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PERFORMANCE COMPARISON OF AODV/DSR ON-DEMAND ROUTING PROTOCOLS FOR AD HOC NETWORKS

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ABSTRACT

Ad hoc networks are characterized by multihop wireless connectivity, frequently changing network topology and the need for efficient dynamic routing protocols. I compare the performance of two prominent on demand routing protocols for mobile ad hoc networks—Dynamic Source Routing (DSR) and Ad Hoc On-Demand Distance Vector Routing (AODV). We demonstrate that even though DSR and AODV share similar on-demand behaviour, the differences in the protocol mechanics can lead to significant performance differentials. The AODV out-perform DSR in the normal situation but in the constrained situation DSR out-performs AODV, the degradation is as severe as (30%) in AODV whereas DSR degrades marginally (10%) as observed through simulation [7].
Keywords : Ad hoc networks, routing protocols, mobile networks, wireless networks, simulation, performance evaluation, AODV, DSR

I. INTRODUCTION

Wireless cellular systems have been in use since 1980s. We have seen their evolutions to first, second and third generation's wireless systems. These systems work with the support of a centralized supporting structure such as an access point. The wireless users can be connected with the wireless system by the help of these access points, when they roam from one place to the other.

The adaptability of wireless systems is limited by the presence of a fixed supporting coordinate. It means that the technology cannot work efficiently in that places where there is no permanent infrastructure. Easy and fast deployment of wireless networks will be expected by the future generation wireless systems. This fast network deployment is not possible with the existing structure of present wireless systems.

Recent advancements such as Bluetooth introduced a fresh type of wireless systems which is frequently known as mobile ad-hoc networks. Mobile ad-hoc networks or "short live" networks control in the nonexistence of permanent infrastructure. Mobile ad hoc network offers quick and horizontal network deployment in conditions where it is not possible otherwise. Ad-hoc is a Latin word, which means "for this or for this only." Mobile ad hoc network is an autonomous system of mobile nodes connected by wireless links; each node operates as an end system and a router for all other nodes in the network. A wireless network is a growing new technology that will allow users to access services and information electronically, irrespective of their geographic position.

Wireless networks can be classified in two types: - infrastructure network and infrastructure less (ad hoc) networks. Infrastructure network consists of a network with fixed and wired gateways. A mobile host interacts with a bridge in the network (called base station) within its communication radius. The mobile unit can move geographically while it is communicating. When it goes out of range of one base station, it connects with new base station and starts communicating through it. This is called handoff. In this approach the base stations are fixed.

A Mobile ad hoc network is a group of wireless mobile computers (or nodes); in which nodes collaborate by forwarding packets for each other to allow them to communicate outside range of direct wireless transmission. Ad hoc networks require no centralized administration or fixed network infrastructure such as base stations or access points, and can be quickly and inexpensively set up as needed.

A MANET is an autonomous group of mobile users that communicate over reasonably slow wireless links. The network topology may vary rapidly and unpredictably over time, because the nodes are mobile. The network is decentralized, where all network activity, including discovering the topology and delivering messages must be executed by the nodes themselves. Hence routing functionality will have to be incorporated into the mobile nodes.

MANET is a kind of wireless ad-hoc network and it is a self-configuring network of mobile routers (and associated hosts) connected by wireless link the union of which forms an arbitrary topology. The routers, the participating nodes act as router, are free to move randomly and manage themselves arbitrarily; thus, the network's wireless topology may change rapidly and unpredictably. Such a network may operate in a standalone fashion, or may be connected to the larger Internet.

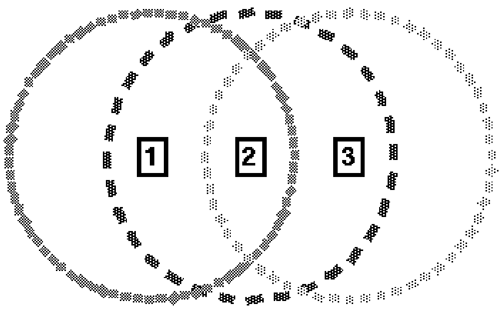


Figure1: Example of a simple ad-hoc network with three participating nodes

Mobile ad hoc network is a collection of independent mobile nodes that can communicate to each other via radio waves. The mobile nodes can directly communicate to those nodes that are in radio range of each other, whereas others nodes need the help of intermediate nodes to route their packets. These networks are fully distributed, and can work at any place without the aid of any infrastructure. This property makes these networks highly robust.

In Figure 1 nodes A and C must discover the route through B in order to communicate. are not in direct transmission range of each other, since A‘s circle does not cover C.

