

Comparison of AOMDV, DSR and MDART Multipath Routing Protocols

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Abstract

Mobile ad-hoc network is a self-organized in which mobile nodes can be established anywhere without any need of central administration. In MANET resources are limited and topology is highly dynamic, so routing has been a very important area of research. Many routing protocols have been proposed by researchers. Still, there is some routing protocols can be proposed. In this paper, an attempt has been made to simulate AOMDV, DSR and MDART routing protocols using the NS2 simulator and compare their performance for number of packets send, number of packets dropped, packet delivery ratio, average delay, average jitter and average throughput.

Keywords: MANET; AOMDV; DSR; MDART.

1. INTRODUCTION

In general, Mobile ad hoc networks (MANET) can configure its network and change its location. Mobile nodes act as a router and as hosts. In MANET the series of mobile nodes are present, which are dynamic in nature. In MANET mobile nodes move freely without any restrictions. MANET has no fixed infrastructure. In a MANET, the nodes make the wireless network by making non-centralized administration. We assume that these nodes are wireless handsets, phones, etc. MANET face various challenges like dynamic network topology, no centralized control, quality of service, limited bandwidth, hidden terminal problem, etc. So, MANET has been a very

difficult task in routing of information. Many routing protocols have been proposed and implemented for MANET.

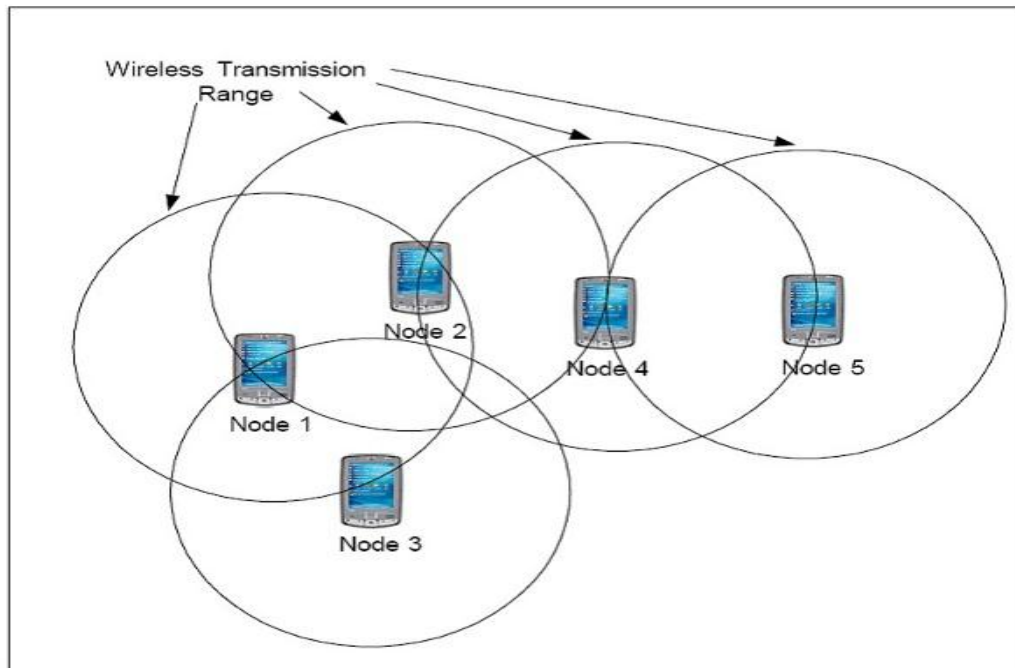


Figure 1: An example of the MANET

1.1. Characteristics of MANET

- **Multi hop routing:** When a node tries to send information from source to destination which is out of its communication range than packet forward via intermediate nodes.
- **Distributed procedure:** There is no background for the control of the network, so by distributing the node for the control of the network.
- **Dynamic topology:** Nodes move freely with different speed, so a network topology change in unpredictable times.
- **Physical medium shared:** The communication medium is accessible to any entity with adequate resources.
- **Independent terminals:** In a MANET, each independent node could function as a router and a host.

1.2. Advantages of MANET

- Flexibility improved.
- Scalability improved.
- Robust in nature.

- The Network can set up at any location.
- Self-configuring network.

1.3. Challenges of MANET

- **Bandwidth limited:** In this the effect of noise, fading, multiple access and interface condition, etc. are much less as compared to maximum transmission rate.
- **Threats of security:** Wireless mobile adhoc network exposed to huge security attacks.
- **Power source maintenance:** In which restriction on power source in order to keep size, portability and weight of the size.
- **Route changes mobility induced:** The network topology is highly dynamic because of movement of nodes. This situation often direction to frequent route changes.
- **Routing overhead:** In wireless adhoc networks, nodes change their place within the network which leads to routing overhead.

2. OVERVIEW OF AOMDV, DSR AND MDART ROUTING PROTOCOLS.

2.1. AOMDV

Ad-hoc on demand multipath distance vector (AOMDV) is an extension of the AODV routing protocol, which maintain disjoint routes and multiple loop free [4]. The route entry for a destination node consists of a next hop count and their information. All next hop nodes are assigned the same sequence number [5]. For each destination a node maintains an advertised hop count. For all the paths this advertised hop count is the maximum hop count and is used for sending route advertisement to the destination node. An alternate path defines a node by a duplicate route advertisement [6]. The next hop list and advertised hop count are re-initialized, if a node receives a route advertisement with a greater sequence number [5].

