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General Article

Comparison between different Routing Protocol for Mobile Adhoc Network

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Abstract

Adhoc Mobile Network is interconnection of mobile nodes which are dynamically connected and is self configuring network in which flow of message or forwarding packet from source to destination is done through Routing Protocols .In this article we will discuss many routing protocols which will discover the route and maintain the route for adhoc network.we have shown the comparision between Destination sequenced distance vector routing protocol, Adhoc on demand distance vector routing protocol,Optimized link state routing protocol and Dynamic source routing protocol in which we have discus about the overhead, bandwidth,delay,throughput and packet delivery fraction.

Keywords: *DSDV, OLSR, MPR, AODV, RREQ, RREP, RERR*

1. Introduction

Mobile adhoc network are wireless mobile nodes which act as a router.They are of two types.first type is infrastructured network or base station in which mobile nodes work in specific coverage area when it communicate with base station and as it moves out of coverage area of a base station handoff occurs . second type is infrastuctureless network or adhoc network which are self administering in which mobile nodes act as a router which dynamically allocate the path in multiple hops which is too complex so routing protocol decide which path we have to route the packet to reach the destination.

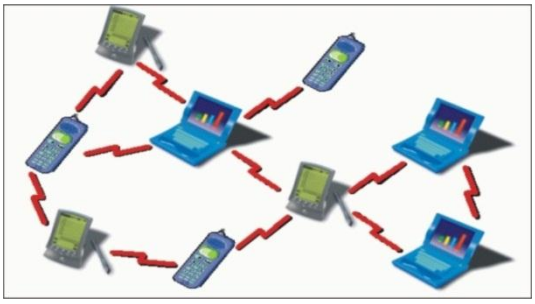

Fig 1 Mobile adhoc network

1.1 Problems of mobile adhoc network

Routing Overhead:-As mobile nodes change their positions dynamically so each time routing table has to be updated which require more overhead
Interference:-Link establishment between the nodes changes frequently which causes interference between the nodes traverse multiple links to reach a destination and mobility causes route change.
Lack of Security:-Parties involved in communication want their data to be secure .attackers can snoop the data when transmitted on the network.
Mobility:- As nodes are dynamic in nature so link breakage and updation of routing table is involved
Assymetric link:-wired network have symmetric link but wireless network ie mobile adhoc network have asymmetric link in which mobile nodes change their positions.
Congested nodes:-some of the nodes involved in communication get overloaded due to which traffic rate increases and congestion occur in that link.

2. Classification of mobile Adhoc routing protocol

2.1 Proactive protocol

It maintains up to date information in the routing tables whenever there is change in network topology.Predefined routes are established to transmit the packet to the destination it is also known as table driven routing protocol as it maintain routing table. Constant propagation of routing information periodically even when topology change does not occur it is not suitable for large network as it has to maintain updated table for each network topology which will require greater routing overhead and more bandwidth. eg dsdv(destination sequenced distance vector routing protocol),olsr(optimized link state routing protocol),wrp(wirelss routing protocol),Table driven routing protocol.

2.1.1Destination sequenced distance vector routing protocol

While transmitting the packet each node maintain routing

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table which contain following information :-
1) Destination address
2) Number of hops required to reach destination
3) New sequence number
In DSDV, each node maintains a next hop table, which it exchanges with its neighbors. There are two types of next hop table exchanges:
1) Full dump:-it send full routing table to the neighbours and will accommodate many packets
2) Incremental update:-those tables which has small changes are sent and should fit in the packet each route update packet will contain sequence number. If two routes have same sequence number than shortest path route will be followed

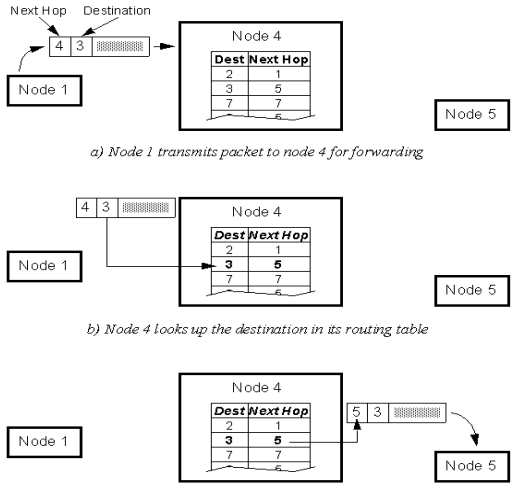

Fig 2 Destination sequenced distance vector routing protocol

2.1.2 Optimized link state routing protocol

Nodes broadcast routing table which create large amount of overhead in network topology.multipoint relay is used to reduce the overhead and for forwarding routing tables. Mobile nodes are selected as mpr to control the traffic.mpr advertise which mobile node will act as mpr to reduce the size of control message.mpr is used to calculate distance from mobile node to destination node.olsr does not detect broken link intermediate node when broadcast the packet than source node came to know that link is broken. OLSR uses two kinds of the control messages: Hello and Topology Control

