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Analysis of AODV for Mobile Ad Hoc Network

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***Abstract* -An Ad hoc network is a self-configuring infrastructure less network of mobile devices connected by wireless. Routing of information differentiate these networks from other ad-hoc networks. The study of wireless sensor network is done by performing simulation done in MATLAB that can help in better understanding of behavior of various routing protocols. The motive of the mobile Ad-hoc network working group is to standardize IP routing protocol functionality suitable for wireless routing application within both static and dynamic topologies with increased dynamics due to node motion and other factors. AODV provide Quick adaptation under dynamic link conditions, Consume less network bandwidth (less broadcast) AODV is routing protocols which provide a route to destination node on demand.**

***Keywords*- Mobile Ad-hoc Network, Routing Protocols, AODV**

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Introduction

An Ad hoc network is a self-configuring infrastructure less network of mobile devices connected by wireless. The motive of the mobile Ad hoc network working group is to standardize IP routing protocol functionality suitable for wireless routing application within both static and dynamic topologies with increased dynamics due to node motion and other factors.

Ad hoc is Latin word which means "for this purpose".[1]

An Ad-hoc network is a Decentralized type of network.Decentralized means it doesn't rely on pre-existing infrastructure indeed each and every node in the network participates in forwarding data for other nodes.Each node in a mobile Ad-hoc network is free to move independently in any where, and will therefore change its links to other devices frequently. The initial challenge in building a mobile Ad hoc network is equipping each device to continuously maintain the information required to properly route traffic. MANET may be connected to the larger Internet.

Due to the constraints in Wireless sensor networks such as bandwidth, lifetime of battery, speed of processor (CPU) and amount of memory there is an essential need for effective communication techniques for improvement of quality of collected data. Routing protocols from this perspective have a very important role in wireless sensor networks. Reliable dissemination of data in a short time interval to base station (BS) is need of sensors in sensor networks [3] in order to quickly respond to the transmitted information by user from time to time because the information that arrives out of time may cause huge disastrous.

Routing of information differentiate these networks from other ad-hoc networks. The study of wireless sensor network is done by performing simulation that can help in better understanding of behavior of various routing protocols.Ad-hoc networks eliminates the constraints of infrastructure and enable devices to create and join networks on the fly- any time, any where – for virtually any application.

Why we need Ad hoc network

The wireless hosts in ad-hoc network, communicate with each other without the exiting of a fixed infrastructure and without a central control.Setting up of fixed access points and backbone infrastructure is not always viable as infrastructure may not be practical short radio (Bluetooth range ~10m). Also there may be lack of infrastructure in war zone.Self-organizing and adaptive – Allows spontaneous formation and deformation of mobile network.Supports peer-to-pear communication.Supports pear-to-remote communication.Useful when infrastructure is absent, destroyed or impractical.

Advantages and application

Ad- network can have more flexibility, It is better in mobility, It can be more economical, Group of people with laptops and they want to exchange files and data without having an access point, It is suitable for military communication at battlefield where there is no network infra structure.[2]

Routing Protocols in Ad-Hoc Network

An ad-hoc routing protocol is a standard through which nodes decide which way to route packets between source and destination. Nodes in ad-hoc network are not familiar with the topology of the network. They have to discover it. Each node must announce its presence and must listen to announcements made by otter nodes

through broadcasting .There are many ways to classify the MANET routing protocols. Depends on how the protocols handle the packet to deliver from source to destination, most of the protocol classifications are made as [9].

A. Flat Routing Protocol

Information distributed by flat routing protocols as needed to any router that can be reached or received information. No effort is made to organize the network, only to discover the best route hop by hop to a target by any path. Think of this as all routers sitting on a flat geometric plane. An example of a flat routing protocol is Routing Information Protocol (RIP).

B. Pro-Active / Table Driven routing Protocols

Table driven routing protocols maintains fresh lists of destinations and their routes by periodically distributing routing tables throughout the network.

