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Performance of Overall Gain in the Network by Varying Antenna Transmission Power with the Different Pause Time

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Abstract

The characteristic of changing topology without a fixed infrastructure and lacking of any centralization is mobile adhoc networking (MANET).The communication between mobile nodes uses multihop wireless links. In the network; nodes act as router and forwarding data packets to other nodes behaving as intermediate node. Routing protocols plays an important role to facilitate communication within the network. In this paper we have compared different transmission power by varying antenna height. Simulation results shown in AODV routing protocol in term of the metrics: Throughput, Average end to end delay, Average jitter. The results are showing various changes due to change in the selected parameters, which are performance parameters of the network.

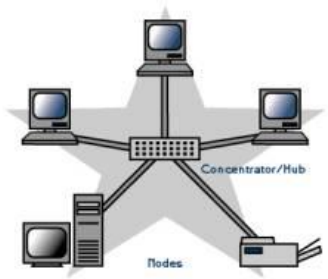
Keywords*: MANET, AODV , RWP (Random way point), Qualnet 5.2*

1. Introduction

To evaluate the computer network Networks are classified in two categories

A. Fixed Infrastructure Network

The network consisting of fixed infrastructure containing wired access points in their range of transmission. . A wired network is simply a collection of two or more computers, printers, and other devices linked by Ethernet cable.



B. Infrastructure Less Network

This network is also called as MANET. Mobile adhoc networking(MANET) does not rely on the fixed infrastructure for their communication. MANET is self configuring, data packets are passed through their intermediate nodes while moving from source to destination[2] A collection of mobile nodes each having both transmitter and receiver for the communication with the other nodes via wireless links is MANET. In past decades wireless networks are preferred much more than wired network due to its technology development and reduced in costs [1].Generally Adhoc Network gives a problem while communicating with the other nodes . nodes must be in the transmission range of the base

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station as it moves out of its range then network fails[5]. MANET solved this problem in this process nodes follow the multihop patten for communicating with the other nodes. Mostly MANET are used in military communication by soldiers, battlefield, rescue operations, earthquakes, floods, fire, quicker access about patient data records, remote sensor for weather knowledge [3]

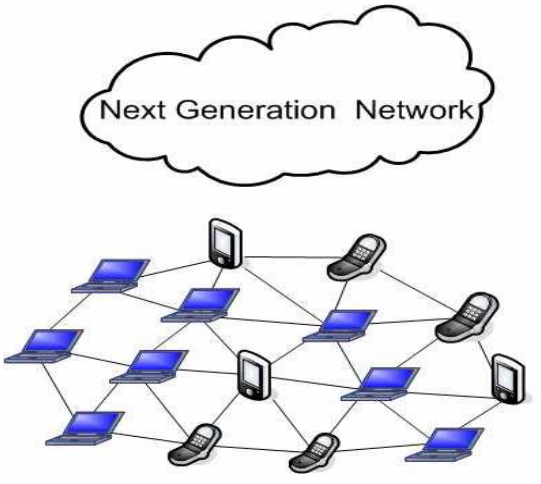

Figure 1. Mobile Adhoc Networking (MANET)

2. Routing Protocol

As MANETs (mobile adhoc networking) is decentralized it changes its network topology frequently so their is big risk of packet loss while transmitting, so routing protocol is used to set up the routes between transmitter and receiver. Routing protocols are classified according to their routing strategy.

A. Proactive Routing Protocol

B. Reactive Routing Protocol

A. Proactive or Table Driven Routing Protocol

Proactive protocols, is also called table driven as the routes are predefined. Packets usually transferred to these predefined routes [6]. As the routes are predefined the packets can be forwarded immediately. Each nodes stores the updated information whenever there is change in its network topology.

For eg. Destination sequenced distance vector routing (DSDV)

B. Reactive or On-demand Routing protocol

Reactive or on-Demand Routing protocols. In this routes are not predefined[6]. In this reactive protocols, Nodes maintain there routes on the on-demand process to send its packets to the destination. Nodes sends its packets to all the neighbor or intermediate nodes and this technique is repetitive until packets are reached to its destination.