1.1. Characteristics of MANET

Mobile ad hoc network nodes are furnished with wireless transmitters and receivers using antennas, which may be highly directional (point-to-point), omnidirectional (broadcast), probably steerable, or some combination thereof. At a given point in time, depending on positions of nodes, their transmitter and receiver coverage patterns, communication power levels and co-channel interference levels, a wireless connectivity in the form of a random, multihop graph or "ad hoc" network exists among the nodes. This ad hoc topology may modify with time as the nodes move or adjust their transmission and reception parameters.

The characteristics of these networks are summarized as follows:

- Communication via wireless means.
- Nodes can perform the roles of both hosts and routers.
- Bandwidth-constrained, variable capacity links.
- Energy-constrained Operation.
- Limited Physical Security.
- Dynamic network topology.
- Frequent routing updates.

1.2. Advantages of MANET

The following are the advantages of MANET:

- They provide access to information and services regardless of geographic position.
- These networks can be set up at any place and time.

1.3. Disadvantages of MANET

Some of the disadvantages of MANETs are as follows:

- Limited resources and physical security.
- Intrinsic mutual trust vulnerable to attacks.
- Lack of authorization facilities.
- Volatile network topology makes it hard to detect malicious nodes.

- Security protocols for wired networks cannot work for ad hoc networks.

1.4. Applications of MANET

Some of the applications of MANETs are as follows:

- Military or police exercises.
- Disaster relief operations.
- Mine cite operations.
- Urgent Business meetings.

2. Routing in MANETs

A routing protocol is the mechanism by which user traffic is directed and transported through the network from the source node to the destination node. Objectives include maximizing network performance from the application point of view - application requirements- while minimizing the cost of network itself in accordance with its capacity. The application requirements are hop count, delay, throughput, loss rate, stability, jitter, cost; and the network capacity is a function of available resources that reside at each node and number of nodes in the network as well as its density, frequency of end-to-end connection (i.e. number of communication), frequency of topology changes (mobility rate). The four core basic routing functionalities for mobile ad hoc networks are:

Path generation: This generates paths according to the assembled and distributed state information of the network and of the application; assembling and distributing network and user traffic state information

Path selection: This selects appropriate paths based on network and application state information.

Data Forwarding: This forwards user traffic along the select route forwarding user traffic along the selected route.

Path Maintenance: Maintaining of the selected route. Consequently routing is bounded by traffic requirements, network capacity and the security requirements, as illustrated in Figure. 2

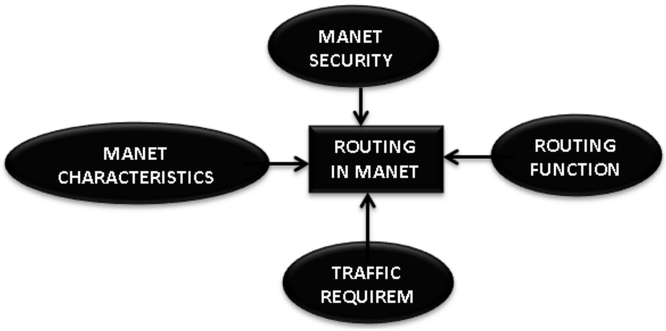


Figure 2: Routing in MANET

Due to its characteristics, other desirable features of ad hoc routing protocol include- fast route establishment, multiple routes selection, energy/bandwidth efficiency and fast adaptability to link changes. Almost all routing systems respond in some way to the changes in network and user traffic state. However, routing systems vary widely in the types of state changes to which they respond and the speed of their response. Routing states can be divided into three categories - Static, Quasi Static and Dynamic. Further, each of the three basic routing functions may be implemented in three ways- Centralized, Decentralized and Distributed.

On-Demand Routing (Reactive Protocols)

In reactive protocols, routes are determined when they are required by the source using a route discovery process. These protocols were designed to reduce the overhead encountered in proactive protocols by maintaining information for active routes only. This means that the routes are determined and maintained for the nodes that are required to send data to a particular destination. Route discovery usually occurs by flooding route request packets through the network. When a node with a route to the destination (or the destination itself) is reached a route reply is sent back to the source node using link reversal if the route request has traveled through the bi-directional links or by piggy-backing the route in a route reply packet via flooding. Therefore, the route discovery overhead (in the worst case scenario) will grow by O(N+M) when link reversal is possible and O(2N) for unidirectional links (where, N represents the total number of nodes and M represents the total number of nodes in the localized region).