C. Hierarchical Routing protocol

In hierarchical routing protocol, the choice of proactive and ofreactive routing depends on the hierarchical level where a node resides.Routing is initially established with some proactively prospected routes and then serves the demand form additionally activated nodes through reactive flooding on the lower levels.

Overview of Ad-hoc On Demand Distance Vector

AODV provide Quick adaptation under dynamic link conditions, Consume less network bandwidth (less broadcast) AODV is a routing protocol which provides a route to destination node on demand.

There are two types of routing protocols which are On Demand (Reactive) routing and table-driven (Pro-active) routing. In reactive routing protocols the routes are created only when source wants to send data to destination whereas proactive routing protocols are table driven. This type of protocols finds a route on demand by flooding the network with Route Request packets. Being a reactive routing protocol AODV uses routing tables, one entry per destination and sequence numbers are used to determine whether routing information is up-to-date and to prevent routing loops.

AODV [8] uses a route discovery process to dynamically build new routes on an as need basis. AODV is a distributed algorithm using distance vector algorithms, such as the Bellman Ford algorithm. When a route to a destination is unknown, AODV creates a route request packet and broadcasts it to its neighbors.

The existing routing protocol AODV supports three phases, Route Request (RREQ), Route Reply (RREP) and Packet Delivery. [5]

The source node start the discovery process by broadcasting a route request (RREQ) packet to its neighbors, which in their turn forward the request to their neighbors, and their neighbors do the same thing and so no, until either the destination or an intermediate node with a route to the destination is located.

The broadcast ID and the node's IP address identified theRREQ.

In RREQ packet the source node adds the last sequence number it has for the destination. The intermediate nodes if have a route to the destination with a sequence number equal or greater than the one included in RREQ then they reply to RREQ.

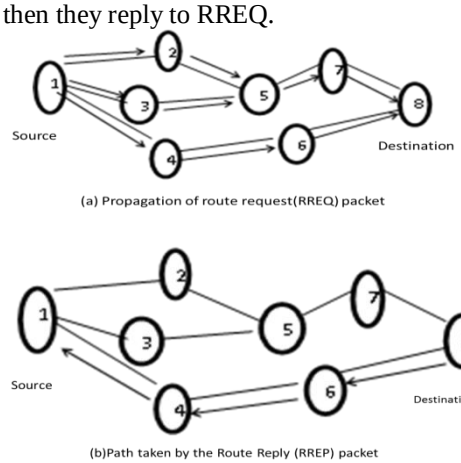


Figure 1(a) Propagation of route request, (b) Path taken by Route Reply

Characteristics of AODV[6]

- Unicast, Broadcast and Multicast communication.
- On-demand route establishment with small delay.
- Multicast trees connecting group members maintained for lifetime of multicast 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.

Advantage of AODV

The main benefitof AODV protocol is that routs are established on demand and destination sequence numbers are used to find the latest route to the destination.

The connection setup delay is lower.

The advantages of AODV are that less memory spaceis required as information of only active routes are maintained, in turn increasing the performance.[7]

Disadvantages of AODV[7]

Intermediate nodes can lead to inconsistent routs if the source sequence number is very old.

The periodic beaconing leads to unnecessary bandwidth consumption.

This protocol is not scalable and in large networks it does not perform well and does not support asymmetric links.

Performance Parameters [9]

We can measure AODV performance on the basis of some parameters these are:

Packet delivery ratio:PDR is a ratio of number of received packets by destination to number of packet send by sender. This illustrates the level of delivered data to the destination.

∑ Number of packet receive / ∑ Number of packet send

The greater value of packet delivery ratio means the better performance of the protocol.

End-to-end Delay:the average time taken by a data packet to arrive in the destination. It also includes the delay caused by route discovery process and the queue in data packet transmission. Only the data packets that successfully delivered to destinations that counted.

∑ (arrive time – send time) / ∑ Number of connections

The lower value of end to end delay means the better performance of the protocol.[9]

Packet Lost: the total number of packets dropped during the simulation.

Packet lost = Number of packet send – Number of packet receive.

