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Enhancing Quality of Service for Adhoc on Demand Distance Vector Protocol based on time for Mobile Ad-hoc Networks

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Abstract-- In MANET (Mobile Adhoc Network) the physical connectivity of the network keeps on changing dynamically. Because of the several MANET constraints such as limited bandwidth, mobility,battery power etc; it becomes very important to design a protocol that suits the requirements for MANETS. The QoS mechanism is done by improving quality in between wireless nodes. This Paper will reflect the link failure and the will provides solutions for it. This work will be focus on the Time based on demand distance vector protocol so that the faulty networks can be prevented. It particularly works on the detection of faulty nodes at the early state of the node connectivity. It will find out the nodes which have low resources to sustain in whole process of routing and by removing these node we can shred out the week links from whole topology which in turns can enhance the quality and fault tolerance. Initially work will start with battery resources as the prime factor in deciding the propose work and latter we can find out other dependent factors. The research work is carried out on Network simulator and parameters are analysed with it.

Keywords-Mobile Ad-hoc Networks (MANETs), Quality of Service, protocols ,node failure issue, on Demand Distance vector protocols;

1. Introduction

A MANET is a multi-hop Adhoc wireless network where nodes can move arbitrary in the topology with variation of speed and trajectory. The Manet network has no infrastructure or dependency and can be implement quickly in any environment but due to limited computing power, low bandwidth, high mobility and absence of central coordinating entity, behavior of different routing protocols are difficult to calculate in different environments.

2. Mobile Ad-Hoc Networks

A MANET consists of mobile nodes, a router with multiple hosts and wireless communication devices. The wireless communication devices are transmitters, receivers and smart antennas. These antennas can be of any kind and nodes can be fixed or mobile. The term node referred to as, which are free to move arbitrarily in every direction. These nodes can be a mobile phone, laptop, personal digital assistance, MP3 player and personal computer. These nodes can be located in cars, ships, airplanes or with people having small electronic devices [11]. Nodes can connect each other randomly and forming arbitrary topologies. Nodes communicate to each other and also forward packets to neighbor nodes as a router. The ability of self configuration of these nodes makes them more suitable for urgently required network connection. For example in disaster hit areas where there is no communication infrastructure. It is greatly desired to have a quick communication infrastructure. MANET is the quick remedy for any disaster situation. MANET is a spontaneous network. It is useful when dealing with wireless devices in which some of the devices are part of the network only for the duration of a communication session. The MANET working group (WG) within the Internet Engineering Task Force (IETF) works specifically on developing IP routing protocols topologies. To improve mobile routing and interface definition standards for use within the Internet protocol suite [11].

3. Related Work

In MANET (Mobile Adhoc Network) the physical connectivity of the network keeps on changing dynamically. Because of the several MANET constraints such as limited bandwidth, mobility, battery power etc; it becomes very important to design a protocol that suits the requirements for MANETS. Last research purposed a protocol mechanism which is loosely based on a reactive protocol AODV (Ad Hoc On demand Distance Vector Protocol). The RECENT proposed protocol uses the time concept based on first come first served basis for path choosing process, hence the name Time On Demand Distance Vector Protocol (TODV). [3]The protocol design presented here suits the MANETS dynamic topology perfectly in finding the best path or route for data communication. The simulation study reveals that the proposed protocol outperforms than existing AODV, in terms of throughput and end-to-end delay[4].

