

COMPARISON OF MULTICAST ROUTING PROTOCOLS IN AD-HOC WIRELESS NETWORKS

Dr.V.B.Narsimha^{1*}
Asst.Professor,
Dept. of CSE,
University College of Engineering,
Osmania University,
Hyderabad.

B.Manjula
Asst. Professor
Dept. of Informatics,
Kakatiya University.
Warangal

B.Sujatha K.Arun Raj Bapuji
Research Scholar,Research Scholar,
Dept. Of CSE Dept. of CSE
Nizam College, AcharyaNagarjuna University,
Hyderabad Guntur

S.Nagaprasad
Research Scholar,
Dept. of CSE
AcharyaNagarjunaUniversity, Guntur

Abstract: The majority of applications are in the areas where rapid deployment and dynamic reconfiguration are necessary and a wire line network is not available. These include military battlefields, emergency search and rescue sites, classrooms, and conventions, where participants share information dynamically using their mobile devices. Well established routing protocols do exist to offer efficient multicasting service in conventional wired networks. These protocols, having been designed for fixed networks, may fails to keep up with node movements and frequent topology changes in a MANET. Therefore, adapting existing wired multicast protocols as such to a MANET, which completely lacks infrastructure, appear less promising. Providing efficient multicasting over MANET faces many challenges, includes scalability, quality of service, reliable service, security, Address configuration, Applications for multicast over MANET. The existing multicast routing protocol do not addresses these issues effectively over Mobile Adhoc Networks (MANET).

1. Introduction:

In ad hoc network portable devises establish communications without central infrastructure. While moving mobile nodes randomly without central infrastructure raises various problems like security, routing and link break etc. This may be causes routing problems. And while moves in the network each node is end system, but any ho it routes packets. These address issues to destination sequenced distance vector (DSDV) and Dynamic Sources Routing (DSR), which are used efficient routing under mobile ad hoc network (MANET). The main classes of wireless network are proactive and reactive routing protocols.

The main objective of this proposed project is studying of mobile ad hoc network routing protocols in grid environment. And it makes the comparison of DSDV and DSR routing protocols, by using performance matrices and average end to end delay, packet delivery fraction, average routing load and data packets lost. And also the study of analysis discussed that which is the better one and which is should be implemented in

MANET technology. This paper gives a brief overview of generic area and identification of DSDV and DSR routing protocols in MANET network. Wireless routing protocols paper is challenging then wired, because wireless contains mobility. So it is important that to understand performance of routing protocols in variation in mobile technology.

- ❖ So I have to evaluate performance of DSDV in packet delivery fraction i.e. It is the ratio of packets delivered to that generated by the traffic generator.
- ❖ And have to evaluate routing protocols average End to End packet delivery time.
- ❖ And Routing load i.e. it is the number of routing packets required to be sent per data packet delivered.

2. Wireless network

Wireless networks use some sort of radio frequencies in air to transmit and receive data instated of using physical connection (like cables). The most important part of wireless network is avoiding lying most expensive cables and maintenance cost.

2.1 Advantages of wireless network:

- ❖ Wireless nodes can establish connection with each other without cables.
- ❖ Network can be extended without cables.
- ❖ Wireless networks offers flexibility and adept easy to changes in the configuration of the network.
- ❖ Setting up a wireless system is easy and fast and avoiding cables to establishing connection.
- ❖ Wireless users can access real time data from home and office.

2.1.1 Disadvantages of wireless network.

- ❖ Interference due to weather and nature. Obstruction like walls.
- ❖ Interference due to other radio frequency.
- ❖ Slow data transfer from end to end.

2.2 Problems in wireless network.

Some of the problems related to wireless commutation are 1) Multi path propagation 2) path loss and 3) Limited frequency spectrum. Multi path propagation is when a signal travels from sources to destination, in between there are obstacles which make the signal propagate in paths beyond the direct line of sight due to reflections, refraction and diffraction and scattering. Path loss can be determined as the ratio of power transmitted signal and received signal. Path loss is the attenuation of the transmitted signal strength as it propagates away from the sender. The main region of obstruct and path loss is due to nature. It is very important some times to estimate and calculate the path loss in wireless commutation. Due to the ratio of ratio frequency the nature of the terrain are not same everywhere and it is very hard to estimate the path loss in wireless communication. During communication number of signals in atmosphere can be overlap each other, and original signal can be obstruct due to other signals. Limited frequency is shared by many wireless technologies.[1][2].

2.3 Ad hoc network

Ad hoc network is a collection of wireless mobile, forming temporary network connections each other without any centralized management [3]. Mobile Ad-hoc networks are self-organizing and self-configuring multi path networks, where the structures changes dynamically depends on network, this happens due to wireless nodes [4]. The nodes in the network acts as hosts and routes data packets from sources to designation in network. A node in the network utilizes same wireless channels and engages them for forwarding the data packets in network [5].

