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The Enhanced Network Architecture,Route discovery and Data Transmission of AODV

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ABSTRACT

Many routing protocols have been proposed for mobile ad hoc networks that can reflect the state-of-the-art of research work on mobile ad hoc network routing.Network architecture of mobile ad hoc networks is an important and essential issue that is a major technical challenge. The report aims at providing a detailed study of the Network Architecture, Route discovery and Data Transmission,of Reactive Protocols AODV. AODV as a Distance Vector Protocols and is Link State Protocols. These kinds of protocols are not maintaining topology information of the network, the nodes can obtain necessary route when it is required hence it is not exchanging the routing information time to time. The network is compatible with the conventional; modify the routing protocol with allowed parameters in AODV. AODV is the best protocol which is used for route discovery and it is adaptable to highly dynamic networks is a great advantage in MANET.

KEYWORDS

MANET, AODV, Network Architecture, Route discovery, Data Transmission.

1. INTRODUCTION

In MANET, mobile nodes communicate with each other using wireless channels, without any existinginfrastructure. Transmission of all kinds of data will takes place with the help of multiple hops across thenetwork, because the transmission as well as reception range of wireless network is limited.the problems with routing in Mobile Ad-hoc Networks are Asymmetric links, Routing Overhead, Interference, Dynamic Topology [1]. MANET has a decentralized network infrastructure.In MANET all nodes are free to move randomly. MANET is capable of creating a Self-configuring and self-maintaining network without the help of a centralized infrastructure.MANET has no fixed infrastructure or centralized administration is Available, these networks are self-organized and end-to-end communication may require routing information [2] via several intermediate nodes. The main assumption of the previously presentedad hoc routing protocols is that all participating nodes do so in good faith and without maliciously disrupting the operation of the protocol [3].

Routing protocol in ad-hoc networks are classified into three main categories, proactive, reactive and hybrid. In proactive routing protocols, routing information of nodes is exchanged, periodically. In reactive routing protocol routing information of nodes gathered on time when needed. In hybrid the combination of the two are used [4].Ad Hoc on Demand Distance Vector routing protocol is a reactive routing protocol which establish a route when a node requires sending data packets. It has the ability of unicast & multicast routing. The Ad hoc On-Demand Distance Vector (AODV) algorithm enables dynamic, self-starting, multihop routing between participating mobile nodes wishing to establish and maintain an ad hoc network. AODV allows mobile nodes to obtain routes quickly for new destinations, and does not require nodes to maintain routes to destinations that are not in active communication. AODV allows mobile nodes to respond to link breakages and changes in network topology in a timely manner [5].

2. AODV PROTOCOL NETWORK ARCHITECTURE

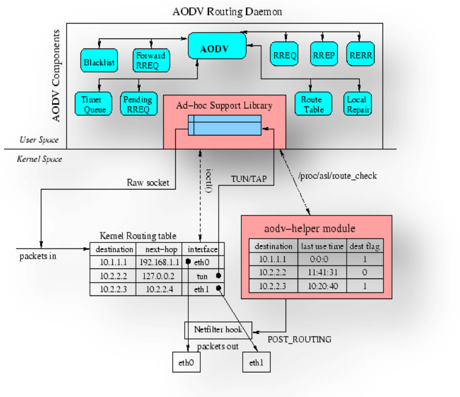
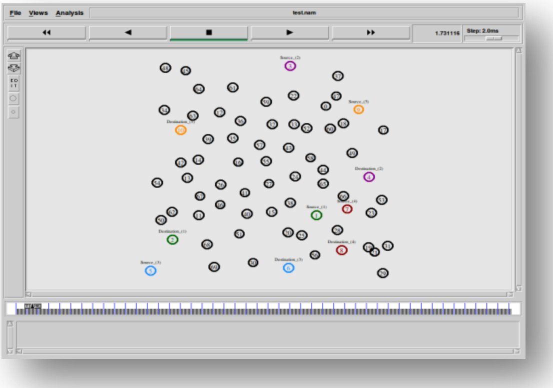


Fig 1: Architecture of AODV

The current Internetworking architecture segregates the routing functionality into two parts: packet forwardingand packet routing. Packet forwarding refers to the process of taking a packet, consulting a table (the forwardingtable), and sending the packet towards its destination as determined by that table. Packet routing, on the otherhand, refers to the process of building the forwarding table. Forwarding is a well-defined process performedlocally at each node, whereas routing involves a complex distributed decision making process commonly referredto as the routing algorithm or the routing protocol. AODV broadcasts every change in the network to every node is not necessary. If a link breakage does not effect on going transmission there will be no global broadcast occurs. Local movements of nodeshave local effects only affected nodes are informed. AODV reduces the network wide broadcasts to the extent possible. Significant reduction incontrol overhead is the great advantage in AODV compare with other protocols.