4. Purposed Work

A MANET is a multi-hop Adhoc wireless network where nodes can move arbitrary in the topology with variation of speed and trajectory. The MANET network has no infrastructure or dependency and can be implement quickly in any environment but due to limited computing power, low bandwidth, high mobility and absence of central coordinating entity, behaviour of different routing protocols are difficult to calculate in different environments. Reactive protocols seek efficient resource utilization when required. Some related work suggested time based on demand distance vector protocol which shows quite better results compared to simple on demand protocols. The protocol design presented here suits the MANETS dynamic topology perfectly in finding the best path or route for data communication. Since MANETS are typically used as wireless backbones, they have the nature that the wireless communication is not constant. Hence, it is important to defend them against link or node failures. The requirement for quality of service is increasing day by day as the more attacks, faults, congestion is occurring in Mobile ad-hoc infrastructure. Quality of service is most essential part for providing continuous flow in Mobile ad-hoc devices. Moreover quality of service based on time constraints is needed to be explored and demand refined and stable fault tolerance mechanism. The QoS mechanism is done by improving quality in between wireless nodes. This research will reflect the link failure and the will provides solutions for it. This work will be focus on the Time based on demand distance vector protocol so that the faulty networks can be prevented. It particularly works on the detection of faulty nodes at the early state of the node connectivity. It will find out the nodes which have low resources to sustain in whole process of routing and by removing these node we can shred out the week links from whole topology which in turns can enhance the quality and fault tolerance. Initially work will start with battery resources as the prime factor in deciding the propose work and latter we can find out other dependent factors. At initial state after finding faulty nodes (Nodes with very less battery resources), these nodes will be in sleep mode and will not participate in routing process. After shredding those nodes we will proceed with other mechanisms based on time constraints. Quality of the network will be the final target as quality is directly link to the amount of faults. Parameters for Quality of service would be throughput, failure of nodes, delay ,network load, overhead. These parameters will distinguish the normal working of the network and QoS in network.

4.1- Objectives

- To achieve better solution for Quality of service for MANET.
- To provide solution for node failure in MANET networks and to test timely based Adhoc on Demand Distance vector protocols.

5. Methodlogy Of Research Work

The procedure adopted to accomplish the above mention objective is given below: Our research will focus on the prevention of faulty links in mobile ad-hoc networks. We will start with Time based on demand protocol analysis under OPNET simulator.

Method for Fault Tolerance: In this research, will present better solution for quality of service by improving quality in between wireless nodes. This research will reflect the link failure and the will provides solutions for it. This work will be focus on the Time based on demand distance vector protocol so that the faulty networks can be prevented. It particularly works on the detection of faulty nodes at the early state of the node connectivity. It will find out the nodes which have low resources to sustain in whole process of routing and by removing these node we can shred out the week links from whole topology which in turns can enhance the quality and fault tolerance. Initially work will start with battery resources as the prime factor in deciding the propose work and latter we can find out other dependent factors. At initial state after finding faulty nodes (Nodes with very less battery resources), these nodes will be in sleep mode and will not participate in routing process. After shredding those nodes we will proceed with other mechanisms based on time constraints. Quality of the network will be the final target as quality is directly link to the amount of faults. Procedure adopted to accomplish the result parameters which are analyzed below on results and discussion.

6. Result and Discussion

In this work various Mobile Ad hoc Network (MANET) routing protocols have been studied. To choose best among the existing protocols, it is necessary to design few network models for the evaluation of the performance of these protocols. In this chapter, various network models to carry out the simulations are discussed. At the end of this chapter, results obtained from various simulations in the form of graphs are presented. Future work is also suggested.

6.1 Simulation Results and Analysis

After choosing metrics, the simulation is done for 75minutes for each scenario. Then results are obtained as: -

Delay

Fig. 1 presents the end to end delay of TODV, AODV, Clustered network and Node failure. The clustered n/w has less delay as compared to others and AODV has maximum delay as compared to others. in table 1 (50 nodes) configured by using TODV, AODV , Node failure and Clustered n/w , average end to end delay of all the packets is0.001128 in seconds for TODV and in the case of AODV, the average end to end delay is 0.001982 seconds and for Clustered n/w average delay is 0.000834 seconds. and for Node failure average delay is .000839 seconds.