2.3.1 Problems in Ad-hoc network

In ad-hoc wireless network nodes often changes with in the network locations. But some routes generates unnecessary routes in network, this may cause the network routing load. Most of wired network links rely on the symmetric are always fixed. But in ad-hoc wireless network nodes are changes there positions frequently with in network. Means when sources want to send a packet to destination, mediator will not checks for any quality signals, it just forwards packets. Interference is one the major problem in ad-hoc network. When links comes and go depends on the transmission characteristics, one transmission can over here to another and so this may be correct the total transmission. Another major problem of ad-hoc network is dynamic topology. In ad-hoc network topology is not constant. Mobile node characteristics changes when they movies in network location. In ad-hoc network routing table reflects to topology. Example in the fixed network routing table updates fast (30sec), but this in ad-hoc network it is slow [6].

2.4 DSDV (Distance sequenced distance vector)

Distance sequence distance vector is proactive routing protocol, which is conventional modification of Bellmen-Ford routing algorithm. This protocol adds sequence number, attribute for each route table in each node. Routing table is maintained in each node and this table transmits data packets to other nodes in the network. This protocol was motivated for the use of data exchange along with changing and arbitrary paths of interconnection which may not be close to any base station. All stations list available in the destinations and number of nodes required to transmit data to destination in the routing table. The routing entry is tagged with the sequence number which is originated by the destination station. To consistency this, each station transmits and updates routing table periodically. The packets being broadcasted between stations indicate which station are sending and number of hopes required to reach the particular station [7]. The data broadcast by each node will contains new sequence number and destination address, the number of hops required to reach destination and new sequence number, originally stamped by the destination in each new route table. The Broadcasting of data in DSDV protocol mainly two types 1) full dump and 2) Incremental dumps. Full dump will carry all routing information while incremental dump is only the last change of full dump. These two types of broadcasting done in the network protocol data unit. For full dumps required network protocol data unit but incremental dumps required one network protocol data unit. Proactive routing protocol is based on periodic

exchange of control message and maintaining routing table. Each node maintains complete information about the network. This information is collected from each node from routing table. And each node knows complete topology and it can find best node to route the information. Proactive protocols generates large volume of control message, it uses large amount of bandwidth. The control messages may consume almost the entire bandwidth with the large amount of nodes.

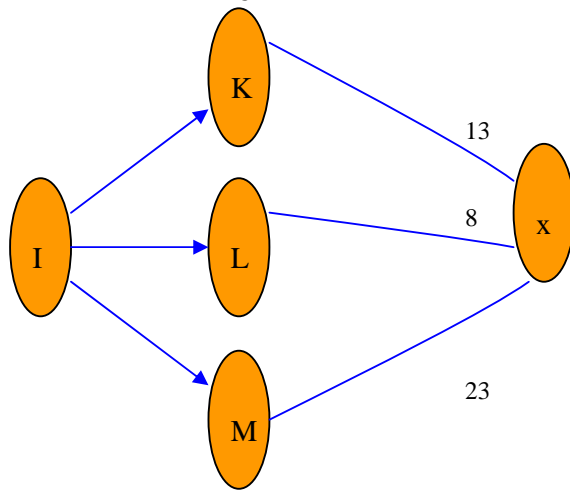


Figure 1: DSDV packet transfer

In the above figure 1 each node I maintains, for each destination x, a set of distance $d_{ij}(x)$ for each neighbor. Node I treats the neighbor K as the next hop for the packet destination for X, if $d_{ik}(x)$ equals minimum of all $d_{ij}(x)$. the message will be sent from I to L as the cost of path to X is minimum through L [11].

2.4.1 Advantages of DSDV protocols

- DSDV maintains multiple paths to every destination. With this, the amount of space in routing table.
- DSDV protocol guarantees loop free paths [10].
- Count to infinity problem is reduced in DSDV [10].
- We can avoid extra routing load by using incremental dumps.

2.4.1 Disadvantages of DSDV protocols

- DSDV doesn't support multi path routing.
- It is difficult to determine a time delay for advertisement of routes [8].
- Wastages of bandwidth due to unnecessary advertisement of routing information in network, even there is no change in the network topology [9].
- It is difficult for large network to maintain routing advertisement. In DSDV each and every host should maintain routing advertisement in network. But in large network it becomes load on network and it consumes more bandwidth.
- All routing decision is taken in completely distributed fashion. Each node uses its local information for routing messages.
- This information may be old or invalid and local information may not update proper.
- This may create a message loop and this message loop can around cycle for a long time.

2.5 DSR (Dynamic Source Routing):

The key feature of Dynamic source routing is uses source routing. DSR is simple and efficient routing protocol designed for use of multi-hop wireless ad hoc network. DSR allows the network completely self-organized and self-configured without any need of existing of central administration. In DSR, the sender knows the complete host-by-host route to destination. These routes are stored in route cache. The data packets carry's the source route in the packet header. When a node want to send a packet to destination in the ad-hoc network, the host don't knows where to transmit the data, it uses a route discovery process dynamically detrain such a route. Route discovery works by flooding the network with route request. Each node receives route request to broadcast it, unless it is the destination or it has a route to the destination in its route cache. Such nodes replies to the request with a route reply packet that is route back to original sources. This route request and replay both are sources routed. The route request shows the path in which way packets should transmit. The route request it self source to backward path. The route carried back by the RREP packet is cached at the source for future use [12] [13].