For *eg*. Adhoc on-Demand Routing protocol (AODV), Dynamic source Routing (DSR)

B.1. Adhoc on-demand Distance Vector Protocol (AODV)

AODV is a pure on-demand route acquisition system, as nodes maintain there own routes by sending Hello messages to the other nodes. These Hello messages are also called as route request (RREQ) in this route request are broadcasted to the other nodes. If node has a valid route [7] from source to destination then only nodes reply to this request

by sending Route reply (RREP) messages and so on this process continue up till the routes are discovered when this RREP is received then the nodes starts forwarding data. When nodes receive route error (RERP). If data is being forwarded and a link break is detected[7] a route error (RERR) is sent to the source of the data in hop by hop. When node receives RERR it invalidates the route and reinitiates.

3. Simulation Setup

The Qualnet 5.2 simulator is used for the analysis process, Qualnet is a 3d simulator in which the comparative study and analysis is done. The design of the scenario is random in which constant bit rate (CBR) is applied between source and destination. The random waypoint model of the mobility is used in the scenario. The simulation parameter used in the scenario is shown in the table 1.

Table1. Simulation Parameters

Parameters	**Value**
Simulator	Qualnet 5.2
Terrain area (m*m)	1500*1500
Routing protocol	AODV
No. of nodes	50
CBR	3 (Bidirectional)
Mobility	Random waypoint
Pause time	10,15,20,25,30
Simulation time	300 sec
Antenna height	1.5m
Transmission power in dBm	10dBm ,13dBm, 16dBm

3.1. Performance Metrices

Some of the important performance metrices can be evaluated

Throughput

Throughput is the average rate of all the successful data packets received by the destination from source . this is measured in bits/sec

$$Throughput = \frac{Total\ packet\ received}{total\ packet\ sent}$$

Average end to end delay

The delay in the average time, reception of data packet at destination forwarded by source is end to end delay. It includes all possible delays caused by buffering during route discovery latency, retransmission delay. This is calculated by the formula

$$D = (T_R - T_S)$$

Average jitter

Jitter is the variation of the packet arrival time. The packet arrival time is low, for the better performance in ad-hoc networks delay between the different packets should be low.

$$Average\ end\ to\ end\ delay = \frac{\sum(Arrival\ time - sent\ time))}{Total\ no.of\ connections}$$

4. Simulation Analysis and Discussion

The simulation result are shown in the form of graph

Throughput - It is evident from the result graph that throughput of overall network for the transmission power of 16DBm is better than that of transmission power 10DBm and 13DBm in the Routing protocol AODV. Since more the transmission power more the reception of data packets at the destination.

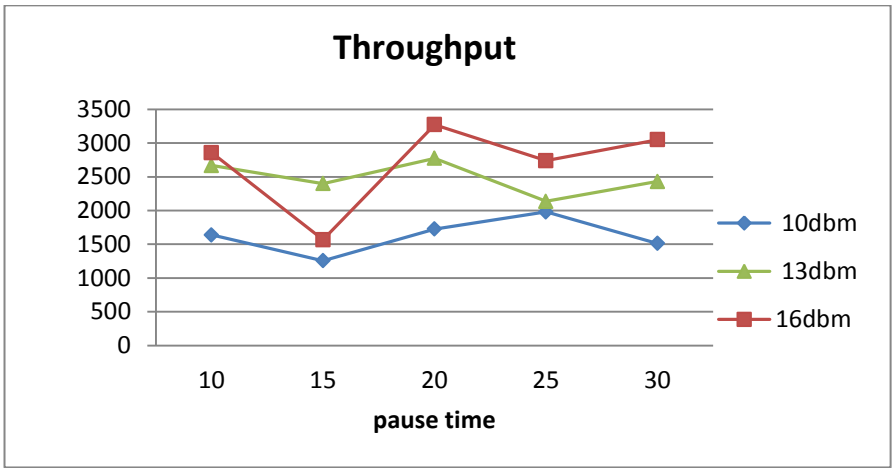

Figure 2. Throughput (Bits/sec)

