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AODV and ZRP Analysis for Congestion in MANET

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***Abstract*: MANET is a field of remote versatile node that deals with communication of the nodes using ad-hoc networking. In this process transitional nodes have been deploy for packet forwarding. In this paper we have analyzed different scenario for congestion avoidance in MANET by different routing protocol so that better performance can be achieved. AODV and ZRP protocol has been computes varying speed at each scenario transmission. On the idea of speed throughput, end to end delay, queue length, packet drop. Proposed method offers various deserves in MANET communication. On the basis of these consequences we will say that proposed approach offer an awful lot higher outcomes.**

***Keywords*: Ad-hoc on Demand Distance Vector (AODV), Zone Routing Protocol (ZRP), Congestion.**

1. Introduction

Mobile ad hoc network (MANET) is self-regulated network fabricate by mobile devices that doesn't transmit in any fixed foundation. MANET hubs will be personal devices like mobile phones, personal digital assistance (PDA's) and laptops. Hubs in MANET will move freely at intervals transmission varies of network for broadcasting take place and hubs that are outside the transmission change/differ of network cannot participate in broadcasting [1].

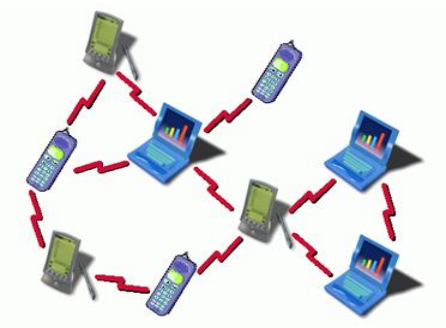

Fig. 1. Adhoc network

Devices in MANET will communicate directly if each start and end devices are in direct transmission range. Devices that isn't in direct transmission vary will communicate with the assistance of intermediate hub that works as switch for forwarding packets, it implies that devices in MANET not simply/uniquely works as end system however conjointly /collectively as router for forwarding route request, reply packets and information packets that helps in communication. MANET reduces the cost and time of network setup and administration. This may have several applications particularly as well as military and emergency services [2].

2. Classification of Routing Protocols

Routing protocols define a set of rules which governs the journey of message packets from source to destination in a network. In MANET, there are exceptional kinds of routing protocols every of them is applied consistent with the community circumstances.

A. Reactive routing protocols

Reactive routing protocol is also referred to as on demand routing protocol. On this protocol path is discovered on every occasion it is needed nodes initiate course discovery on demand basis. Source node sees its path cache for the to be had course from source to vacation spot if the course isn't available then it initiates path discovery manner. The Reactive routing protocols have two major additives example DSR, DSDV, AODV [3].

B. Hybrid routing protocol

Hybrid routing protocol in addition to proactive and reactive routing protocols, any other magnificence of unicast routing protocols that can be diagnosed is hybrid protocols. The area-based hierarchical link-state routing protocol (ZRP) is an instance of a hybrid protocol that combines both proactive and reactive procedures, for that reason seeking to deliver collectively the advantages of the 2 techniques. ZRP defines around each node a region that carries the associates inside a given quantity of hops from the node [4].

C. Challenges in MANET

Scalability: A network has some limiting parameters like its size and traffic rate. But the ability of network to sustain its performance even with the increase of these parameters is

known as scalability [5].

Mobility: Mobility means competence to sustain the network while nodes of the network keep changing their location. There exist four popular models to support mobility i.e. random way point, random point group mobility, Manhattan mobility model and freeway mobility model. We have selected Random Waypoint Model in our research work. In this model, there is a uniform distribution of velocity from zero to max (max is the highest velocity which can achieve by any node), which is randomly chosen by a node to reach any arbitrary location. The pause time parameter decides the duration of node to stop after reaching arbitrary location.

Congestion: Congestion is a state of affairs in communication networks wherein too many packets are found in a part of the subnet. Congestion may also occurs when the burden at the community (wide variety of packets send to the community) is greater than the ability of the network (wide variety of packets a network can cope with). Congestion close in bandwidth degradation, packet losses, power and waste time on congestion regaining [6]. In internet while congestion occurs it is typically focused on a single router, whereas, because of the shared medium of the MANET congestion will no longer overload the cellular nodes however has an impact on the whole insurance are [7].

3. Literature Review

[1]. Manish Kumar et.al – A Mobile Ad hoc Network is a network which does not need any infrastructure and configures itself by wireless link for communication of mobile nodes. In this research they work on mobility and scalability by varying nodes, network size in MANET routing protocol. They work on AODV, DSR and OLSR protocols in MANET by varying different parameters and compare all and found OLSR is better than AODV and DSR researcher take OPNET for this simulation. This research says that performance varies from protocol to protocol with mobility and scalability in the network.