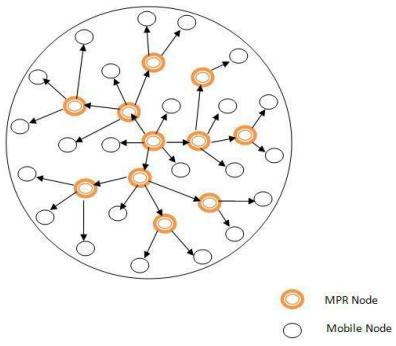

Fig. 3 Optimized link state routing protocol

2.1.3 Comparison between DSDVR and OLSR

Table 1 Comparison between DSDVR and OLSR

DSDVR	OLSR
Overhead is more as in large network it has to Update routing table timely	Overhead is controlled by multipoint relay
Mobility causes route change and topology change	Mobility can't be handle
Broadcasting in dsdv is used to maintain routing updates	Mobile nodes broadcast list of multipoint relay selector instead of neighbor nodes

2.2 Reactive Protocol

Reactive Protocol does not maintain any routing table before the connection establishment .routing table is configured when the node is involved in communication on demand basis. Reactive protocol undergo these operation route discovery ,route maintenance and route deletion. A Source node calls for the route discovery phase to determine a new route whenever a transmission is needed. This route discovery mechanism is based on flooding algorithm which employs on the technique that a node just broadcasts the packet to all of its neighbors and intermediate nodes just forward that packet to their neighbors. This is a repetitive technique until it reaches the destination.

2.2.1 Adhoc on demand distance vector routing protocol

Aodv maintain routing table which store the next hop or destination route information.source when initate to send data packet to destination it will check the path from the routing table. . It broadcasts a route request (RREQ) packet to its neighbors The RREQ contains IP addresses of source and destination(D) node, current sequence number of source(S)and last known sequence number of D, a broadcast ID from S, which is incremented each time S sends a RREQ message[6]through destination sequence number we obtain fresh route to broadcast the packet.as in mobile adhoc network nodes are mobile so rediscovery of route is maintained timely.intermediate node store the path from source to destination in its routing table as if it get RREP from destination or intermediate node.

2.2.2 Dynamic source routing protocol

In dynamic source routing protocol is based on source routing which maintain route cache. Route to another node is not available on demand basis route will establish between source and destination.there are two types of dynamic source routing
1) Route Discovery
2) Route Maintainance
Route discovery:-In route discovery when source send the message to destination it will check the route cache if the route is available for the destination otherwise we will discover the new route.Route discovery requires seven fields during this process such as sourceid, destid,

ReqID,Addresslist, Hoplimit, Network Interface List, Acknowledgment list. Source will send RREQ message to broadcast to the specific destination.In this intermediate node forwards the RREQ to the next hop according to the route specified in the header. When the destination receives the RREQ, It sends back a route reply message. If the destination has a route to the source in its route cache, then it can send aroute response (RREP) message along this route. Otherwise, the RREP message can be sent along the reverse routeback to the source. Intermediate nodes may also use their route cache to reply to RREQs. If an intermediate node has a route to the destination in its cache ,then it can append the route to the route record in the RREQ, and send an RREP back to the source containing this route.

Route maintenance:-When a node detects error while transmitting the route it will inform the route cache to remove that route from the cache which can decrease the route overhead a source receives a RERR packet and a route to the destination is still required, it initiates a new route discovery process. [8]Routes are also deleted from the routing table if they are unused for a certain amount of time.

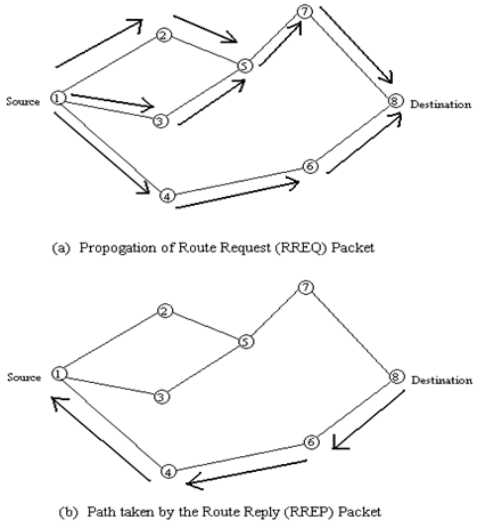

Fig4. Dynamic source routing protocol

3. Comparison between Dsr , Dsdv, Aodv and Olsr

1. Load : It is the amount of traffic being carried by the network.
2. Delay : It is the time taken by a packet from the movement it is transmitted on the network by source node to reach the destination node.
3. Routing Overhead: It is the amount of routing traffic sent over a network.
4. Throughput: It is the no. of packets received by all the destinations over the duration of simulation.

3.1 DSR Performance metrics

1)Packet delivery fraction:- DSR performs well when the number of nodes is less as the load will be less. However its performance declines with increased number of nodes due to more traffic in the network

2)Normalized routing overhead:- DSR routing protocol has less routing overhead than the other protocols in the small network DSR utilizes a route cache. The cache allows multiple route entries to be maintained per destination, thereby enabling multipath routing.