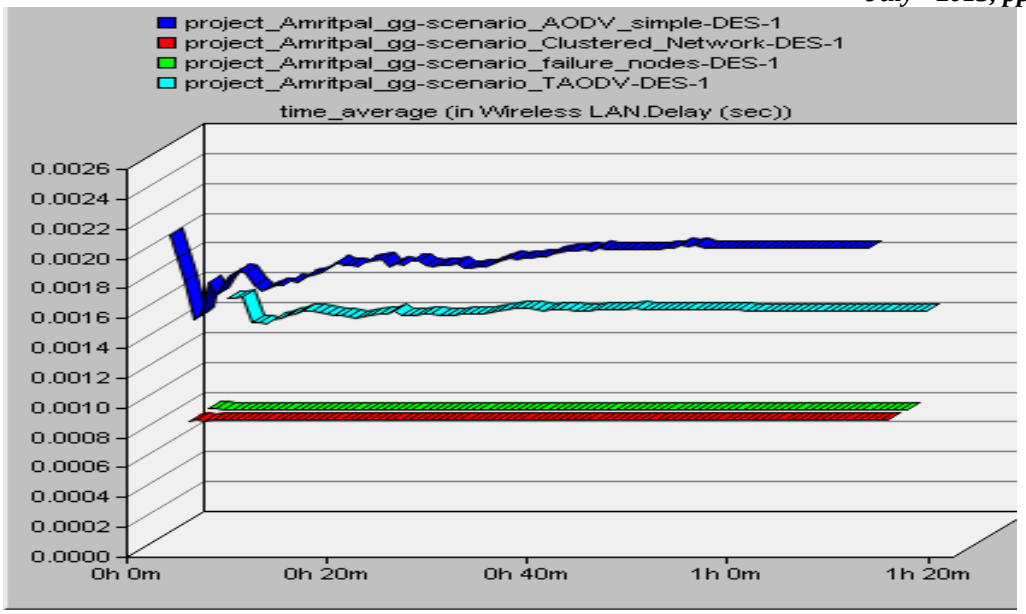

Fig.1 Delay (50 nodes)

Table 1.Delay (50 nodes)

S. No	Time (min)	AODV	TODV	Clustered N/W	Node Failure
1	4	0.002151	0.001500	0.000831	0.000831
2	7	0.001622	0.001339	0.000841	0.000841
3	24	0.001985	0.001392	0.000843	0.000843
4	57	0.002088	0.001413	0.000841	0.000841
5	59	0.002068	0.001413	0.000841	0.000841
Average (sec)		0.001982	0.001128	**0.000834**	**0.000839**

Network Load

Generally the network load in TODV is lower than AODV, Clustered n/w , Node Failure , because the TODV makes the limited network and there is no connection outside the limited area then processing becomes small therefore network load is lower than AODV. In clustered n/w and Node Failure the processing becomes more therefore is high.In Fig. 2Fig. 3 AODV (50nodes), the calculated average network load is 5285.12 bits/sec, whereas, the average network load for TODV4792.34 bits/sec. and Clustered n/w and node failure n/w the average network is 7562.23 and 6233.22 bits/sec. respectively.