Source nodes are 1, 3, 5, 7, 9 Destination nodes are 2, 4, 6, 8, 10

Fig 2: Simulation of nodes in AODV

Current Architecture of AODV has some challenges like Handling Outstanding Packets, Updating the Route Cache, Intermixing Forwarding and Routing Functions, New Routing Models, Cross-Layer Interactions, hence this situation leads to develop a general solution to support on-demand routing in general purpose operating systems.

AODV algorithms reducethe acquisition time. It could eliminate the necessity of periodical system in wide range broadcasts and the nature of AODV is symmetric links between nodes.There is no maintenance of routing information and periodic routing table exchange. Hence the AODV architecture has to be improved.

3. ROUTE DISCOVERY IN in AODV

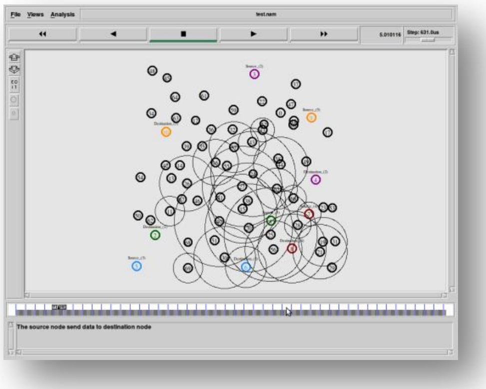


Fig 3.1: All nodes broadcast the control packets to its one hop neighbor nodes and identifies the route

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AODV consists of two processes- Route Discovery (use of RREQ and RREP) and Route Mainte- nance (use of RERR and HELLO).

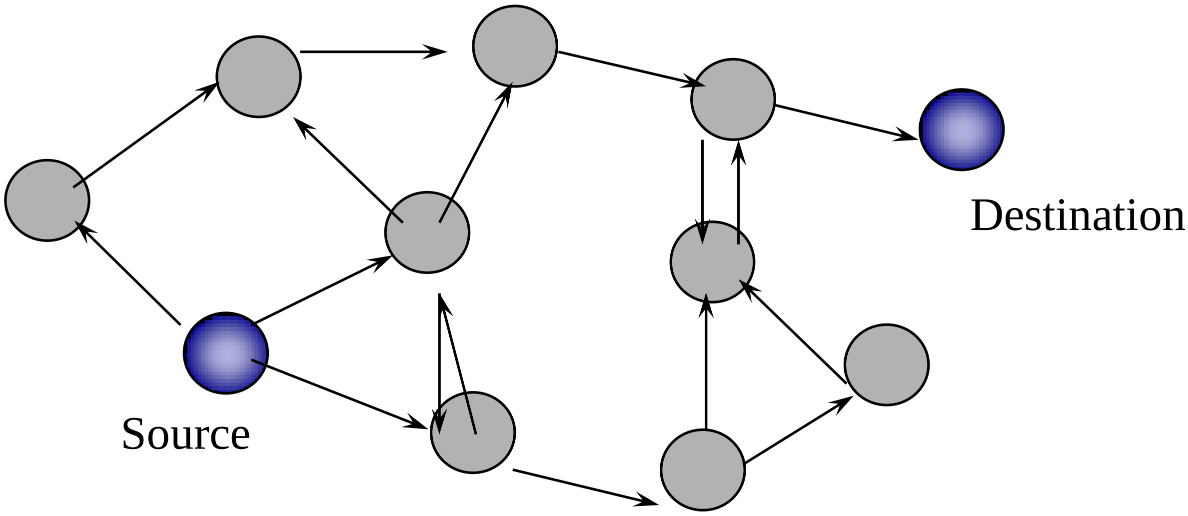

Fig 3.2: RREQ

In RREQ, when a source node needs to send packets to a destination, for which it has no available route, it broadcasts a RREQ (Route Request) packet to its neighbors. Each node maintains a monotonically increasing sequence number to ensure loop free routing and supersedes stale route cache. The source node includes the known sequence number of the destination in the RREQ packet.

