Performance comparison of AOMDV and POR Routing Protocols in MANETS

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Abstract

Mobile ad hoc network (MANET) [1] is Mobile nodes that are communicated with each and every other hop using multi-hop wireless nodes. Each node acts as a router in network and no fixed infrastructure for mobile nodes and there is no base station of it, forwarding data packets for other nodes [2]. Without network infrastructure is known as ad hoc network is formed by mobile stations inside a restricted area which communicates without the need of access point [3]. An ad hoc network can be formed by mobile computers with wireless interfaces that are communicate among themselves without any help of infrastructure. In an ad hoc network the mobile nodes are access to serve both routers and hosts. Performance comparison of AOMDV and POR with ns-2 (version 2.34) simulations shows that throughput as POR packet delivery is better than that of AOMDV.

Keywords: MANETS, AOMDV, POR, Data delivery, routing protocol.

I. Introduction

Mobile ad hoc networks (MANET) as a self-configuration and less infra structure data transmission. Due to the broadcasting nature of wireless channel and dynamic network topology, reliable data delivery in MANETs. In this main issue is high mobility [1]. Most existing protocols as topology based routing protocols used in MANETS. There are quite easily influences to node mobility, especially in large scale networks. Main reason is due to the procedure of a node –node before data transmission is predefined. Network topology is changed very fast and it is difficult to maintain a route.

The route recovery and route discovery procedures are time consuming, when path link is breaks that time data packet loss is occurred and then the packet is reroute and transmission rate is interrupted. Routing protocols are DSDV, DSR, AODV and AOMDV. Here node mobility is not easy to influence. Next will introduce the Geographic routing (GR) protocol, this is uses the location based data packets will be transmitted in hop-by-hop routing. And source is alert of its own location.

In GR, to select the next hop forwarder use the greedy forwarding with the large positive information to the destination and GR is very high efficiency and scalability. If the node moves out of sender coverage area transmission will be fail i.e., packet loss occur. Then GPSR (Greedy Perimeter state less routing) is introduced and due to the broadcasting nature of wireless medium single data packet transmission will leads to the multiple reception and enhance the robustness of backup condition. It does not deliver the data packets to sensitive applications.

In AOMDV, nodes are selected to the destination as forwarding candidates and all neighboring nodes request to the next neighboring nodes. Then the path is multiple route requests to the neighbor nodes and route reply to the destination. When the path link is breaks then entire packet is loss and also throughput is decreased at the same time time-consuming and energy-consuming. Next will introduce the POR (position based opportunistic routing) protocol, it may achieve the multiple receptions without losing information and collision avoidance. Reduce the latency and duplicate relaying packets.

II. ROUTING PROTOCOLS

2.1. Overview

Mobile Ad-hoc Network (MANET) is a less infrastructure for mobile nodes that means infrastructure is absent. Nodes are utilized in the network of same random access wireless channel; cooperate in a friendly manner to attractive their multi hop forwarding. The nodes in the network as not only acts as hosts but also as routers and that route data to from other nodes in network [2].

The main features of MANET are listed some as below [4]:

a. MANET can be formed without any pre-existing infrastructure.
b. MANETS can follow the dynamic topology and where nodes may join and leave the network at any time and the multi-hop routing. It may keep changing as nodes join and leave from the network. It does have very limited physical security, and increasing security.
c. Every node in the MANET can assist in the routing of packets in network.
d. Limited Bandwidth & Power is limited

Routing protocols can be fallowed into different categories:

(1) Uni-cast routing protocols
- a. Topology-based routing protocols
  - • Proactive routing protocols
  - • Reactive routing protocols
  - • Hybrid routing protocols
- b. Geographical-based routing protocols

(2) Multicast routing protocols
(3) Broadcast algorithms

In this may have to discuss about reactive routing protocols (e.g., AOMDV, POR) and simulating the results for that protocols.