If any link is broken the source nodes sends notification by using route error packet. Source removes these types of packets from route cache. If the same route is needed it must use same routing table for initiate. DSR makes more aggressive in sources in source routing and routing cache. No other special mechanism is used for routing loops. If forwarding node caches the source route in a packet it forwards for possible future use.

DSR protocol composed with two main mechanism used 1) Route Discovery 2) Route maintains and these two protocols works together and they allows nodes to discover over and maintain routes data to destination in network. All these aspects of protocol work on demand entirely. The protocol allows multiple routes to any destination and allows each sender to select and control the routes used in routing its packets.

2.5.1 Route Discovery:

Route discovery is used when source want route information to destination. The source node looks up the route cache whether destination route is available or not. If it found valid route to destination, it uses route data packets to send. If it doesn't found valid route to destination, then it initiates route discovery processes a route request. The route message contains address of source and destination and unique identification number. An intermediate node receives route message and it checks in route cache for the destination. If no route found, it appends it address to route record of message and forwards the message to neighbor. The message moves in the network until reaches either to source or destination [3].

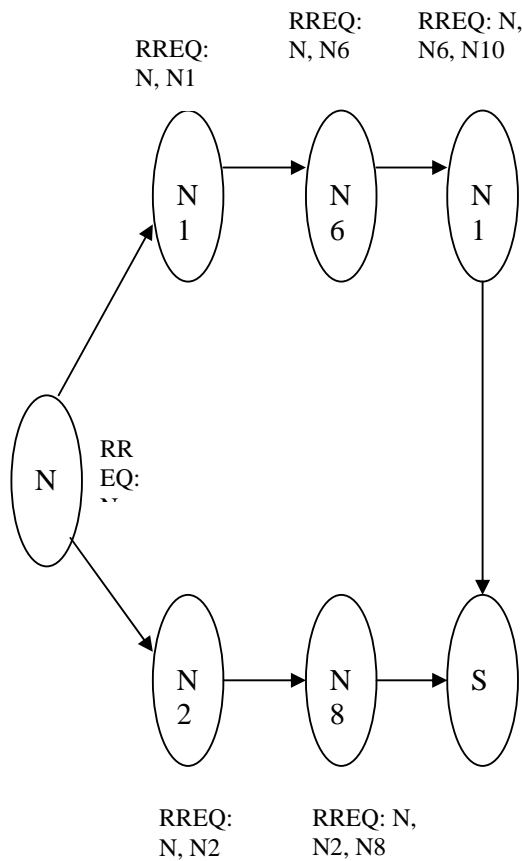


Fig 2: Route Discovery

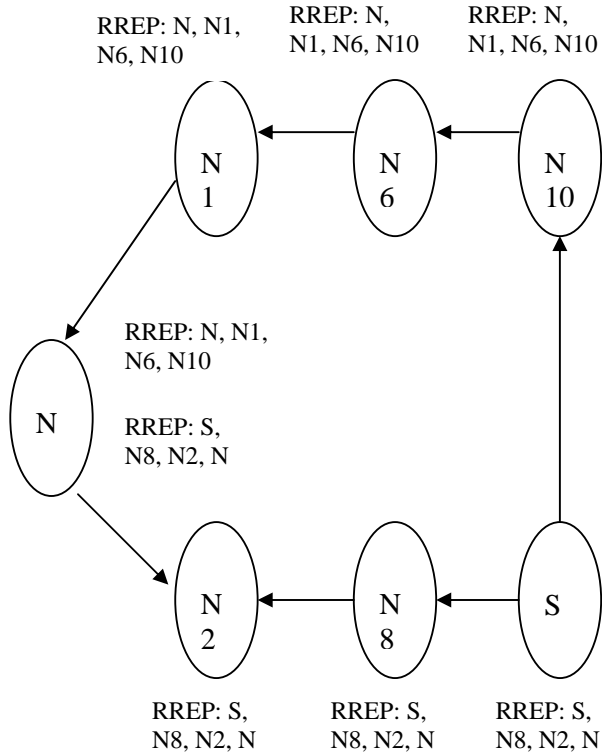


Fig 3: DSR Route reply

2.5.2 DSR Route maintains

Route maintains is used for route errors. When node encounters a fatal error to transmit the data packets to link layer, it removes route information from route cache and generates error message. The route error message is sent to each node that has sent a packet route over broken links. When a node receives a error message, it removes the hop in error from its route cache. Acknowledge is used to verify the correct operation route link [3].

2.6 Conclusion:

In current state problem of DSDV is routing information will maintained in each node locally in network. All routing decisions are taken completely distribution fashion. So the local information may be old and invalid, local information updates periodically. This raise a loop and a message may loop around the cycle for along time. But DSR is dynamic sources routing, source node is knows next hop-by-hop destination.

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