Average end to end delay - Delay in the average time when the packet are delivered from source to destination is average end to end delay. In the analysis it is observed that transmission power of 16dBm has less average end to end delay in comparison to other transmission powers. Because more the transmission power less will be the delay in packets delivery

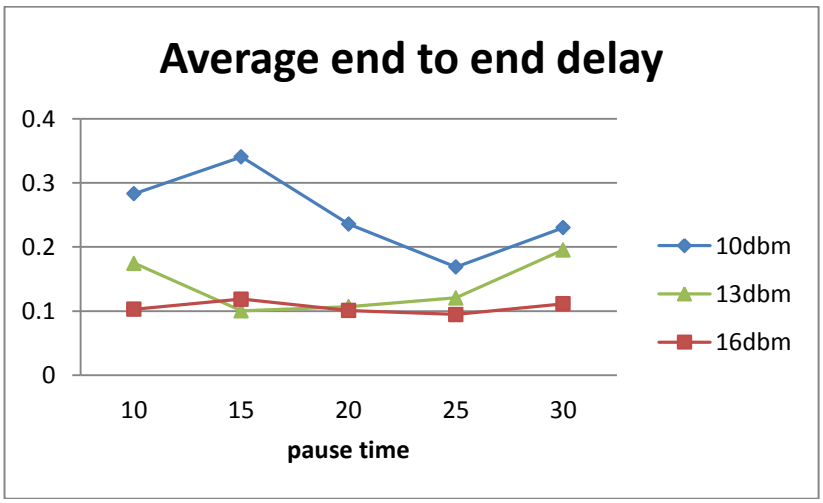

Figure 3. Average End to End Delay

Average jitter – This is the very important metric for any routing protocol to check the variation of packet arrival time. In this analysis the average jitter is less in transmission power 16dBm due to less time in arrival to packets in given time than 10 dBm, 13dBm

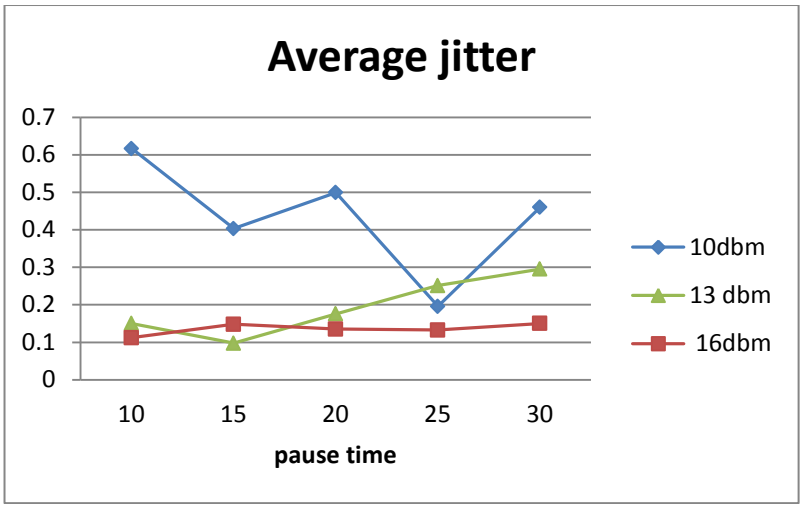

Figure 4. Average Jitter

5. Conclusion

It is observed in the analysis that the transmission power of 16 dBm for over all network is better than that of the transmission power 10dBm and 13dBm in every performance metrics. Gain in the overall network is good when the high transmission power is given to the antenna. As the transmission power increases drop in the data packets and delay in the time of reception of the data packets reduces.

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