II. METHODS AND MATERIAL

Reactive protocols can be classified into two categories:

- Source routing, and
- Hop-by-Hop routing

In Source routed on-demand protocols, each data packets carry the complete source to destination address. Therefore, each intermediate node forwards these packets according to the information kept in the header of each packet. This means that the intermediate nodes do not need to maintain up-to-date routing information for each active route in order to forward the packet towards the destination. Furthermore, nodes do not need to maintain neighbor's connectivity through periodic beaconing messages. The major drawback with source routing protocols is that in large networks they do not perform well.

In hop-by-hop routing (also known as point-to-point routing), each data packet only carries the destination address and the next hop address. Therefore, each intermediate node in the path to the destination uses its routing table to forward each data packet towards the destination. The advantage of this strategy is that routes are adaptable to the dynamically changing environment of MANETs, since each node can update its routing table when they receiver fresher topology information and hence forward the data packets over fresher and better routes. The disadvantage of this strategy is that each intermediate node must store and maintain routing information for each active route and each node may require being aware of their surrounding neighbors through the use of beaconing messages. This following section describes the three protocols along with their performance comparison. The performance metrics represent the worst-case scenario.

1) Ad hoc On-demand Distance Vector (AODV)

The AODV routing protocol is based on DSDV and DSR algorithm. It uses the periodic beaconing and sequence numbering procedure of DSDV and a similar route discovery procedure as in DSR. However, there are two major differences between DSR and AODV. The most distinguishing difference is that in DSR each packet carries full routing information, whereas in AODV the packets carry the destination address. This means that AODV has potentially less routing overheads than DSR. The other difference is that the route replies in DSR carry the address of every node along the route, whereas in AODV the route replies only carry the destination IP address and the sequence number. The advantage of AODV is that it is adaptable to highly dynamic networks. However, node may experience large delays during route construction, and link failure may initiate another route discovery, which introduces extra delays and consumes more bandwidth as the size of the network increases.

Ad hoc On-Demand Distance Vector (AODV) routing is a routing protocol for mobile ad hoc networks and other wireless ad-hoc networks. It is jointly developed in Nokia Research Centre of University of California, Santa Barbara and University of Cincinnati by C. Perkins and S. Das. It is an on-demand and distance-vector routing protocol, meaning that a route is established by AODV from a destination only on demand[1,4].

AODV is capable of both unicast and multicast routing. It keeps these routes as long as they are desirable by the sources. Additionally, AODV creates trees which connect multicast group members. The trees are composed of the group members and the nodes needed to connect the members. The sequence numbers are used by AODV to ensure the freshness of routes. It is loop-free, self-starting, and scales to large numbers of mobile nodes. AODV defines three types of control messages for route maintenance:

RREQ-A route request message is transmitted by a node requiring a route to a node. As an optimization AODV uses an expanding ring technique when flooding these messages. Every RREQ carries a time to live (TTL) value that states for how many hops this message should be forwarded. This value is set to a predefined value at the first transmission and increased at retransmissions. Retransmissions occur if no replies are received. Data packets waiting to be transmitted (i.e. the packets that initiated the RREQ). Every node maintains two separate counters: a node sequence number and a broadcast_ id. The RREQ contains the following fields:-
Source address, broadcast ID, source sequence number, destination address, destination sequence number and hop count[2,3].

The pair < source address, broadcast ID> uniquely identifies a RREQ. Broadcast_id is incremented whenever the source issues a new RREQ.

RREP- A route reply message is unicasted back to the originator of a RREQ if the receiver is either the node using the requested address, or it has a valid route to the requested address. The reason one can unicast the message back, is that every route forwarding a RREQ caches a route back to the originator[2].

RERR- Nodes monitor the link status of next hops in active routes. When a link breakage in an active route is detected, a RERR message is used to notify other nodes of the loss of the link. In order to enable this reporting mechanism, each node keeps a ―precursor list", containing the IP address for each its neighbors that are likely to use it as a next hop towards each destination[3].

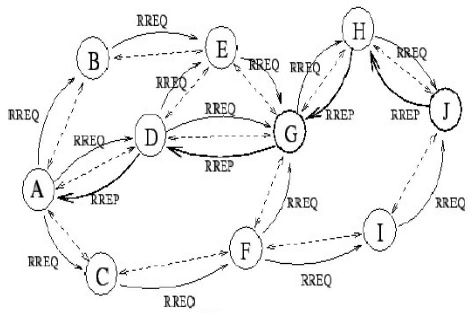


Figure 3: A possible path for a route replies if A wishes to find a route to J

The above Figure 3 illustrates an AODV route lookup session. Node A wants to initiate traffic to node J for which it has no route. A transmit of a RREQ has been done, which is flooded to all nodes in the network. When this request is forwarded to J from H, J generates a RREP. This RREP is then unicasted back to A using the cached entries in nodes H, G and D.