[2]. Kiyotaka Kaji et.al - MANET is a useful in many practical scenario since it provide multihop communication without wired infrastructure. In this research they proposed to adaptive reroute packet to divergence congestion area in MANET. To divergence packets when they meet the congested area using only an additional header field and one additional routing table. The divergence routing table is computed from the 2-hop neighbor information so that we can add the detour function to any type of shortest-path-based routing protocol by periodical hello message exchange. Simulation results say that proposed work improve the communication performance in MANET.

[3]. Suveg Mudgal et.al - In this research, we have studied the problem of load balancing and energy efficiency. We have presented an alternative approach to select primary path in a multipath algorithm based on load, residual energy and delay. For calculating load, they take queue length as a parameter and residual energy is calculated by total energy minus consumed energy at any time. They run the simulation using ns2 simulator by integrated the proposed mechanism with AOMDV protocol resulting I-AOMDV & performed simulation. After comparing the result I-AOMDV protocol improves overall performance of network as compared to original AOMDV.

[4]. Prachi jain et.al - The observe of MANET is a developing location of studies. Efforts were made for reaching green broadcasting in MANET. In this studies such routing protocols are designed to switch packet from source to destination but by those protocols, packet loss ratio become growth. Numerous routing protocol set of rules also are designed to transfer packets however with the aid of the ones algorithm too packet loss ratio is growth. On this studies they use buffer control to control packet loss in MANET.

[5]. K.C. Kullayappa Naik et- in this paper, the performance of AODV for both heterogeneous m and homogeneous MANET with appreciate to various range of nodes became analyzed and found its simulation overall performance outputs. The result honestly offers the distinction between the homogeneous and heterogeneous networks. The packet loss charge and control overhead parameters have not taken into consideration within the research in real time programs factor of view, the simulation studies of networks having heterogeneous nodes are very crucial. The overall performance of AODV routing protocol in heterogeneous community is better than homogeneous network.

[6]. Subodh Kumar et.al- on this paper performance of different routing protocols such as proactive routing protocols, reactive routing protocols and hybrid routing protocol has been evaluated by using varying number of nodes. Various overall performance parameters are used to analyze the overall performance of protocols under institution mobility like throughput, common jitter and average give up-to-end put off. This research showed that institution mobility has vital effect on the exhibition of all form of routing protocols. Simulation results finish that reactive routing protocol AODV, DSR and DYMO provide better overall performance than proactive and hybrid routing protocol underneath variable range of node density and their mobility.

[7]. Bhawna Ahlawat et.al - this paper discusses numerous routing protocols to investigate congestion trouble in MANET and additionally diverse performance parameters have been evaluated right here like packets transmitted, packets collided, packets that were given into mistakes, throughput and common put off via using AODV (advert- hoc on call for distance vector), DSR (dynamic source routing) and ZRP (area routing protocol) protocols with the aid of taking five, 10 and 20 nodes. On this work, packets transmitted, packets collided, percentage of packets mistakes, throughput and common delay are studied and calculated. They simulated a community framework to research problem of congestion in MANET.

4. Methodology

On this task a comparative analysis of different routing algorithm i.e. ZRP and AODV are finished with various speed for reading congestion and scalability. Purpose of this study is to investigate the throughput, delay, queue period and packet drop via the AODV and ZRP routing protocols via the use of specific parameters.

The simulations had been achieved by using Qualnet simulator. The goal of this work is to research congestion trouble in MANET with the aid of two analyzed routing protocols i.e. AODV and ZRP. This research work basic on specific scenario includes first deciding on the parameters for a MANET, then defining and simulating a fundamental situation and ultimately, by means of varying the chosen parameters, simulate and compare extra cases of varying speed. The chosen cases have been

Case I:

In this case a network scenario is demonstrate in which 50 nodes are taken and analyzed using different speed for congestion control in MANET. The results are demonstrated under varying speed of nodes for AODV and ZRP routing protocols.

Case II:

In this case a network scenario is analyzed using 60 nodes and varying speed of nodes for congestion control in MANET. The results are demonstrated under varying number of speed for AODV and ZRP routing protocols.

Case III:

In this case a network scenario is analyzed for 70 nodes and varying speed for congestion control in MANET. The results are demonstrated under varying node speed for AODV and ZRP routing protocols.

Case IV:

In this case a network scenario is analyzed for 80 nodes with 2500m X 2500m terrain and varying speed for congestion control in MANET. The results are demonstrated under varying speed for AODV and ZRP routing protocols.