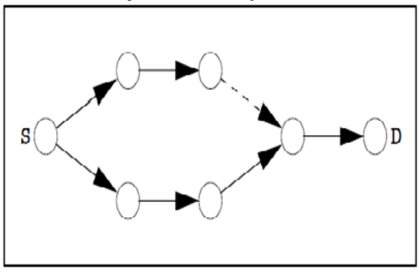
2.1.1. Ah Hoc On Demand Multicast routing protocol *[AOMDV]. [13]*

Here Ad-hoc On-demand Multipath Distance Vector Routing (AOMDV) protocol is an enhancement part of the AODV protocol for computing multiple loop-free and link disjoint paths [5]. Multipath routing is provides the multiple alternative paths between each and every source and destination nodes in a network. The benefit of such multipath is a fault tolerance, bandwidth increasing, and security improvement. Overlapping, looping (infinity loop) and optimum disjointed paths and the main issue in such algorithms [14]. Destination contains a number of next-hops nodes along with the neighbor hop counts in route entries and same sequence number is accessed to the all neighbor nodes. For destination node, a node maintains the hop count information, which is defined as the maximum hop count is all the paths and uses the sending route request of the destination.

Each duplicate route node request is received by the neighbor node and it can be defined as an alternate path to the destination. Loop free node is assured by the acceptance of alternate paths to destination and if it has a less hop count than the advertised hop count for that destination. Because the maximum hop count is used, the advertised hop count therefore does not change for the same sequence number [5]. When a route advertisement is received for a destination with a greater sequence number, the next hop list and advertises the hop count is reinitialized.

Multi-path AODV can be used to find the node-disjoint or link disjoint routes. To find node-disjoint routes, each node does not reject the duplicate RREQs immediately. Source node is RREQ to the all neighboring nodes and selects the node-disjoint path, because duplicate RREQs packets are not broadcasted to the neighbors. Any two RREQs are arriving at intermediate nodes via different neighbors of the source could not have transmitted at the same node [5]. Several changes are required in the basic AODV route discovery mechanism to enable computation of multiple link disjoint routes between source destination pairs.

Note that any intermediate node I on the route between a source S and a destination D can also form such multiple routes to D, thus making available a large number of routes between S and D. In the route discovery procedure a reverse path is set up backwards to the source via the same path the route request (RREQ) has traversed. If duplicates of the RREQ coming via different paths are ignored as before, only one reverse path can be formed. To form multiple routes, all duplicates of the RREQ arriving at a node are examined as each duplicate defines an alternate route. See Figure 2 each of these alternate routes may not be disjoint [12].



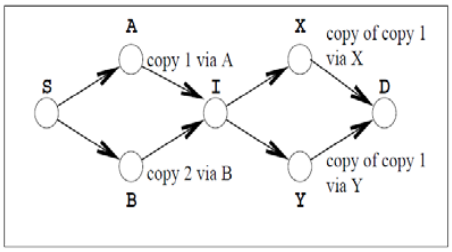


Figure: 1 (a) Second copy of RREQ is transmitted over the dotted link. (b) The second copy of RREQ via B is suppressed at intermediate node I.

In the hope of getting link disjoint paths (which would be more numerous than node disjoint paths) the destination node adopts a “looser” reply policy. It replies up to k copies of RREQ arriving via unique neighbors, disregarding the first hops of these RREQs.

2.1.2. Position Based Opportunistic Routing [POR] Protocol

The POR is designed at based on geographic routing and opportunistic forwarding. The nodes are assumed to be aware of their own location and the positions of their neighbors. Neighborhood location information can be exchanged using one-hop beacon or piggyback in the data packet’s header. The location information of nodes can be obtained with GPS [15] and it likes equipment and neighbor’s coordinates are updated periodically through one hop beacons.

When the source node S wants to sends packets to the destination node D. It calculates the forwarder list according to the distance between its neighbors and the destination and inserts the list into the packet header the neighbor. After that packet is send out, tacking the best forwarder list can be set with respect to the respected nodes.

All nodes within the sender’s coverage area nodes may receive the packets and check its position in the forwarder list, there are n nodes ahead of it, and it will wait for n time's slots before forwarding those packets if the same packet was being sent by the other node before the dedicated time slots. It will discard the packets and sub sequent nodes will do the same operation, until the packet reaches the destination.