AODV builds routes using a route request/route reply query cycle. When a source node desires a route to a destination for which it does not already have a route, it broadcasts a route request (RREQ) packet across the network. Nodes receiving this packet update their information for the source node and set up backwards pointers to the source node in the route tables. In addition to the source node's IP address, current sequence number, and broadcast ID, the RREQ also contains the most recent sequence number for the destination of which the source node is aware. A node getting the RREQ may send a route reply (RREP) if it is either the destination or if it has a route to the destination with corresponding sequence number greater than or equal to that contained in the RREQ. If this is the case, it unicast a RREP back to the source. Otherwise, it rebroadcasts the RREQ. Nodes keep track of the RREQ's source IP address and broadcast ID. If they receive a RREQ which they have already processed, they discard the RREQ and do not forward it.

As the RREP propagates back to the source, nodes set up forward pointers to the destination. Once the source node receives the RREP, it may begin to forward data packets to the destination. If the source later receives a RREP containing a greater sequence number or contains the same sequence number with a smaller hop count, it may update its routing information for that destination and begin using the better route.

As long as the route remains active, it will continue to be maintained. A route is considered active as long as there are data packets periodically travelling from the source to the destination along that path. Once the source stops sending data packets, the links will time out and eventually be deleted from the intermediate node routing tables. If a link break occurs while the route is active, the node upstream of the break propagates a route error (RERR) message to the source node to inform it of the now unreachable destinations. After receiving the RERR, if the source node still desires the route, it can reinitiate route discovery[2].

Multicast routes are set up in a similar manner. A node wishing to join a multicast group broadcasts a RREQ with the destination IP address set to that of the multicast group and with the 'J'(join) flag set to indicate that it would like to join the group. Any node receiving this RREQ that is a member of the multicast tree that has a fresh enough sequence number for the multicast group may send a RREP. As the RREPs propagate back to the source, the nodes forwarding the message set up pointers in their multicast route tables. As the source node receives the RREPs, it keeps track of the route with the freshest sequence number, and beyond that the smallest hop count to the next multicast group member. After the specified discovery period, the source nodes will unicast a Multicast Activation (MACT) message to its selected next hop. This message serves the purpose of activating the route. A node that does not receive this message that had set up a multicast route pointer will timeout and delete the pointer. If the node receiving the MACT was not already a part of the multicast tree, it will also have been keeping track of the best route from the RREPs it received. Hence it must also unicast a MACT to its next hop, and so on until a node that was previously a member of the multicast tree is reached. AODV maintains routes for as long as the route is active. This includes maintaining a multicast tree for the life of the multicast group. Because the network nodes are mobile, it is likely that many link breakages along a route will occur during the lifetime of that route.

The counting to infinity‖ problem is avoided by AODV from the classical distance vector algorithm by using sequence numbers for every route. The counting to infinity problem is the situation where nodes update each other in a loop.

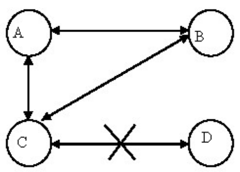


Figure 4: Counting to infinity problem

Consider nodes A, B, C and D making up a MANET as illustrated in Figure 4. A is not updated on the fact that its route to D via C is broken. This means that A has a registered route, with a metric of 2, to D. C has registered that the link to D is down, so once node B is updated on the link breakage between C and D, it will calculate the shortest path to D to be via A using a metric of 3.C receives information that B can reach D in 3 hops and updates its metric to 4 hops. A then registers an update in hop-count for its route to D via C and updates the metric to 5. So they continue to increment the metric in a loop.

The way this is avoided in AODV, for the example described, is by B noticing that as route to D is old based on a sequence number. B will then discard the route and C will be the node with the most recent routing information by which B will update its routing table.

Characteristics of AODV

- Unicast, Broadcast, and Multicast communication.
- On-demand route establishment with small delay.
- Multicast trees connecting group members maintained for lifetime group.
- Link breakages in active routes efficiently repaired.
- All routes are loop-free through use of sequence numbers.
- Use of Sequence numbers to track accuracy of information.
- Only keeps track of next hop for a route instead of the entire route.
- Use of periodic HELLO messages to track neighbors.

Advantages and Disadvantages

The main advantage of AODV protocol is that routes are established on demand and destination sequence numbers are used to find the latest route to the destination. The connection setup delay is less. The HELLO messages supporting the routes maintenance are range-limited, so they do not cause unnecessary overhead in the network.

One of the disadvantages of this protocol is that intermediate nodes can lead to inconsistent routes if the source sequence number is very old and the intermediate nodes have a higher but not the latest destination sequence number, thereby having stale entries. Also multiple Route Reply packets in response to a single Route Request packet can lead to heavy control overhead. Another disadvantage of AODV is that the periodic beaconing leads to unnecessary bandwidth consumption.