5. Experimental Setup and Result Analysis

Performance analysis of different parameters evaluated on the basis of Throughput, Avg.end to end delay, Average queue length, Drops packets. Four performance metrics are analyzed for mobility. Mobility is taken to investigate the congestion possibility in the network.

Table 1
Constant parameters

S. No.	Parameters	Values
1	Simulation Time	600sec
2	Movement Model	Random way point
3	Routing Protocol	AODV,ZRP
4	Send Packets	6000
5	Transmission Range(dbm)	10
6	Queue	RED

Table 2
Parameters for simulations

Parameters	Values
No. of Nodes	70, 80
Terrain	2000m X 2000m, 2500X2500
Max Speed	2,4,6,8,10,12
No. of Traffic Connection	25,30

Case 1. When number of node is 70, Traffic Connection 20 and terrain 2000X2000 the throughput, avg. end to end delay, queue length, drop packets are,

1. Throughput

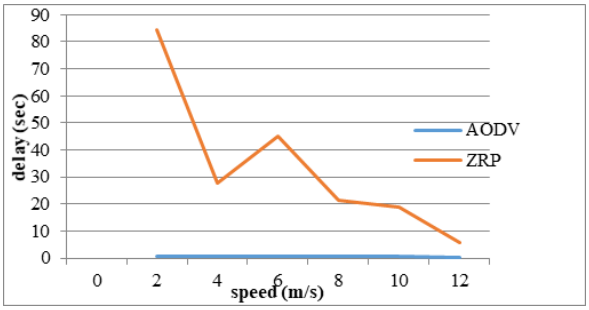

Fig. 1. Throughput vs. Speed

Above fig.1 shows that proposed model using AODV model has increase the throughput value as compared to ZRP algorithm. Dynamic adoption of various situations in AODV has increase the throughput value of network.

2. Avg. End to End Delay

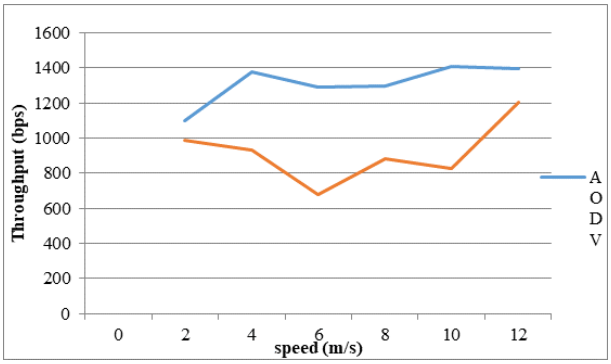

Fig. 2. Avg. end to end delay vs. Speed

Above fig. 2 shows that proposed model using AODV algorithm has reduce the delay time as compared to ZRP algorithm. Dynamic adoption of various situations in AODV has increase the throughput value of network.

3. Queue length

Above fig. 3 shows that proposed model using AODV model has reduce the queue length as compared to ZRP algorithm. Here with increase in speed queue length of ZRP also decreases but AODV queue was quit low.

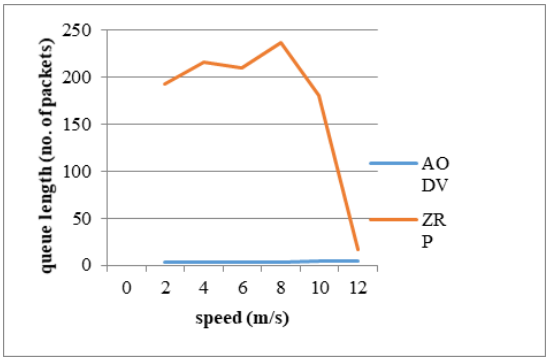

Fig. 3. Queue length vs. Speed

4. Drop Packets

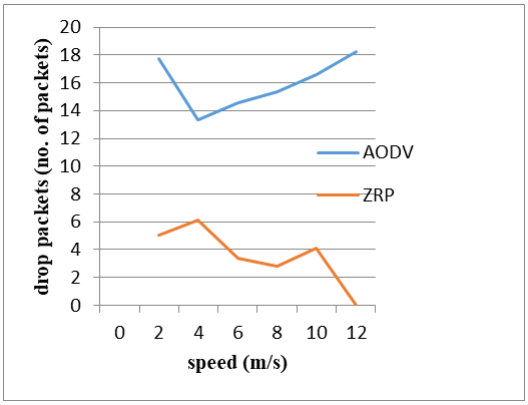

Fig. 4. Drop packets vs. Speed

Above fig.4 shows that proposed model using AODV model has increase the packet drop count as compared to ZRP algorithm. Here with increase in speed packet drop of ZRP was less than AODV.

