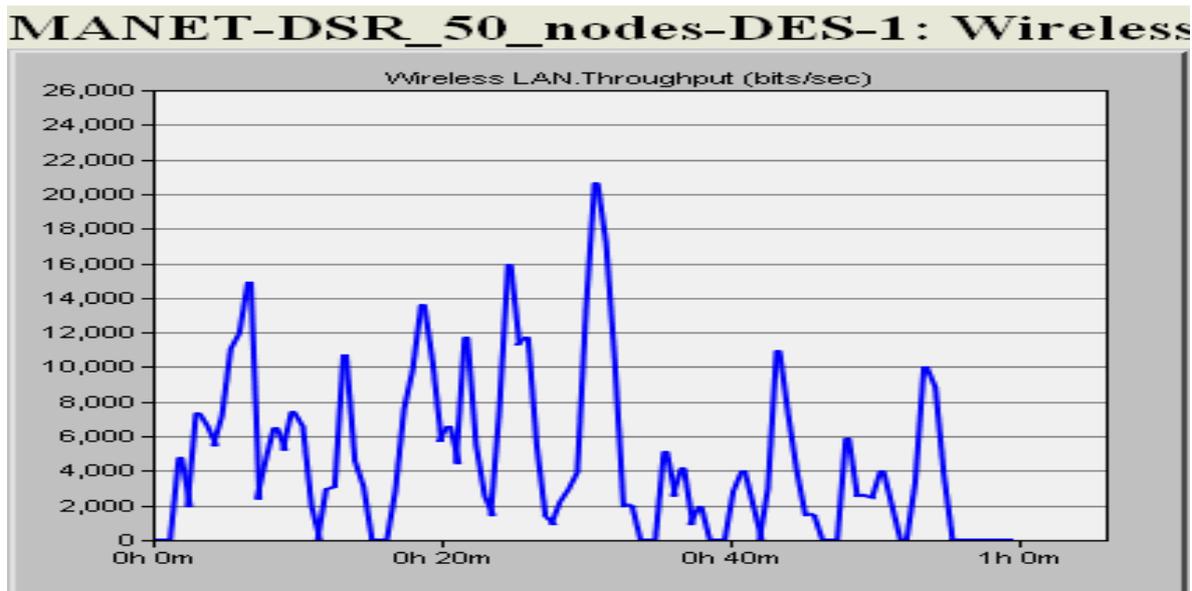
value is around 21000 bits per second.

Fig.4: Variation of MANET Throughput in bits/sec for DSR Protocol

4. Conclusion

In this paper, WLAN and MANET static networks have been developed for 50 nodes and each network has been configured for static data transmission. The network performance has been compared for DSR protocols using QoS parameters like, Throughput and end to end packet delay. Both the networks show their superiority for different parameters and selection of parameters can be done on the basis of system requirements.

        From the results, it has been concluded that data delay in WLAN and MANET for DSR protocol less in MANET. Hence from simulation results it has been conclude that DSR protocol is not suitable for WLAN in terms of data packet delay.

        Throughput analysis shows that performance of WLAN for DSR protocol is better as compared to MANET. Results also show that in terms of throughput the performance of DSR protocol is better for the MANET as compared to WLAN.

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