2) Dynamic State Routing (DSR)

The DSR protocol requires each packet to carry the full address every hop in the route, from source to the destination. This means that the protocol will not be very effective in large networks, as the amount of overhead carried in the packet will continue to increase as the network diameter increases.

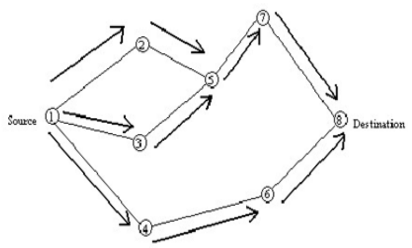
Therefore, in highly dynamic and large networks the overhead may consume most of the bandwidth. However, this protocol has a number of advantages over other routing protocols, and in small to moderately size networks (perhaps up to a few hundred nodes), this protocol performs better. An advantage of DSR is that nodes can store multiple routes in their route cache, which means that the source node can check its route cache for a valid route before initiating route discovery, and if a valid route is found there is no need for route discovery. This is very beneficial in network with low mobility, because the routes stored in the route cache will be valid for a longer period of time. Another advantage of DSR is that it does not require any periodic beaconing (or hello message exchanges), therefore nodes can enter sleep node to conserve their power. This also saves a considerable amount of bandwidth in the network. A full description of this protocol appears in later text.

Dynamic Source Routing (DSR) is a routing protocol for wireless mesh networks.[5] It is similar to AODV in that it establishes a route on-demand when a transmitting mobile node requests one. However, it uses source routing instead of relying on the routing table at each intermediate device.

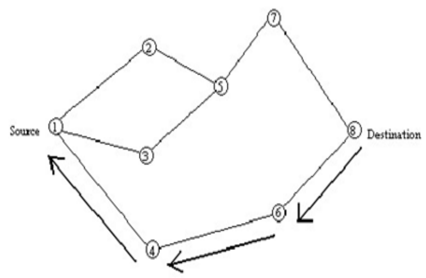
Dynamic source routing protocol (DSR) is an on-demand, source routing protocol, whereby all the routing information is maintained at mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is composed of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to arbitrary destinations in the ad hoc network[5]. An optimum path for a communication between a source node and target node is determined by Route Discovery process. Route Maintenance ensures that the communication path remains optimum and loop-free according the change in network conditions, even if this requires altering the route during a transmission. Route Reply would only be generated if the message has reached the projected destination node, route record which is firstly contained in Route Request would be inserted into the Route Reply.

To return the Route Reply, the destination node must have a route to the source node. If the route is in the route cache of target node, the route would be used. Otherwise, the node will reverse the route based on the route record in the Route Reply message header - symmetric links. In the event of fatal transmission, the Route Maintenance Phase is initiated whereby the Route Error packets are generated at a node. The incorrect hop will be detached from the node's route cache; all routes containing the hop are reduced at that point. Again, the Route Discovery Phase is initiated to determine the most viable route.

The major dissimilarity between this and the other on-demand routing protocols is that it is beacon-less and hence it does not have need of periodic hello packet transmissions, which are used by a node to inform its neighbors of its presence. The fundamental approach of this protocol during the route creation phase is to launch a route by flooding RouteRequest packets in the network. The destination node, on getting a RouteRequest packet, responds by transferring a RouteReply packet back to the source, which carries the route traversed by the RouteRequest packet received.



(a). Propagation of request (PREQ) packet



(b). Path taken by the Route Reply (RREP) packet

Figure 5: Creation of route in DSR

A destination node, after receiving the first RouteRequest packet, replies to the source node through the reverse path the RouteRequest packet had traversed. Nodes can also be trained about the neighbouring routes traversed by data packets if operated in the promiscuous mode. This route cache is also used during the route construction phase. If an intermediary node receiving a RouteRequest has a route to the destination node in its route cache, then it replies to the source node by sending a RouteReply with the entire route information from the source node to the destination node.

Advantages and Disadvantages

DSR uses a reactive approach which eliminates the need to periodically flood the network with table update messages which are required in a table-driven approach. The intermediate nodes also utilize the route cache information efficiently to reduce the control overhead.

The disadvantage of DSR is that the route maintenance mechanism does not locally repair a broken down link[5]. The connection setup delay is higher than in table driven protocols. Even though the protocol performs well in static and low-mobility environments, the performance degrades rapidly with increasing mobility. Also, considerable routing overhead is involved due to the source-routing mechanism employed in DSR. This routing overhead is directly proportional to the path length.