3)Throughput:- The throughput value of DSR increases at lower pause time and grows as the time increases. Hence, DSR shows better performance with respect to throughput among these three protocols

4)Delay:- DSR having the lowest and most stable End to End Delay in Mobility

3.2 Dsdv Performance metrics

1)Packet delivery fraction:- DSDV performance is the worst. The performance degrades with the increase in the number of nodes.

2) Normalized routing overhead:- DSDV generates much more routing traffic than AODV. This is due to the fact that DSDV fact that DSDV periodically generates routing traffic as opposed to the on demand nature of AODV.

3)**Throughput:-** Throughput value of DSDV increases initially and reduces when the time increases.

4)Delay:-DSDV having the lowest and most stable End to End Delay in mobility

3.3 Aodv Performance metrics

1)Packet delivery fraction:- The performance of AODV is consistentlyuniform with increase in the number ofnodes

2) Normalized routing overhead:- AODV contains a number of the routing control messages such as RREQ, RREP, RRER and Hello, etc., and accordingly the routing overhead is increased

3) Throughput:- The throughput value of AODV slowly increases initially and maintains its value when the time increases

4) Delay:-In AODV end to end delay is higher

3.4 OLSR Performance metrics

1) Packet delivery fraction:-OLSR delay increases as the of nodes increases. This is because OLSR divides the nodes into MPR set and MPR selector set.

2) Normalized routing overhead:- OLSR is a link state protocol which uses a table driven approach.Therefore, it generates more communication overhead and takes more maintenance time which adds to the overall load in the network

3) **Throughput:-** OLSR has maximum throughput in every scenario regardless of high routing overhead and delay

4) **Delay:-**OLSR delay increases as the of nodes increases. This is because OLSR divides the nodes into MPR set and MPR selector set

4. Application of Manet

1) Military:-They will equip the soldiers with military devices to communicate with eachother.it create a

common place network technology where soldiers vehicles and military headquarters communicate with eachother.in this soldier create automated battlefield.

2) Business: In some business some people involve collaborative work in which people from outside the office environment are involved to share,cooperate and exchange their ideas .in business environment we involve dynamic database access and mobile offices.

3) Emergency services: In commercial sector adhoc network is used for disaster recovery like floods, earthquake and fire. Replacement of fixed infrastructure in case of environmental disasters. Emergency rescue operations must take place where non existing or damaged communications infrastructure and rapid deployment of a communication network is needed.in this we can support doctors and nurses in hospital.

4) Education: Mobile Adhoc network is used for meetings or for delivering of lectures.virtual classroom environment is provided to the student for learning

5) Sensor network: Home applications smart sensors and actuators embedded in consumer electronics.

6) Personal area network and bluetooth: A personal area network is a short range, localized network where nodes are usually associated with a given person. Short-range MANET such as Bluetooth can simplify the inter communication between various mobile devices such as a laptop, and a mobile phone.

7) Local level: Ad-Hoc networks can autonomously link an instant and temporary multimedia network using notebook computers to spread and share information among participants at conference or classroom. Another appropriate local level application might be in home networks where devices can communicate directly to exchange information.

8) Coverage extension: Extending cellular network access and Linking up with the Internet, intranets, etc.

Conclusion and future scope

In this paper we have discussed different routing protocol which specified the route between the nodes to involve communication and comparision between dsr,dsdv,aodv and oslr in which we have discuss about the overhead, bandwidth,delay,throughput and packet delivery fraction. In this we have provided the difference between two proactive protocols dsdv and olsr. Our future scope is to maintain reputation based protocol for the mobile nodes.

References

Tanu Preet Singh ,Shivani Dua& Vikrant Das(January 2012),EnergyEfficient Routing Protocols In Mobile AdHoc Networks,International Journal of Advanced Research in Computer Science and Software Engineering ,Volume 2, Issue 1,

Krishna Gorantala(June 15, 2006), Routing Protocols in Mobile Ad-hoc Networks, Master's Thesis in Computing Science

Padmini Misra, Routing Protocols for Ad Hoc Mobile Wireless Networks P.Manickam, T.Guru Baskar, M.Girija, Dr.D.Manimegalai(February2011),Performance comparisons of routing protocols in mobile ad hoc networks,International Journal of Wireless & Mobile Networks (IJWMN) Vol. 3, No. 1

Anitkumar and PardeepMittal(February 2011), A Comparative Study of AODV & DSR Routing Protocols in mobile adhoc network, International Journal of Advanced Research in Computer Science and Software Engineering

Mueller, Rose P. Tsang2, and Dipak Ghosal Multipath Routing in Mobile Ad Hoc Networks:Issues and Challenge,Department of Computer Science, University of California, Davis, CA 95616 Sandia National Laboratories, Livermore, CA 94551

Elizabeth.M.Royer(April 1999),A Review of Current Routing Protocols for Ad Hoc Mobile Wireless Networks, IEEE Personal Communications

S. S. Tyagi and Aarti, Study of MANET: Characteristics, Challenges, Application and Security. Attacks(May 2013),International Journal of Advanced Research in Computer Science and Software Engineering , Volume 3, Issue 5