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Design and Simulation of Mobile Ad Hoc Network for Multiple Mobility Management

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Abstract: *Now a days many countries are facing a serious problem of mobile signal strength. It has also become a major issue in many parts of the world. In order to solve this problem use of MANET (mobile ad hoc network) through WiMAX has popularized. In this paper I will show the complete scenario of MANET network. In this three conditions are included: when the users are fixed, when the users are movable away from the base station and the last one is when the users are movable towards the base station. These three conditions are shown one by one by routing protocol both AODV and DSDV and results are simulated with NS2.*
Keywords: *AODV, Ad hoc network, DSDV, MANET, NS2, Simulation, WiMAX*

I. Introduction

1.1 Mobile Ad Hoc Network(MANET)

Mobile Ad hoc network is a group of wireless equipments knows as wireless nodes, that vigorously links and transmit information .Wireless nodes can be personal computer with wireless LAN card, Personal digital assistant (PDA) or additional types of wireless or mobile communication equipments. A wireless node in general is any computing device that utilizes the air as broadcasting medium.

Fig.1 In this fig we can see there is one base station, through which all the devices like mobiles and laptops are connected. Base station transfers the data to all devices.

In MANET, a wireless node can be the basis, the target, or transitional node of data broadcasting . A node playing the task of in between node, functions as a router that can obtain and forward data packets to its near the objective node. The nature of Ad hoc is the reason because of which wireless nodes have a propensity to keep moving in place of being still. Consequently, the network topology alters from time to time.

1.2 WiMAX

Worldwide interoperability microwave access includes wireless standards initially formed to give 30-40 megabit/second data rates and after having 2011 update it allocates up to 1 gigabit/second for stationary stations. It was named WIMAX by WIMAX Forum which started in June 2001 led and forwarded the conformity and interoperability of standard IEEE 802.16 or wireless man advanced is nominee for the 4G, in contest with LTE advanced.

1.3Conditions Related To MANET

In this scenario of MANET, there are eight nodes out of which four users are there, three are relay stations and one is base station.

1) When users are fixed- In this the base station is fixed along with relay station and users i.e. the users are fixed on their position and neither move towards the base station nor away from it.

2) When the users move towards the base station- In this the base station and relay stations are fixed however, the users are in continuous motion towards the base station. Time the user takes to reach to the base station depends on the speed which might be defined by us. It can be changed as per users wish.
3) When the users are moving away from the base station- In this the users are continuously moving away from the base stations but the base and relay stations are fixed. The time taken depends on the speed of the user defined earlier.

II. Protocols Used

Here we use two protocols the first one is AODV and the other is DSDV.

2.1 Aodv

AODV is a routing protocol for Ad hoc mobile networks with many mobile nodes. AODV stands for Ad hoc on demand distance vector. As its name suggests it creates routes on demand by the users. Thus, it is a reactive protocol. The information about the next hop to the destination and the sequence number is obtained from the destination are stored by routing table showing the freshness of information obtained.

Furthermore the information about the lively neighbors is collected throughout the discovery of the target host. When the equivalent route breaks, then the neighbors can be notified. The avoidance of source routing decreases the routing burden in a large network. It is the main advantage of AODV. In addition another useful feature of AODV is its application of enlarging ring search to manage the deluge of RREQ (Route Request) packets and look for routes to strange destinations. Along with this it also supplies destination sequence numbers, permitting the nodes to have up to date routes.

On the other hand few nodes have to be taken into concern when using AODV. Firstly, it needs bidirectional links and periodic link layer acknowledgements to become aware of broken links. Then, it needs to sustain routing tables for maintenance unlike DSR.

2.2 Dsdv

It stands for Destination sequenced distance vector routing. It creates routes automatically and is active all the time. It checks for updates itself without users demand. DSDV requires more data packets than AODV. It adds attributes, sequence number, to each route table entry of the conventional routing information protocol (RIP). Utilizing the initially linked sequence number, the mobile nodes can differentiate stale route information from the latest and thus prevent the formation of routing loops.

In DSDV, every mobile node belonging to an ad hoc network sustains a routing table, which registers all existing destinations, the metric and next hop to each destination and a sequence made by the destination node. Using such routing table which is piled up in each mobile node, the packets are broadcasted between the nodes of an ad hoc network. Sporadically routing table is updated with advertisement by nodes on an ad hoc network or when important new information is available to sustain the stability of the routing table with the vigorously altering topology of the ad hoc network.

At times or at once when network topology modification are sensed, each mobile node advertises routing information using transmitting or multicasting a routing table update packet. The update packet launch out with a metric of one to direct connected nodes.It shows that each neighbor is at a distance of one metric (hop) from the node. It is dissimilar from that of the conventional algorithm. After having the update packet, routing table is updated by the neighbor with rise in the metric by one and recovery the update packet to the equivalent neighbors of each of them.