The lower value of the packet lost means the better performance of the protocol.[9]

Simulation Work-

The characteristics of AODV routing protocol is shown by the following simulation graphs.

Packet delivery ratio:Here Figure2 shown that packet delivery ratio varies between range 75% to 85%. As we increase number of nodes frompacket delivery ratio decreases.

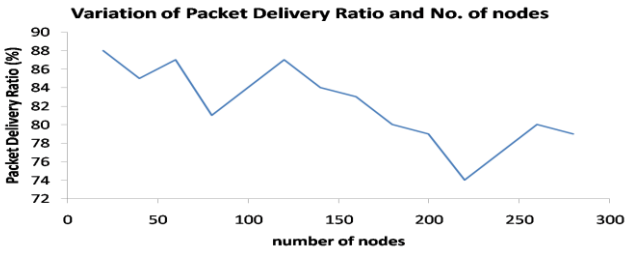


Figure 2 Variation of packet Delivery Ratio and No. of Nodes

End-to-end Delay: End to end delay varying from 0.4 to 1.5 sec as shown in graph in Figure3. It increases with the increase of number of nodes due to waiting in the interface queue.The delay time is also affected by route discovery.

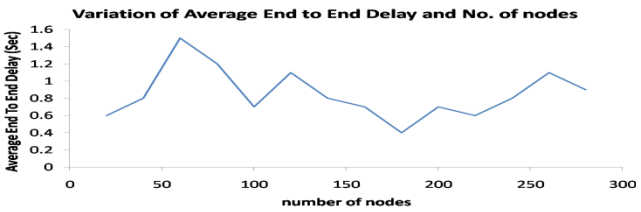


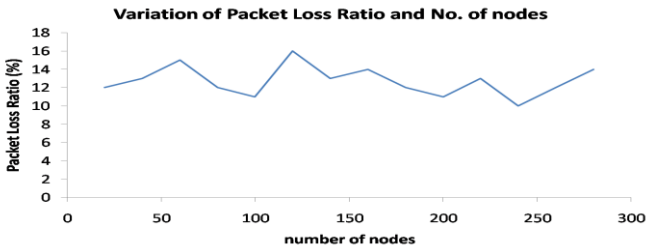
Figure 3 Variation Average End to End Delay and No. of Nodes

Packet Lost: Figure4 shown that variation of packet loss and number of nodes, when number of node increase then packet losses varying from 10% to 16%

Figure 4 Variation of packet Loss and No. of Nodes

Conclusion

In this paper, we reported on simulation-based experiments evaluating AODV routing in MANET.The simulation study consisted of routing protocols AODV analyzing their behavior with respect to three parameters Packet delivery ratio, End-to-end delay and Packet loss.



REFERENCES

1. Tomas Krag and Sebastian Büettrich (2004-01-24). "Wireless Mesh Networking". *O'Reilly Wireless Dev Center*. http://www.oreillynet.com/pub/a/wireless/2004/01/22/wirelessmesh.html. Retrieved 2009-01-20.
2. http://www.slideshare.net/ENGMSHARI/adhoc-networks
3. V. Kunchakarra, "SIMULATION STUDY OF ROUTING PROTOCOLS IN WIRELESS SENSOR NETWORKS," Department of Computer Science, Osmania University, Dec. 2005
4. http://moment.cs.ucsb.edu/AODV/aodv.html
5. SwarnaliHazra University of Calcutta, India,
6. Vivekkumar,"simulation and compatison of AODV and DSR routing protocols in MANETs" Department of Computer Science,Thapr university patiala
7. http://www.enggjournals.com/ijcse/doc/IJCSE10-02-02-47.pdf
8. C. E. Perkins and E. M. Royer, "Ad hoc On-demand Distance Vector Routing," Proceedings of the IEEE Workshop on Mobile Computing Systems and Applications, 1999, pp 90–100.Vetrivelanet N., Reddy A.V. (2008) International MultiConfer-ence of Engineers and Computer Scientists, II.
9. http://harrismare.net/2011/07/14/packet-delivery-ratio-packet-lost-end-to-end-delay