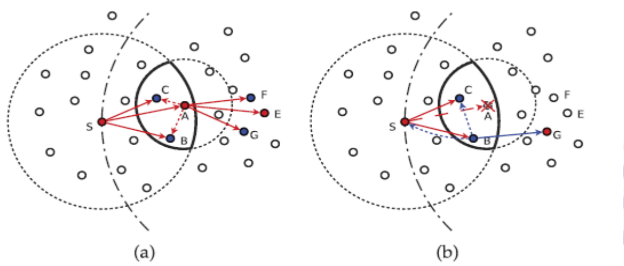


Figure2. (A) the operation of POR in normal situation. (B) The operation of POR when the next hop fails to receive the packet situation.

In this the above figure nodes sends the source to destination. A source node located in the forwarding area satisfies the two conditions: i.e., 1) it makes positive progress toward the destination; and 2) its distance to the next op node should not exceed half of the transmission range in wireless mode (i.e., R=2), so that ideally all the forwarding candidates can hear from one another. First sender sends the data transmits the forwarding area and chooses the candidate selection process and the condition is satisfied then forwards the next forwarding area to the destination. Collect the information to the forwarder does not forwards the packets to the destination and same time sub-optimal candidates has to be send the packets to the destination in certain period of time.

III. SIMULATION MODEL

The performance of **AOMDV** is evaluated in terms of Scenario and Traffic patterns using NS 2 [6] and Bonn Motion [5].

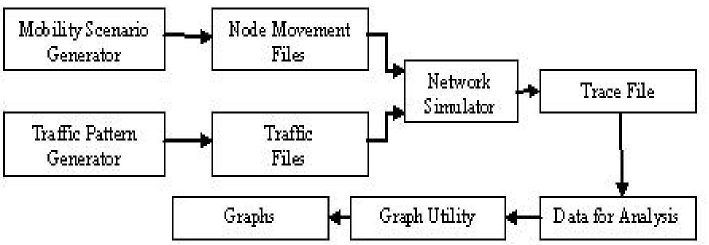


Figure3. Overview of the simulation model

The following Figure 3. Illustrates the simulation model [7] and the simulation parameters are described in Table 1. In our study and evaluation for the two protocols AOMDV and POR we have used the radio Propagation model which is the ns - 2 [12] (Version 2.34) default model.

The result of simulation is generated as trace files and the awk & Perl scripts are used for report generation. In this model mobility generator is moves to the nodes files and some of that traffic generator and collects the information to the network simulator and trace the file. Trace file is generated at flow of data and speed of that particular node. Then calculate the performance evaluation of both routing protocols.

Parameter	Value
Mac protocol	IEEE 802.11
Propagation model	Two-way ground
Transmission Range	250m
Mobility model	Random way
Traffic type	point(RWP)
Packet size	Constant bit rate (CBR)
Number of nodes	256 bytes
Simulation time	80
	900sec

Table: 1 Simulation parameters

IV. PERFORMANCE METRICS

Performance Metrics [8, 9] are quantitative measures that can be used to evaluate any MANET routing protocol. We considered the following four metrics. To evaluate the multi path on-demand routing protocols AOMDV and POR. The fallowing metrics are used in performance comparison.

4.1. Packet delivery ratio

The ratio of the number of packets is received and the number of packets expected to receive. Thus, for multicast packets delivery, the ratio is equal to the total number of received packets over the number of originated packets times the group size. It is calculated as follows:
Packet Delivery ratio = (*Number of Packets Received*/*Number of Packets Sent*) *x* 100.