3) Related Work

The performance differentials are analyzed using varying network load, mobility and network size. The internet connectivity may frequently create scenarios of multiple sources with constant bit rate traffic leading to common destination. In this paper, the performance of AODV and DSR are compared in normal and constrained scenarios for getting conclusions[7].

4) Simulation Environment

We simulated on Network Simulator [6], an event driven network simulator developed at UC Berkeley that simulates variety of IP networks.

To setup a simulation network, an OTCL script is written and to simulate it the script is executed which initiates an event scheduler and the network topology is setup using the network objects, controlling the traffic sources and the time to start and stop the transmitting of packets.

NAM and Xgraph are used for running the simulations. The biggest advantage of network animator (NAM) is that it provides a graphical user interface (GUI) for the different simulation environment according to the parameters specified by the user. The Xgraph utility generates the graphical output of the input data (or trace files).

To evaluate the performance of protocol in MANET, the protocol should be tested under realistic conditions such as – transmission range, data traffic, movement of mobile users etc. The simulations here use the Random Waypoint Mobility Model. It includes pause times between changes in destination and speed. The Random Waypoint model uses the concepts of epoch and pause making it a little bit more similar to realistic user mobility model.

Evaluations based on throughput and Packet delivery fraction comparison.

For all the simulations, the same movement model is used. The maximum speed of the nodes was set to 20m/s.

The number of nodes varied for 10 and 15.

The Simulation time was varied as 10s and 25s.

Table 1: Simulation Scenario for Simulation time as 10s and 25s for 10 nodes

Parameter	Value
Number of nodes	**10**
Simulation Time	10 sec and 25 sec
Pause Time	5ms
Environment Size	800x800
Transmission Range	250 m
Traffic Size	Constant Bit Rate
Packet Size	512 bytes
Packet Rate	5 packets/s
Maximum Speed	20 m/s
Queue Length	50
Simulator	ns-2.34
Mobility Model	Random Waypoint
Antenna Type	Omni directional

Table 2: Simulation Scenario for Simulation time as 10s and 25s for 15 nodes

Parameter	Value
Number of nodes	**15**
Simulation Time	10 sec and 25sec
Pause Time	5ms
Environment Size	800x800
Transmission Range	250 m
Traffic Size	Constant Bit Rate
Packet Size	512 bytes
Packet Rate	5 packets/s
Maximum Speed	20 m/s
Queue Length	50
Simulator	ns-2.34
Mobility Model	Random Waypoint
Antenna Type	Omni directional

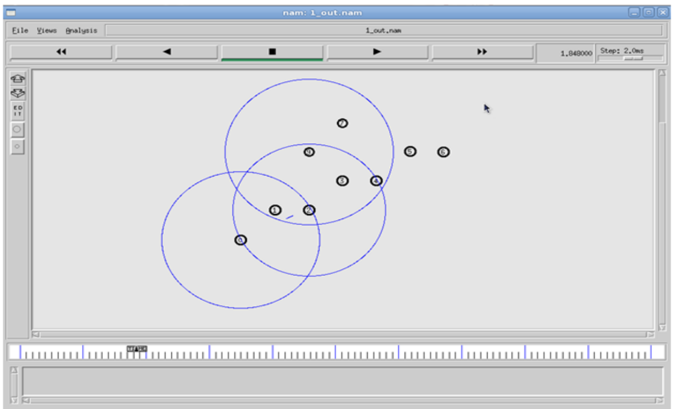
III. RESULT AND DISCUSSION

5) Simulation Results

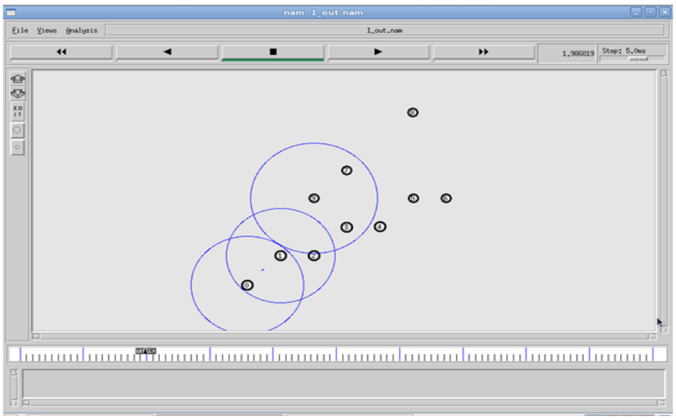
Experiments are conducted with CBR traffic sources sessions between different to common destination using AODV and DSR. The performance metric is Average Packet delivery rate. It was observed that AODV performs better than DSR in normal case. In another experiment four different CBR traffic sources started sessions with a common destination. The performance comparisons reflect that AODV suffers degradation of 30% whereas DSR suffers 10% compared to the normal situation (shown in Graphs)[7,8]. On comparing their performances, it was observed that DSR performs better than AODV under the constrained situation[7].

