



An Efficient AODV Routing Protocol Based on Dynamic Threshold Assignment for Local Repair in MANET

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Abstract: In this paper, we have implemented the process of error detection, repairing of errors and routing protocols implementation in MANET (mobile ad hoc network) using dynamic threshold technique. MANET is very popular and efficient, easiest and secure way to of communication between two or more mobile user ends, we can send and receive data, information, updates and signals from one end to another end securely by using MANET.

Keywords: threshold, routing protocols, error repair

I. Introduction

Wireless communication between mobile users is becoming more popular than ever before. This is due to recent technological advances in laptop computers and wireless data communication devices, such as wireless modems and wireless LANs. This has lead to lower prices and higher data rates, which are the two main reasons why mobile computing continues to enjoy rapid growth. There are two distinct approaches for enabling wireless communication between two hosts. The first approach is to let the existing cellular network infrastructure carry data as well as voice. The major problems include the problem of handoff, which tries to handle the situation when a connection should be smoothly handed over from one base station to another base station without noticeable delay or packet loss. Another problem is that networks based on the cellular infrastructure are limited to places where there exists such a cellular network infrastructure. The second approach is to form an Ad hoc network among all users wanting to communicate with each other. This means that all users participating in the Ad hoc network must be willing to forward data packets to make sure that the packets are delivered from source to destination. This form of networking is limited in range by the individual nodes transmission ranges and is typically smaller compared to traditional cellular system. Ad hoc networks have several advantages compared to traditional cellular systems.

These advantages include:

- On demand setup
- Fault tolerance
- Unconstrained connectivity

Ad hoc networks do not rely on any pre established infrastructure and can therefore be deployed in places with no infrastructure. This is useful in disaster recovery situation and places with none existing or damaged communication infrastructure where rapid deployment of a communication network is needed. Ad hoc networks can also be conferences where people participating in the conferences can form a temporary network without engaging the services of any pre existing network

II. Problem Description

The first objective of the work is modification of the existing AODV protocol in order to provide alternative path to restrict congestion and in case of link failure. The Second objective of the work is to evaluate the performance of the proposed routing protocol Modified AODV with existing AODV for Mobile Ad-hoc Networks. This evaluation should be done theoretically and through simulation. We drive graphs between existing AODV and modified AODV on the basis of Throughput, Routing Load, Number of packets lost and Packet Delivery Ratio and I found that Modified AODV is more suitable than the existing one.

III. Scope of the Dissertation

MANET routing protocols are generally classified in three categories namely proactive, reactive and hybrid. Ad hoc routing protocols exhibiting both reactive and proactive protocols are called hybrid routing protocols. Our Dissertation work is focused only on, On-Demand Routing Protocol AODV. In this paper, we have modified the Local Repair method and Threshold Value of Existing AODV in MANET. The main objectives of the paper are to decrease the congestion in the network, decrease the routing load, decreases the number of packet lost and increase the throughput, increases the total transmitted packet.

Make the routing protocol which will support the real time traffic.

The objectives of the paper are listed below:

- (a) To simulate AODV and Modified AODV.
- (b) To support real time traffic for Ad Hoc network.
- (c) To reduce the network Traffic in the Ad Hoc network.
- (d) To compare and analyze the result of AODV and Modified AODV.

IV. Contribution

In the Dissertation one of the major contributions will be to modify the Local Trial method of the existing AODV by changing the TTL formula of existing AODV on demand routing protocol and analyze the performance of the existing protocol with the Modified AODV in MANET. Confined web traffic with performance metrics Delay and Throughput by using NS2 simulation. Secondly, in designing and implementing the network scenarios by varying number of nodes, mobility of nodes and traffic loads to examine the protocols performance and to identify the optimal protocol in routing. Energy consumption of the routing protocols while performing my evaluation and the pause time for the mobile nodes used in my Dissertation will not be considered. As pause times assigned to the nodes will also have the impact over the performance of network, as the nodes engaged in communication will stop at the assigned pause time and then takes a new random destination. Thus consideration of pause time will affect the analysis of my chosen protocol, in my chosen aspects scalability, mobility, network load and TCP delay. Hence pause times are set constant for all the scenarios.

V. Security in MANETS

MANETs has certain unique characteristics that make them vulnerable to several types of attacks. Since they are deployed an open environment where all nodes co-operate in forwarding the packets in the network, malicious nodes are difficult to detect. Hence, it is quite difficult to design a secure protocol when compared to wired or infrastructure-based wireless networks. It is not enough to have an ad hoc network work with acceptable level of reliability and quality of service.

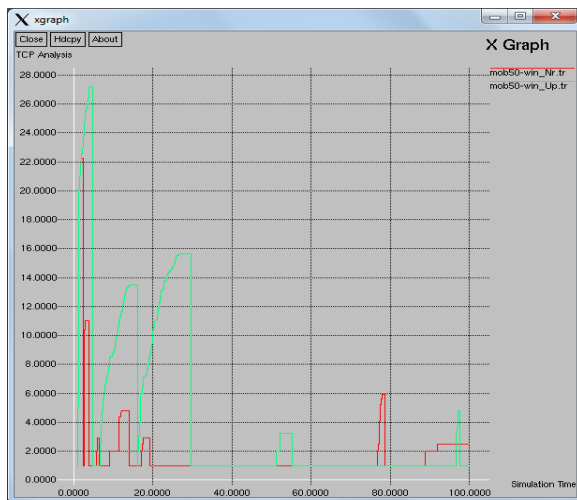


Fig. 1: Before AODV (in normal mode)



