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# Route Discovery Process in Reactive Routing Protocol

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## ABSTRACT

A Mobile Ad-hoc network (MANET) is a self-organizing wireless network, which has no fixed infrastructure or central control station. A Major aspect of ad-hoc networks is that the nodes move randomly, which requires the routing protocols in ad-hoc network to quickly respond to the network topology change. In addition to that it should provide the various quality of services such as guaranteed delivery, security, reduced overhead etc. An efficient protocol must have the mechanism to maintain paths to other nodes and in most cases, if the routes are affected, it should be able to recover using an existing alternate path. In this, we focused the various methodologies used for route discovery, route maintenance and route recovery process adopted in Reactive routing protocol for MANETs. A Reactive (on-demand) routing strategy is a popular routing category for wireless ad hoc routing.

**Keywords :** Reactive Routing Protocol, Ad-Hoc - On Demand Distance Vector (AODV), Comparison of Reactive Routing Protocol.

## I. INTRODUCTION

Mobile Ad-hoc network is a collection of portable computing devices that form a self-organizing and self-administering wireless networks. Reactive protocols is also known as Source Initiated Protocols. It's not necessary to maintain the routing information or routing activity if there is no any communication. If one node wants to send a packet to the another node then this protocol searches for the route in an on-demand manner and establishes the connection in order to transmit and receive the packets. The route maintenance procedure is used to maintain the routes. These protocols tend to use less bandwidth for maintaining the route tables at every node. However, the latency drastically increases, leading to long delays before a communication can start. This is because a route to the destination has to be acquired first.

To limit the impact of this delay, most protocols will use a route cache for once established routes. The routing mechanisms will vary in different protocols based on the factors like mobility of nodes, expected quality of services, area of application, resources availability etc. The data packets will be lost during path break which occurs due to node mobility. When the network traffic requires real time delivery (voice, for instance), dropping data packets at the intermediate nodes can be costly. Likewise, if the session is a best effort, TCP connection, packet drops may lead to slow start, timeout, and throughput degradation.

## II. REACTIVE ROUTING PROTOCOL

Reactive routing is a bandwidth efficient on-demand routing protocol for Mobile Ad-Hoc Networks. The protocols comprises of two main functions of Route

Discovery and Route Maintenance. In this protocol, a node initiates a route discovery process throughout the network, only when it wants to send packets to its destination. This process is completed once a route is determined or all possible permutations have been examined. Once a route has been established, it is maintained by a route maintenance process until either the destination becomes inaccessible along every path from the source or the route is no longer desired. A route search is needed for every unknown destination. Therefore, theoretically the communication overhead is reduced at expense of delay due to route search. Some reactive protocols are Ad hoc On-Demand Distance Vector (AODV), Dynamic Source Routing (DSR).[1 2]

## III. Ad-Hoc - On Demand Distance Vector (AODV)

Active on demand vector routing protocol uses mobile nodes to identify routes rapidly to reach new destinations and does not require nodes to maintain routes to destinations. It is loop-free and avoids “counting to infinity" problem. The operation of Active on demand vector comprises of two main processes i.e. route discovery and route maintenance.[2 3]

Nodes in the network is comprises with some of the information about the particular nodes. Each node in the network maintains a routing table with the routing information entries such as Destination IP Address, source IP address, Destination Sequence Number, Next Hop, IP Address Lifetime (expiration or deletion time of the route) Hop Count (number of hops to reach the destination) Network Interface other state and routing flags (e.g., valid, invalid).[4,5]

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The route discovery process generates route request / route reply query cycle. When a node has a data to send then it broadcasts a route request (RREQ) packet across the network. The RREQ contains the following fields such as source-address, destination-address, destination-sequence number and hop-count. The nodes receiving this packet update their information for the source node and set up backwards pointers to the source node in the route tables.

A node receiving the route request (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. The RREP contains the following fields such as Destination- address, Destination-sequence number and lifetime. Otherwise, it rebroadcasts the RREQ. Once the source node receives the RREP, it may begin to forward data packets to the destination.

If there are any link or node failures, then the node in the upstream of the break propagates a route error (RERR) message to the source node to inform it of the now unreachable destination(s). In order to enable this reporting mechanism, each node keeps a ``precursor list'', containing the IP address for each its neighbours that are likely to use it as a next hop towards each destination. After receiving the RERR, if the source node still desires the route, it can reinitiate route discovery. On-demand routing protocol which is widely developed in ad- hoc networks because of its effectiveness and efficiency.

### A. Route *Discovery*

When a node wants to establish a route with another node in the network then first it will check whether it have valid route to the destination or not. If it have a valid route in the routing table then it simply send the packets on that route. If it has not a valid route then it

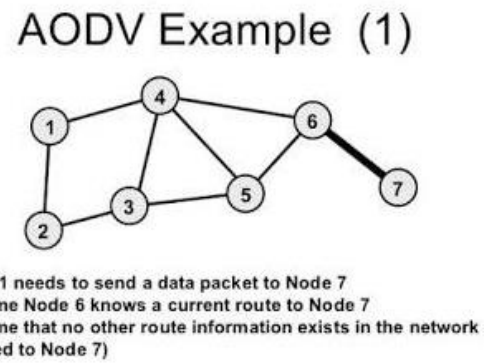
start route discovery process. For this it will create a request packet RREQ (Route request). If they have a route to the destination then they simply send the reply otherwise forward the packets to their intermediate node and so on. At last it will reach to the destination and it simply Unicast the RREP (Route Reply) packet to the source. The source will enter the route in routing table with lifetime of the route. After discovering the efficient route the data packets will be forwarded through the discovered route from source to the destination.