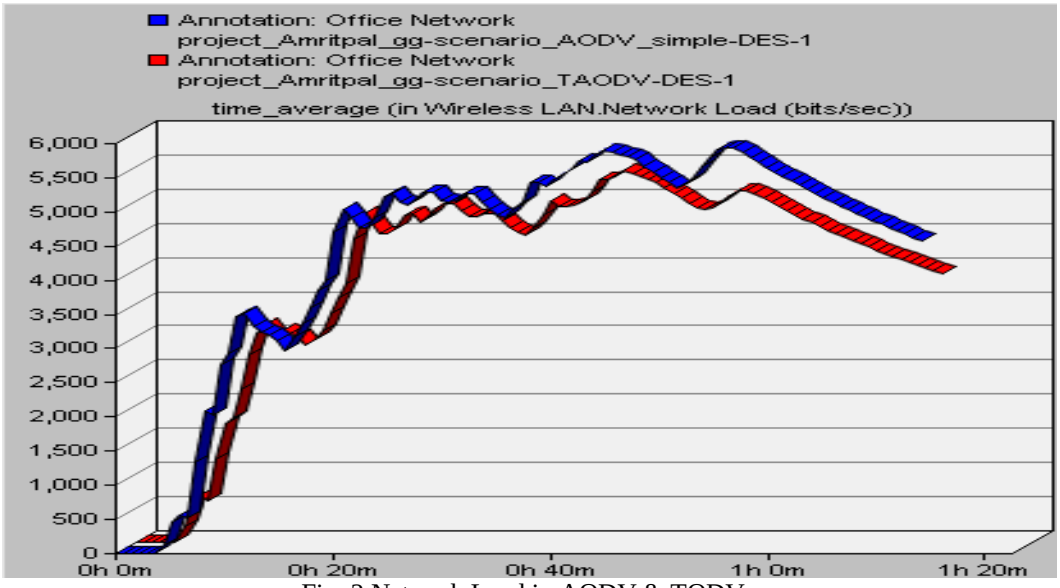

Fig..2 Network Load in AODV & TODV

Table 2 Network Load in TODV & AODV

S .NO	Time in min	AODV	TODV
1	8	2079.52	1722.66
2	12	3507.67	2985.08
3	21	5035.59	4649.62
4	45	5890.45	5390.65
5	57	5936.03	5089.90
Average Load (bits/s)		5285.47	**4792.58**

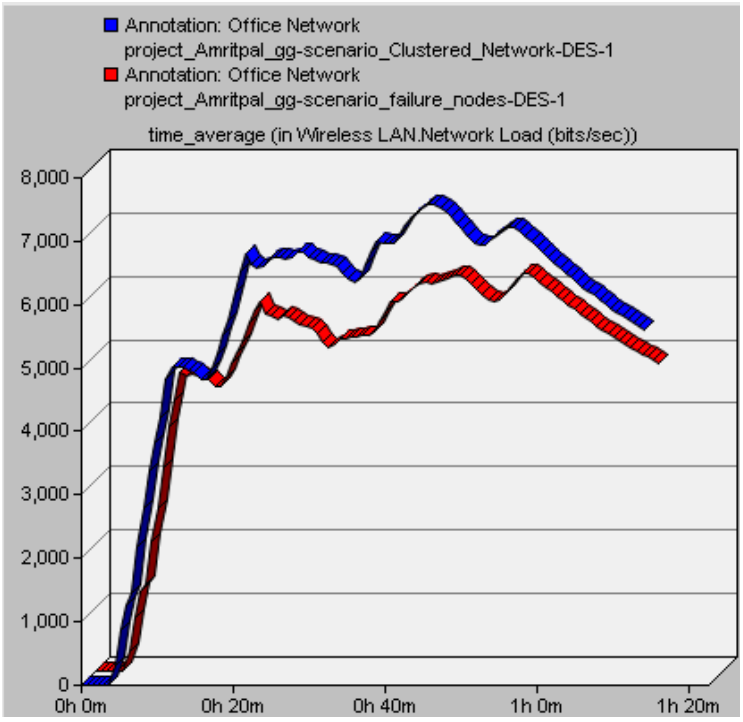

Fig 3 Network Load in Cluster Network & Node Failure

Table 3 Network Load in Cluster Network& Node Failure

S. NO	Time in min	Clustered N/W	Node Failure
1	8	2765.86	2564.21
2	12	5009.52	4655.20
3	21	6781.22	5805.36
4	45	7510.65	6147.33
5	57	7208.31	6147.33
Average Load (bits/s)		7562.33	**6231.22**

Throughput

In case ofAODV the throughput becomes low because , in AODV the nodes are scattered in large distance therefore the processing becomes large and then throughput becomes small but when TODV apply on AODV then the throughput becomes large , because when TODV apply on AODV , the TODV makes the limited network and there is no connection

outside the limited area therefore the throughput becomes high as compared to simple AODV. In clustered n/w throughput becomes high as compared to TODV and when in case of nodes in clustered n/w there is very less throughput becomes decreased