Fig. 2: After AODV with routing packet analysis

VI. Algorithm for the Sending and Receiving Information in Normal AODV

- I. Initialization
 - Set $TTL_START = 5$
 - Set $TTL_THRESHOLD = 7$
 - Set $TTL_INCREMENT = 2$
 - Set $NETWORK_DIAMETER = 30$
- II. Calculation of TTL Time
 - $rt \rightarrow rt_req_last_ttl = \max(rt \rightarrow rt_req_last_ttl, rt \rightarrow rt_last_hop_count);$
- III. Check Whether TTL is zero or not
 - if $(0 == rt \rightarrow rt_req_last_ttl) \{$
 - // first time query broadcast
 - $ih \rightarrow ttl = TTL_START; \}$
 - else $\{$
- IV. Expanding ring search
 - if $(rt \rightarrow rt_req_last_ttl < TTL_THRESHOLD)$
 - $ih \rightarrow ttl = rt \rightarrow rt_req_last_ttl + TTL_INCREMENT;$

- ```

else {
V. Network-wide broadcast
 ih->ttn_ = NETWORK_DIAMETER;
 rt->rt_req_cnt += 1;
 }
 }
VI. Remember the TTL used for the next time
 rt->rt_req_last_ttn = ih->ttn_;

```

## VII. Result Analysis

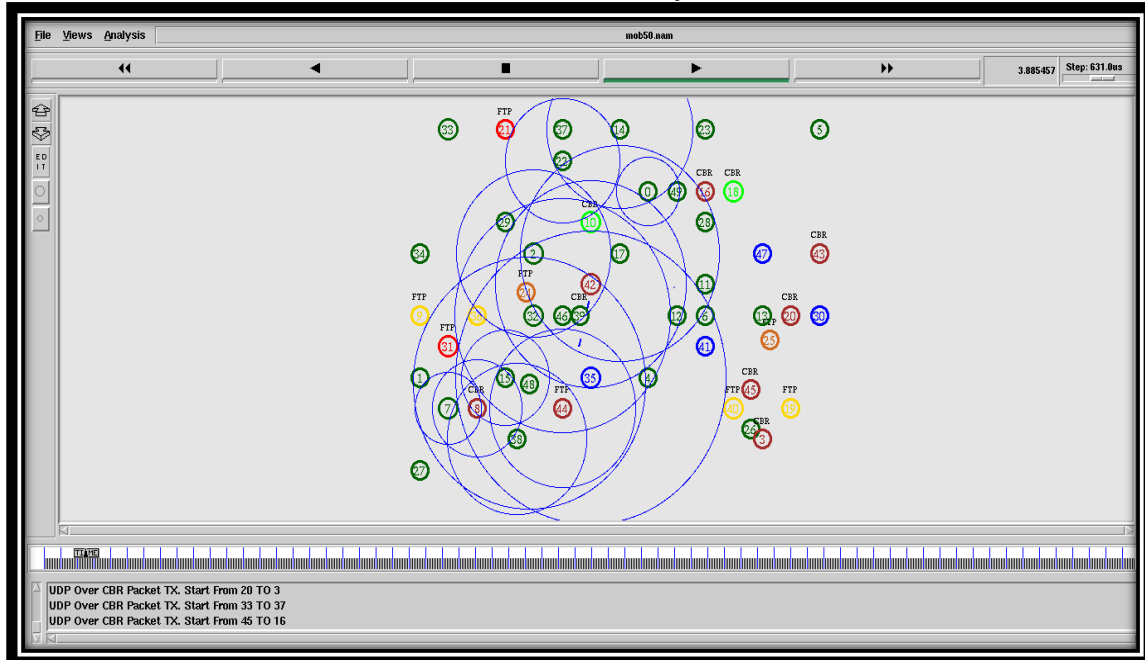


**Fig. 3: Routing load gives a measure routing overhead of the protocol. This is the ratio of overhead bytes to delivered data bytes.**

## VIII. Conclusion

AODV is one of the most popular ad-hoc on-demand routing protocols. In the AODV routing protocol, local repair operation done by broadcasting RREQ packet with TTL equal to Eq. (1). This process produces high routing message overhead which consumes high portions from the bandwidth of the connected nodes. Whereas the new adaptive MAODV routing protocol, local repair done on one or more trials with TTL in the first trial initialized to a small value equal to LR\_TTL\_START. This will reduce the routing message overhead resulted from local repair operation in the AODV routing protocol. From the obtained results it could be concluded that in small ad-hoc networks, MAODV is suitable for the applications that need low routing message overhead. MAODV is suitable for applications that needs high throughput, where MAODV has throughput higher than the AODV routing protocol. MAODV is suitable for applications that need low average end to end delay, where MAODV has average end to end delay lower than the AODV routing protocol. MAODV is suitable for the applications that need high throughput, where MAODV has throughput higher than the AODV routing. Finally, it could be concluded that for the different ad-hoc network sizes ranging from 50 up to 300 nodes, the MAODV routing protocol enhance the network performance than the AODV routing protocol. Where, MAODV reduces both of the routing message overhead and average end to end delay than the AODV routing protocol. Moreover, MAODV increases the throughput.

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