Simulation Graphs

1) A Screenshot of 10 nodes of AODV NAM – Network animator



2) A Screenshot of 10 nodes of DSR NAM – Network animator

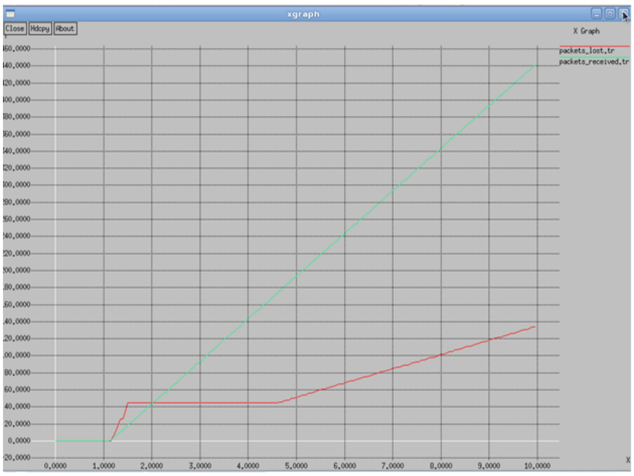


3) X Graph of 10 seconds simulation time of AODV with 10 nodes

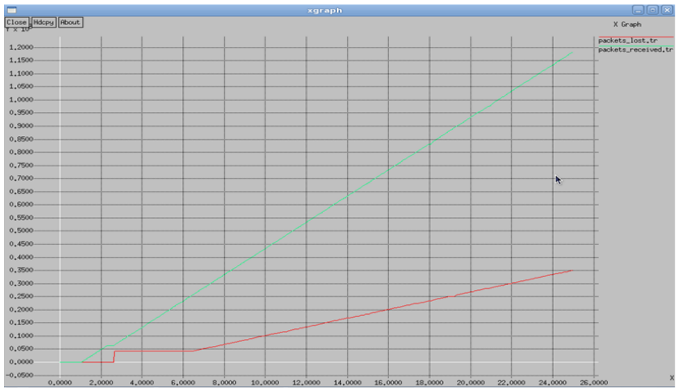
From fig, as the simulation start the packet received and packet loss is initially zero, because initially there is no CBR connection and nodes taking their right place. As the CBR connections establish between the nodes the number of packet received increases but no packet loss is there, it means all generated packets are being received by the nodes. But the packet loss increases substantially on the simulation time increases. Finally the packet received is more than the packet loss.

4) X Graph of and 10 seconds simulation time of DSR with 10 nodes

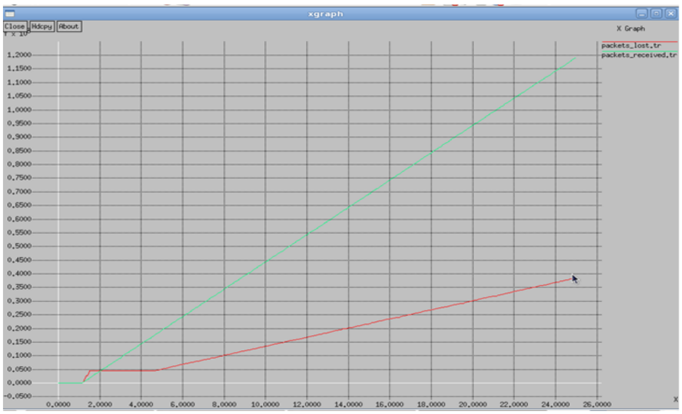
By the Figure we see that as the simulation start the packet received and packet loss is initially zero, because initially there is no CBR connection and nodes taking their right place. As the CBR connections establish the number of packet lost increases very much as compare to packet received. It shows that mostly generated packets are being dropped by the nodes. But the packet loss decreases substantially on the simulation time increases, and number of packet received increases substantially on the simulation time increases.