This process will be go over till all the nodes of Ad hoc network get a copy of the update packet with a equivalent metric. Before updating routing table and retransmitting the update packet for each destination node, the update data is maintained for a short time till the arrival of the best route. If a node obtains more than one update packets for the same destination during waiting time duration, the routes with more fresh sequence numbers are always chosen as the source for packet forwarding decisions. If the update packet with same sequence number is found with the same node, then the update packet with the smallest metric is utilized and the existing route will be deleted or stored as less favorable. Interpreting the advertisement of probably unstable root can moisten the rise and fall of the routing table and decrease the number of retransmission of possible route entries that enter in with same sequence number.

III. Simulation Parameter

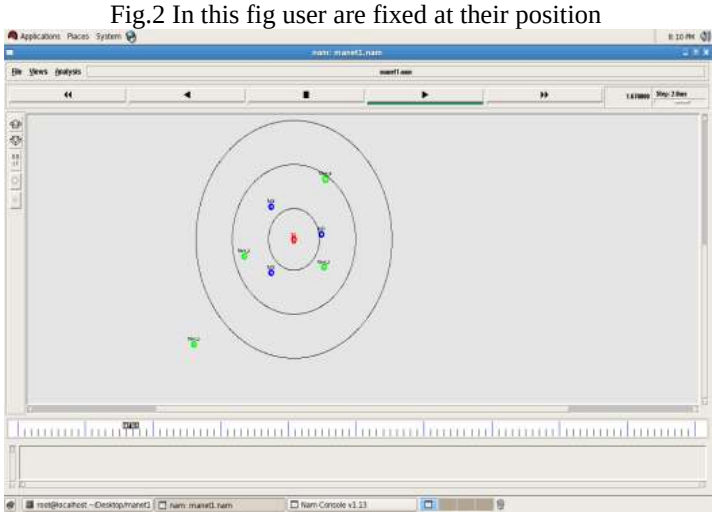
Parameter	Description
1.Channel	Wireless
2. Radio propagation	Two ray ground
3.Network interface	Wireless physical
4. Mac type	802.16
5. Interface queue	Drop tail/pre queue
6. Antenna type	Omni directional
7. Routing protocol	AODV & DSDV
8. Packet size	1000 byte
9. Nodes	8
10. Area	500/500

Table.1 shows simulation parameters and their description. It shows channel type, protocols, packet size and other parameters.

IV. Simulation Result

The simulation results are shown below.

Fig.2 In this fig user are fixed at their position



In this figure the red point shows base stations or server, the blue ones are relay stations and green ones are users. We can see in above diagram, users are fixed at their position i.e. they can't move towards or away from the base station. And black circle indicates the coverage area.

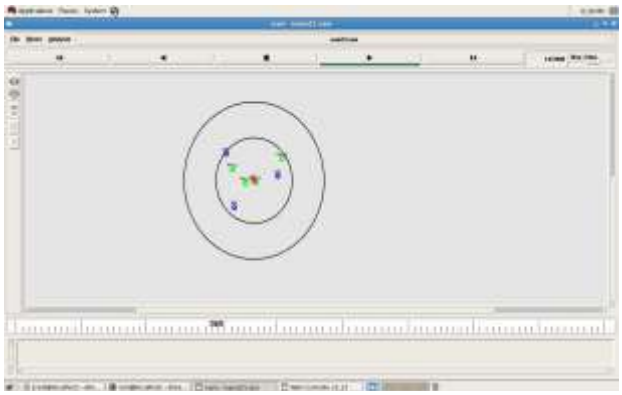


Fig. 3 In this fig we can see that the users are moving towards the base station

In this figure the red point shows base stations or server, the blue ones are relay stations and green ones are users .We can see in this diagram users are moving towards the base station. And black circle indicates the coverage area.

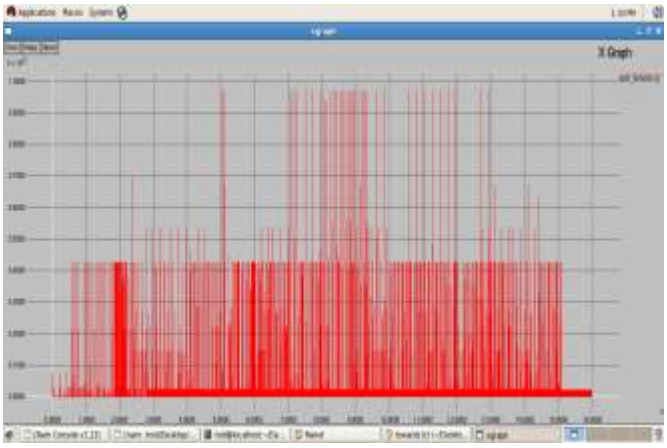


Fig. 4 this graph shows that what happens when the users moving towards the base station in AODV

Fig 4 Indicates the graph between the simulation on X-axis and delay time on Y-axis which indicate that the maximum delay of the condition in which user are moving towards the base station for AODV protocol is about 97 µ sec and each vertical red colour line indicates the delay of each packet therefore the total number of lines shoes the number of packet communicated in the network which is design using AODV protocol.