2.2. DSR

Dynamic Source Routing (DSR) is a based on reactive routing protocol. It is a simple and designed specifically for multi-hop wireless adhoc network. DSR is self-organizing and self-configuring completely, requiring no existing infrastructure [7]. In DSR, an error message (RERR) is sent to the source code if any, link to source node is broken [10]. DSR does not use hello packets. DSR support multiple paths, but it is not scalable to large networks. DSR is based on link state algorithm, which maintains a cache. DSR acts completely on demand with no periodic activity of any variant required at any scale within the network.

A. The operation of the DSR protocol is broken into two stages:

- **Route Discovery Phase:** This phase flood the network with route requests, if the suitable route is not found in the route [8].

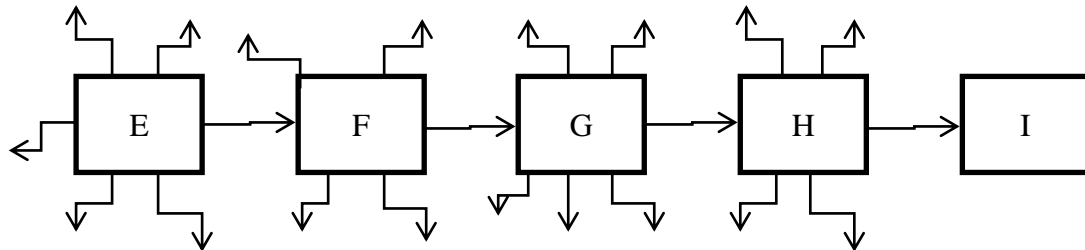


Figure 2: Route discovery example: In which node E is initiator and node I is the target.

- **Route Maintenance Phase:** This phase use error message and acknowledge for maintenance of route [9].



Figure 3: Route maintenance example: In which node G is unable to forward a packet from E to I over its link to another hop H.

2.3. MDART

Multipath Dynamic Address Routing (MDART), is based on DHT-based shortest path routing protocol is called as DART. M-DART based on the distance vector and it uses the hop by hop routing method. The origin of M-DART protocol that does not familiarize any further communication overhead by relying on the routing information is already available in the DART protocol. M-DART invents multiple routes between source and destination [11].



Figure 4: DART and MDART routing update entry

In fig.4 explain that MDART routing protocol does not use any special extra field and control packet in the routing update entry. In this the routing update packet is the same as the DART routing protocol in the number of routing entries.

- A. Characteristics of MDART:** These valuable characteristics are obtained by blind route notification, in which is used in hierarchical multipath routing. Blind route notification is notifying neighbors about the presence of routes to a sibling without detailing the path from which packet will be forwarded [13].

3. LITERATURE SURVEY

Alex Hinds, Michael Ngulube, Shaoying Zho and Hussain Al-Aqrabi explained that range of MANET routing protocol. In this performing routing task required computing power and memory. The mobility of nodes is a major factor in MANET because of limited wireless transmission range.

Manish Sharma and Jaspreet Kaur define the characteristics and performance of AODV, DSR, GRP, OLSR and TORA routing protocol. In these protocols condition in bandwidth, power consumption and computational power. In this compare the routing protocols by using different parameter and performance metrics from which conclude that OLSR is best in term of the packet delivery fraction.

Davinder Singh Sandhu and Sukesh Sharma describe that the performance of three routing protocols such as BATMAN (Better Approach to Mobile adhoc Network), DSR (Dynamic Source Routing) and OLSR (Optimized link state routing protocol) from this analyze the performance of reactive and proactive routing protocol. In this analyzed the performance by using parameters such as the PDR (Packet Deliver Ratio), End-to-End delay, Routing Load, after Throughput from this OLSR shows the best result among others.

Ramandeep Singh and Farminder Singh define that MANET is infrastructure less and decentralized multi-hop network in which nodes are randomly moving in any direction. In this the challenge in MANET are defined such as routing, power consumption and multicast. In this DSR routing protocol enhanced for multicasting in MANET.

Mamta Sankaria and Anita Ganpati simulate the AODV, AOMDV, DSR and MDART routing protocols using a NS-2 simulator, which is an open source event driven simulator. In this defines that simulator provides support for TCP, UDP and various Unicast and Multicast routing protocol. In this AODV is better in term of number of packets dropped.

4. RESULTS AND COMPARISONS

Comparison between AOMDV, DSR and MDART routing protocol mentioned in this table. This considers the characteristics of AOMDV, DSR and MDART routing protocols in the network. A variety of proactive (table-driven) routing protocols are compared in this table.

Table 3.1 Routing Protocol Comparison

Parameters	AOMDV	DSR	MDART
Packet delivery ratio	Medium	High	Low
Routing overhead	Medium	Low	High
Normalized routing load	Medium	Low	High
Number of packet drop	Low	Medium	High
Loop free	Yes	Yes	Yes

5. CONCLUSION

In this review paper AOMDV, DSR and MDART routing protocols analyzed their performance on the bas of parameters such as packet delivery ratio, routing overhead, normalized routing load, number of packets dropped and loop free. The AOMDV, DSR and MDART routing protocols are under the packet length, mobility and effect of nodes check their performance. From the analyzed the parameter we concluded that the MDART routing protocol is better than other two routing protocols.

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