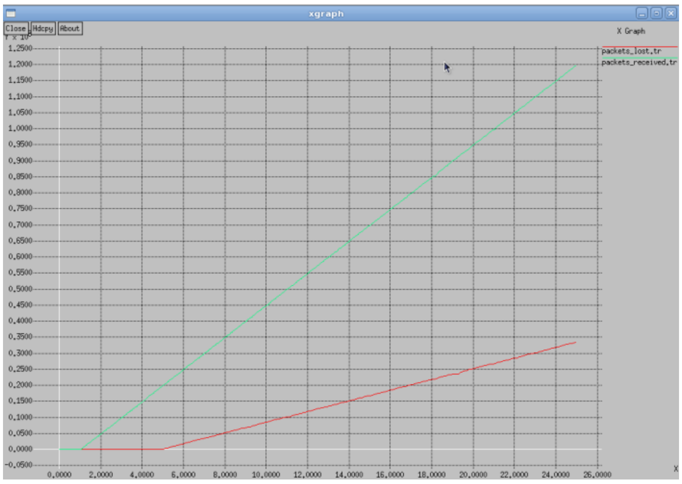
5) X Graph of 25 seconds simulation time of AODV with 10 nodes



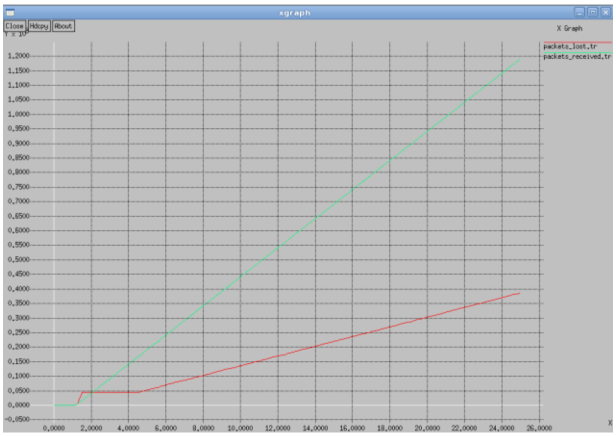
6) X Graph of 25 seconds simulation time of DSR with 10 nodes



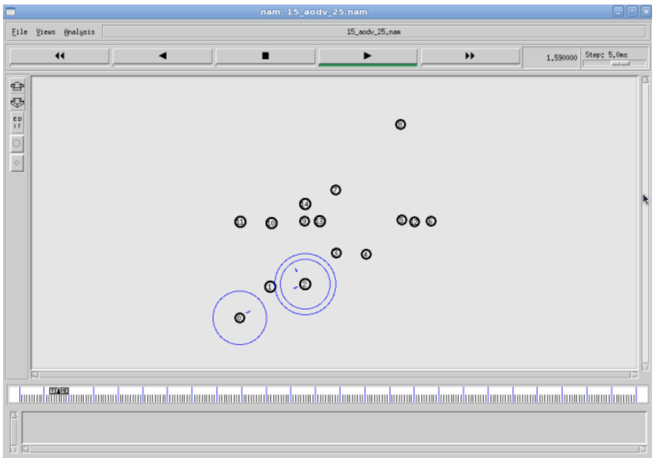
7) X Graph of 25 seconds simulation time of AODV with 15 nodes



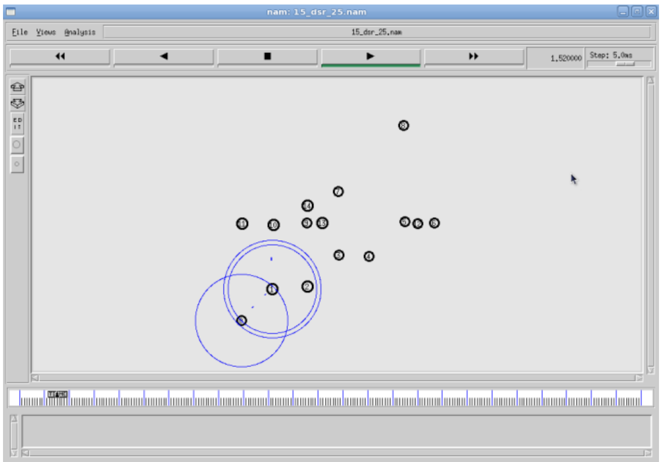
8) X Graph of 25 seconds simulation time of DSR with 15 nodes



9) A Screenshot of 15 nodes of AODV NAM – Network animator



10) A Screenshot of 15 nodes of AODV NAM – Network animator



IV. CONCLUSION

We could observe that the performance of reactive routing protocol depends upon the scenario. In normal cases AODV performs better than DSR using various performance metrics. DSR works better than AODV in constrained situation of several CBR traffic sources leading to same destination in the mobile communicating nodes [7].

We could also see the same behaviour of AODV & DSR in fact of packet receiving and packet loss. Initially there is no packet loss in AODV and a very high packet loss in DSR. But as the simulation time increases, the packet loss decreases and the packet receiving increases [7].

Moreover it can also be seen that AODV performs better with dynamic topology whereas DSR performs over AODV with static topologies.

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