Case 2. When number of node is 80, Traffic Connection 25 and terrain 2500X2500 the throughput, Avg. delay, queue length, drop packets are –

1. Throughput

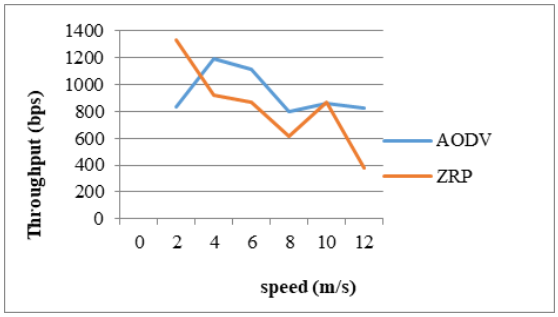

Fig. 5. Throughput vs. Speed

Above fig. 5 shows that proposed model using AODV model has increase the throughput value as compared to ZRP algorithm. Dynamic adoption of various situations in AODV has increase the throughput value of network.

2. Avg. end to end delay

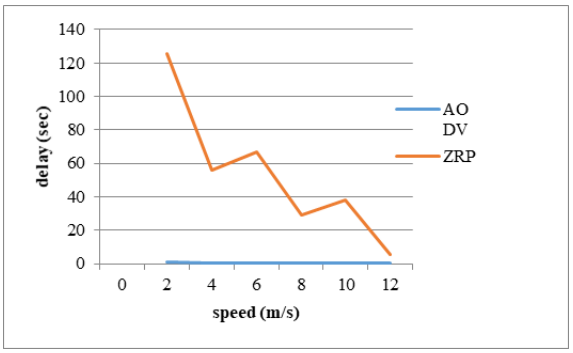

Fig. 6. Avg. end to end delay vs. Speed

Above fig. 6 shows that proposed model using AODV algorithm has reduce the delay time as compared to ZRP algorithm. Dynamic adoption of various situations in AODV has increase the throughput value of network.

3. Queue length

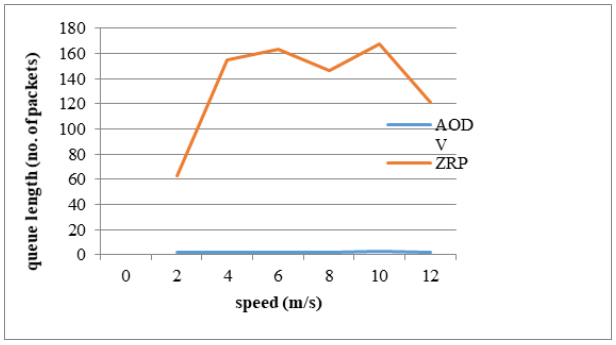

Fig. 7. Queue length vs. Speed

Above fig. 7 shows that proposed model using AODV model has reduce the queue length as compared to ZRP algorithm. Here with increase in speed queue length of ZRP also decreases but AODV queue was quit low.

4. Drop packets

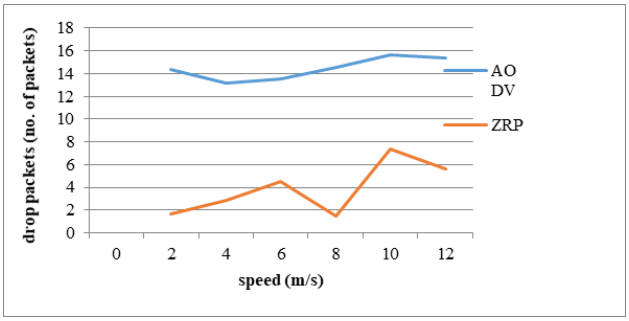

Fig. 8. Drop packets vs. Speed

Above fig. 8 shows that proposed model using AODV model has increase the packet drop count as compared to ZRP algorithm. Here with increase in speed packet drop of ZRP was less than AODV.

6. Conclusion

The outcomes of the simulations were examined and discussed. The distinctive situations having exceptional length of mobile nodes have been tested under four different instances of experimentation, the overall performance of the AODV and ZRP routing protocols with different speed were analyzed using different metrics like end to end delay, throughput, queue length and their drop packets. All the simulation scenarios were aimed for the monitoring of critical conditions from the graphs and tables it's been concluded that reactive protocols e.g. AODV, show masses of variations within the consequences whilst hybrid protocols e.g. ZRP are very less vulnerable to the mobility of the nodes and shows very much less versions in the outcomes.

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