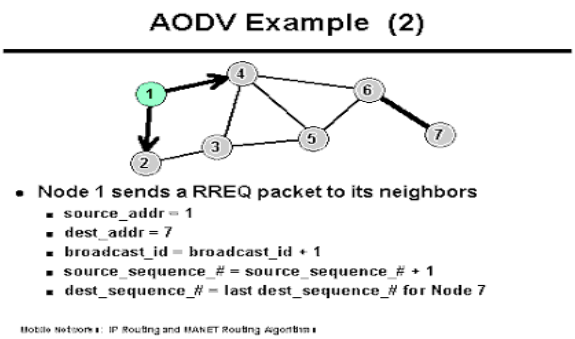
## B. Route Maintenance

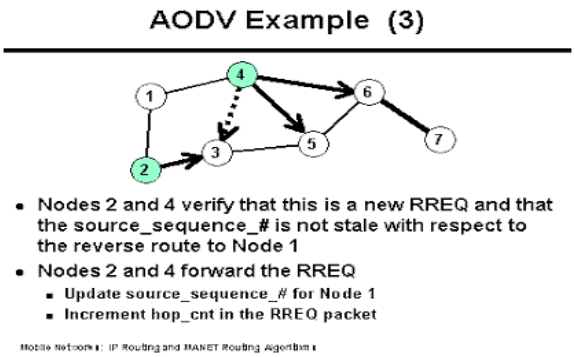
When a route failure occurs then the route maintenance process is initiated. The route failure occurs due to many reasons such as node mobility or power exhaustion. When a route failure occurs then the error message RERR is send to the source then the source will invalidate the route entry in the routing table and reinitiate the route discovery. The information or the data of the routes through the nodes are stored in the form of table to each of the nodes. Tables at each nodes maintains the information of each nodes present in the network.

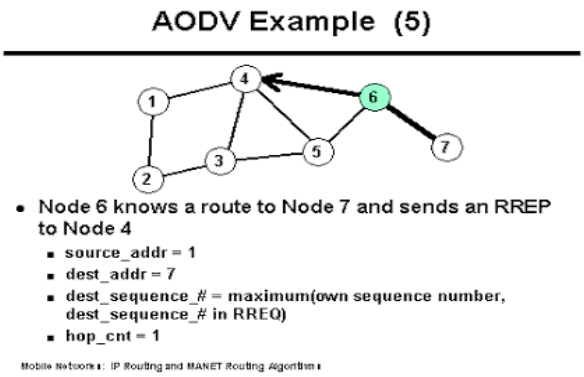
There are some other control packets such as HELLO, RREP-ACK. HELLO messages are used to monitor the connectivity among neighbouring nodes.

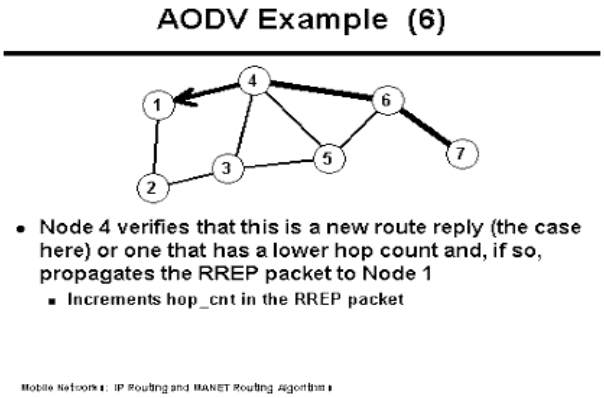
### Example of AODV for route discovery

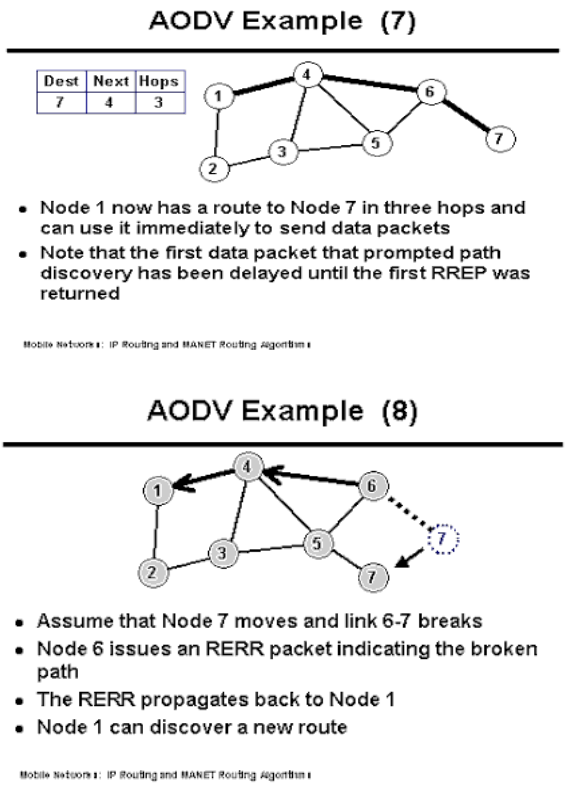





The above figure is the example for finding the route from source to the destination through the nodes. It contains four frame types i.e. route finding, route frame, data frame, ACK. The route finding frame finds the possible route from source to the destination after finding the possible route the route frame gets back to the source from destination to send the data frame, when the data frame is sent successfully the destination needs to send the ACK frame to the source. So that source will came to know that data is successfully sent to the destination.

## IV. CONCLUSION

The task of finding and maintaining routes is nontrivial in mobile ad-hoc network. The mobility causes frequent unpredictable topological changes. A path that was considered to be optimal will not be optimal after a while. The factors that affect the routing process are link capacity, link and node capability, network density, etc. Also, the simulation results show that there is no one protocol is having better performance. Each protocol is suitable for some applications. An efficient routing protocol should be selected that suits the desired task.

## V. REFERENCES

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