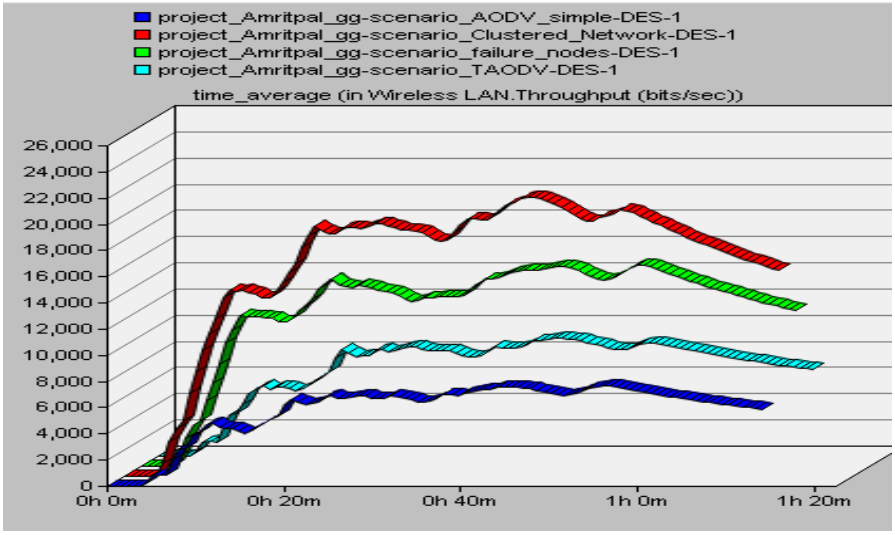

Fig..4 Throughput (50 nodes)

Fig. 4 shows the throughput of AODV, TODV , Clustered N/w and Node Failure (50 nodes). In case of AODV protocol, average throughput is 6520 bits/sec and for TODV, the average throughput is 7601 bits/s and for Clustered N/w, the average is 18246 whereas, the average throughput for Node Failure is 13818 bits/sec concluded from table 4.

Table.4 Throughput (50 nodes)

S. NO	Time in min	AODV	TODV	Clustered N/W	Node Failure
1	11	4641	5173	13587	11467
2	21	6426	7819	18284	14216
3	35	6425	7536	17992	12909
4	45	7519	8956	21131	15201
5	57	7589	8521	20236	15298
Average Throughput (bits/s)		6520	7601	18246	13818

7. Conclusion

In this work, the performance of the Ad-hoc on demand distance vector routing protocol and Time Ad-hoc on demand distance vector protocol have been summarized. The main focus was to show the performance of TAODV under normal environment, under Clustered environment and performance after faults occurrence in term of throughput, delay and network load. In doing so, a TAODV scenario has been created and performance found to be better than normal AODV. This network further extended to create cluster heads and cluster formation according to the energy check level. Performance of network increases after clustering according to the proposed work, TAODV gives more throughputs as compared to normal AODV and further clustered network of TAODV provides the improvements in term of throughput. As described delay is case of TAODV is much less than the AODV. In node architecture changes has been done according to the developed algorithm. After clustering and energy saving distribution, faulty behavior has been added to network with failure of four wireless nodes and fault tolerance mechanism works fine to compensate the throughput loss by maintaining the level of performance for the faulty network also. Performance and fault tolerance property of network has been validated which shows improvement of the performance in case of proposed work scenario. This research provides great scope for mobile ad-hoc networks to behave similar to wireless nodes in case of sensor networks in which energy saving is the biggest concern. Moreover proposed work behave like a proactive routing process as it store information of some intermediate node which are learned early in route search process so it can be consider as a hybrid protocol scheme and can be used in both pro active and on demand network scenarios.

In nutshell, fault tolerance and quality has been improved with proposed algorithm by implementing clustering approach and energy checking process.

8. Future Scope

It is an important issue for the further study to implement the proposed scheme on the distributed environment of wireless ad-hoc devices with congested network. Various type of TCP protocols such as TCP Reno, TCP Vegas and TCP FRC needs good testing for the given scheme. The proposed work need strong testing in scenario where congestion is

more and priority wise distribution of traffic should need to be considered. Moreover implementation of clustering approaches with proposed scheme can be consider providing security with resources saving in the wireless Ad-hoc networks.

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