<src_addr, src_sequence_#, broadcast_id, dest_addr, dest_sequence_#, hop_cnt>

Fig: Structure of RREQ

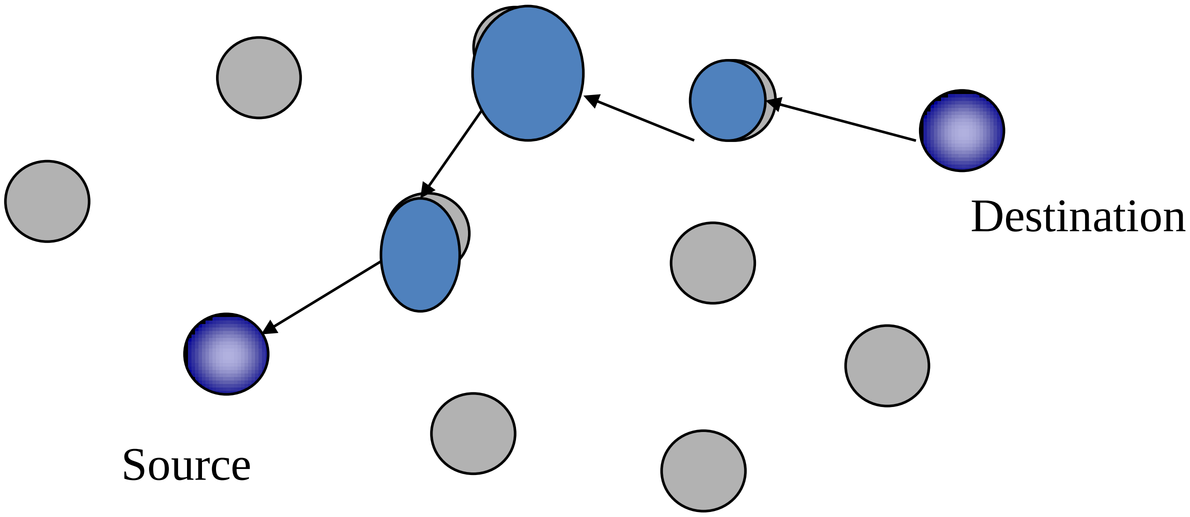

Fig 3.3: RREP

The RREP packet is the message sent back to source by node which is either destination node or contains a valid route to destination.The unicast RREP along reverse path to source of the request. Each neighboring node blindly rebroadcast the received RREQ packet until a route is established. The RREP is unicast in a hop-byhopfashion to the source. As the RREP propagates, eachintermediate node creates a route to the destination. Whenthe source receives the RREP, it records the route to the destinationand can begin sending data. If data is _owing and a link break is detected, a RouteError (RERR) is sent to the source of the data in a hop-byhopfashion. As the RERR propagates towards the source,each intermediate node invalidates routes to any reachabledestinations. When the source of the data receives theRERR, it invalidates the route and reinitiates route discoveryif necessary.[c]. Neighbourhood information is obtained through hello messages. Each node broadcasts a hello message to its neighbours at a regular hello-interval.Hello messages propagate only for one hop, in the neighbourhood of a node.

4. Data Transmission in AODV

The AODV packets carry only the destination address. AODV has potentially less routing overheads than other protocol and AODV route replies only carry the destination IP address andthe sequence number. The advantage of AODV is that it is adaptable to highly dynamic networks.AODV broadcast theRoute error message to all its neighbors. Route maintained in routing table and AODV allows frequent route discovery and route discovery based on shortest and freshest [a].

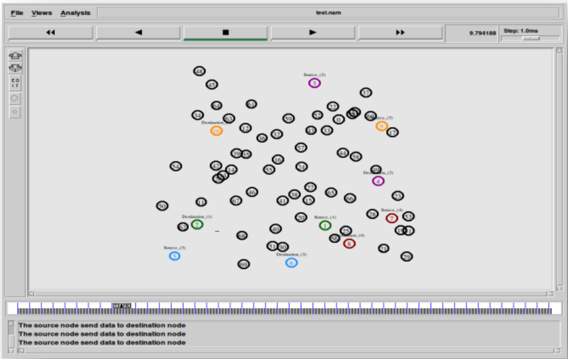

Fig 4: All source nodes transmit data to destination via identified route.

The route discovery mechanism utilizes simple flooding method, where a mobile node massively rebroadcasts received route request (RREQ) packets until a route to destination is established. This can cause more retransmissions and thus excessive energy consumption. This work aims to reduce the number of messages RREQ (Route Request), by a new probabilistic and dichotomy method for the discovery of destination. This method can significantly reduce the number of RREQ packets transmitted during route discovery operation.

The sequence number of routing table is used to determine whether the routing information isup-to-date or not and also it is useful to prevent routing loop problem. To routes are created on demand, source node broadcast (RREQ) request packet to their neighbours and neighbours relaythe same until it reached to its destination. Then destination node sends reply packet to sourcenode (RREP) using the same path from which request packet come. The RREQ contains source address, source-sequence, destination address, destinationsequence, hop count.

AODV is not doing anything when the communication routs between nodes are valid. When a node needs to discover a route to a destination that time only the A RREQ message is broadcasted.

5. Conclusion

AODV offers quick adaptation to dynamic link conditions, low processing and memory overhead, low network utilization, and determines unicast routes to destinations within the ad hoc network. It uses destination sequence numbers to ensure loop freedom at all times. We examined the routing architecture in current system is find that, it is insufficient on several counts, especially for supporting on-demand or reactive routing protocols. Hence new implementations are necessary in future. Need further improvements in response time and capabilities of the protocol are necessary in future.

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