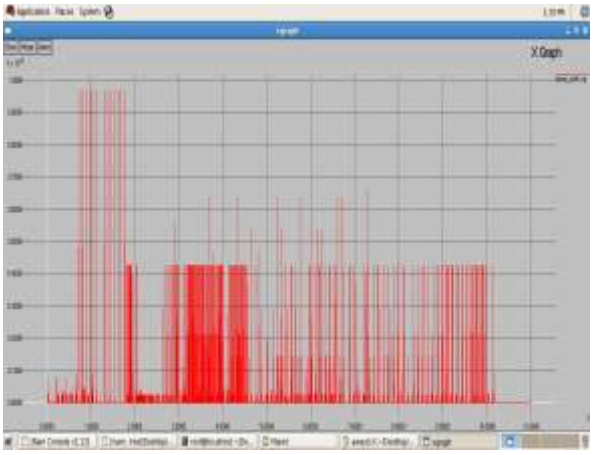


Fig.5 this graph shows that what happens when the users moving away from the base station in AODV

Fig 5 Indicates the graph between the simulation on X-axis and delay time on Y-axis which indicate that the maximum delay of the condition in which user are moving towards the base station for AODV protocol is about 98 µ sec and each vertical red colour line indicates the delay of each packet therefore the total number of lines shoes the number of packet communicated in the network which is design using AODV protocol.

Fig 6 Indicates the graph between the simulation on X-axis and delay time on Y-axis which indicate that the maximum delay of the condition in which user are moving away from the base station for AODV protocol is about 98 µ sec and each vertical red colour line indicates the delay of each packet therefore the total number of lines shoes the number of packet communicated in the network which is design using AODV protocol.

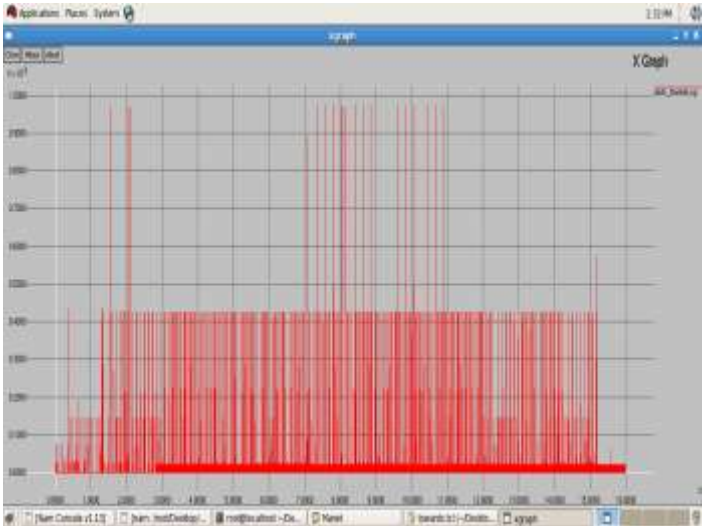


Fig. 6 this graph shows that what happens when the users moving towards the base station in DSDV

Table. 2 shows the results for AODV protocol when users are moving towards the base station.

Average Throughput	797.6480 kbps
Total packet sent	1720
Total packet received	1474
Packet delivery ratio	85.697674 %
Packet loss ratio	14.302326 %

Table. 3 shows the results for AODV protocol when users are moving away from the base station.

Average Throughput	1678.0190 kbps
Total packet sent	2375
Total packet received	1977
Packet delivery ratio	83.242105 %
Packet loss ratio	16.757895 %

Table.4 shows the results for DSDV protocol when users are moving towards the base station

Average Throughput	657.1686 kbps
Total packet sent	1720
Total packet received	1223
Packet delivery ratio	71.104651 %
Packet loss ratio	28.895349 %

V. Conclusion

From the above all result we can conclude that if the mobile user are fix or moving towards the base station then the signal strength will increase and high signal to noise ratio obtain due to which we got maximum packet delivery and less packet loss for AODV as well as DSDV protocol. But if the mobile user moves away from the base station then the strength of the signal decreases and the result for both the protocols are degrade than other two scenarios.

VI. Future Work

In the upcoming days we will be able to implement more nodes in MANET. The number of base stat ion, relay station and users would be increased. Recently in this paper I have used AODV and DSDV routing protocols but in future we would be implement by many other protocols.

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