4.2. Average Throughput

It is a data transmission is determined by the amount of data moved from one node to another in a certain period of time. And Average Throughput [10] is the number of bytes received successfully and is calculated by
*Average Throughput= (Number of bytes received x*8)/ *(Simulation time x* 1000) *kbps*

4.3. Average End-to-End Delay (Average e2e delay)

Average End-to-End [11] delay is the average times of the data packet are transmitted successfully across a MANET from source to destination. It includes all possible delays in networking area, such as buffer is during the route discovery latency, queuing at the interface queue, retransmission delay at the MAC (Medium Access Control), the propagation and the transfer time. The average e2e delay is computed by,

$$D = \frac{\sum_{i=1}^{n}(R_i - S_i)}{n} m\sec,$$

where D is the average end-to-end delay, n is the number of data packets successfully transmitted over the MANET, *' i '* is the unique packet identifier, R_i is the time at which a packet with unique identifier *' i '* is received and *Si* is the time at which a packet with unique identifier *' i '* is sent. The Average End-to-End Delay should be less for high performance.

4.4. Packet Loss

Packet Loss is the difference between the number of data packets are send and the number of data Packets received in that location. It follows that: *Packet Loss= Number of data packets sent− Number of data packets received.*

V. V.PERFORMANCE EVOLUTION

In simulation results AOMDV and POR routing protocols are discussed. And packet loss is very high in AOMDV and POR is better than that of AOMDV also throughput is calculated.

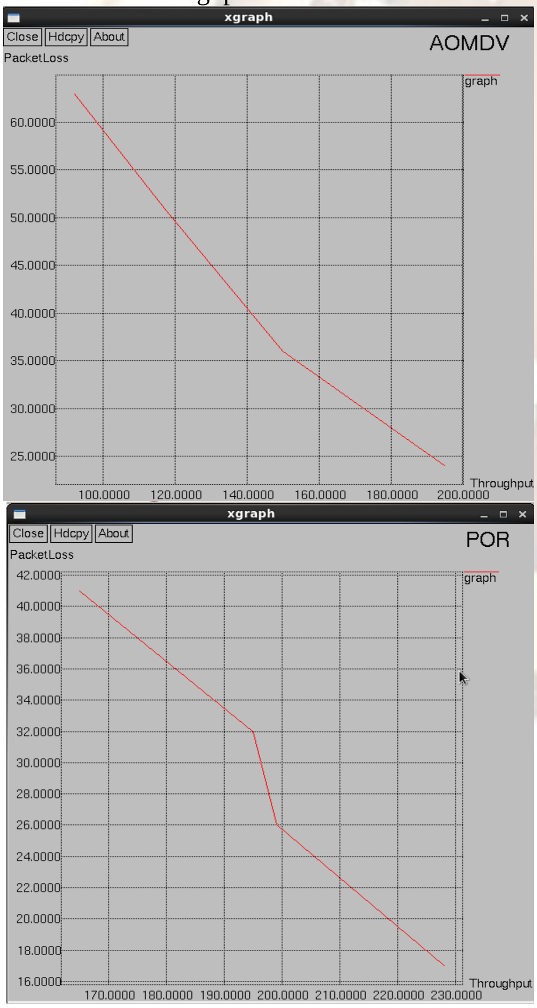


Figure: 4. (a) AOMDV- throughput (b) POR- throughput

In this figure individual through put values are calculated and AOMDV protocol as increasing the throughput values at that time packet loss is increased. And next POR protocol as increasing the throughput values and packet loss is decreased. In POR End-to End data delivery is better than the AOMDV.

Figure: 5. Performance comparison of AOMDV and POR

In this figure performance comparison of AOMDV and POR protocols is calculated and it is time consuming and energy consuming .and POR packet loss is reduced and duplicate relaying packets also reduced.

VI. CONCLUSION

The main contribution of this paper is performance comparison of reactive protocols (e.g., AOMDV, POR). The simulation scenario consisting of minimum 2 and maximum of 100 nodes is created by writing the TCL script in NS-2 (version 2.34) and analyzing the parameters Packet delivery ratio, End-to-End data delivery and throughput with the help of generated X Graph. When compare to the AOMDV throughput POR is better. Reduce the latency and duplicate relaying packets also reduced then enhance the robustness of efficient data delivery. In this use only one channel in AOMDV and POR. In future work, we can use number of channels. One channel will communicate with one node number of channels increase then packet delivery time is decreased. That means ,in existing one 50 nodes per second data packets will send where as in future work enhance the number of channels 100 nodes per second in simulation results.

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