Review of Theoretical Comparison between ADOV, DSR and DSDV

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ABSTRACT:

Mobile Ad hoc network is the collection of wireless mobile node that forms the short lived network without any preexisting infrastructures. Due to the dynamic nature of the mobile Ad hoc network nodes are free to move in any direction within the network. The wireless network is highly error prone due to interference. In this paper the comparison is made between the two on demand routing protocol such as ADOV (Ad hoc on demand distance Vector), DSR (Dynamic Source Routing) and the one table driven routing protocol such as DSDV (Destination Sequenced Distance Vector). This comparison is helpful in determining which protocol is best among these protocols.

Keywords: MANET, DSDV, DSR, AODV.

1. INTRODUCTION

The word mobile Ad Hoc network is the combination of two words: Mobile and Ad Hoc. The term mobile means moving and the term ad hoc means temporary. It is infrastructure less, multi hop wireless network and has gained a lot of popularity in the wireless Communication. This network contains the number of mobile nodes. These nodes can act as both the Router as well as the host. Mobile nodes can exchange the information directly if the nodes are within the transmission range of each other otherwise the exchange of information between these nodes are done through the intermediate nodes. MANET (Mobile Ad Hoc Network) is very easy to set up at any place and any time because it does not need any existing infrastructures [1]. In Ad hoc networks all the network protocols that exchange the information should be distributed across the communication terminal. MANET applications are in many areas. Some of these include are Military Battlefield, Emergency Operations, Personal area network, Local Level, Commercial Sector, Urgent business meeting.

1.1 Types of MANET: Types of the MANET are

Intelligent Vehicular Ad Hoc Networks (InVANETs): These networks are used the handle the unexpected situations.

Vehicular Ad Hoc Networks (VANETs): These networks Enables effective communication with another vehicle.

Internet Based Mobile Ad hoc Networks (IMANET): These networks link the fixed node with the mobile nodes.

2. CHARACTERISTICS OF MANET

Limited Bandwidth: the Bandwidth available fore the wireless network is generally less as compared to the wired network. The throughput of the wireless network is generally low due to various noises [2].

Dynamic Topology: Due to the dynamic nature of the mobile ad hoc network nodes are free to move in any direction.

Energy Constrained Operations: nodes are the portable devices and depends on the batteries. This was the most important design Constraint of MANET.

Security: wireless networks are less secure as compared to the wired networks. Due to the mobility of nodes wireless networks go down frequently. The increased possibility of the different attacks like Denial of Service must be Carefully Handled.

3. ROUTING PROTOCOLS

Routing Protocols define the set of rules which governs the communication of message packet from source node to destination node in the network. It proposed for such type of Ad Hoc network. These protocols find the path for the delivery of packet to the right destination.

3.1 TYPES OF ROUTING PROTOCOLS: Routing Protocols are divided into the three types: On Demand Routing Protocol, Table Driven Routing Protocol, and Hybrid Routing Protocol [3].

3.1.1 On Demand Routing Protocols: In these protocols routes are created only when the routes are required. When the source node needs the route to the destination node then it calls the route discovery procedure. So, it is also called reactive protocol. The two major components of reactive routing protocols are: Route Discovery Phase and Route maintenance phase. In the Route discovery phase when the route is not

available from source to destination node in the available root cache, then source node calls the route discovery phase. Route maintenance: the route failure occurs between the nodes due to the dynamic nature of topology. The Route maintenance Process reinitiates the Route Discovery. These protocols decrease the routing overhead. Some of the existing on demand routing protocols are: AODV, DSR
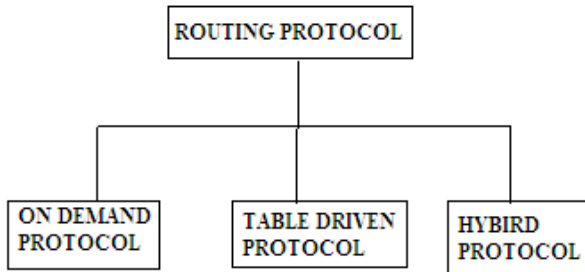

Fig3.1.1 Classification of Routing Protocols

3.1.2 Table Driven Routing Protocol: In this protocol each node maintains its routing table which contains the information from one node to the other node. Nodes can exchange the routing information periodically. It is also known as the proactive routing protocol. Various tables driven routing protocols are: DSDV, OLSR, and WRP, GSR

3.1.3 Hybrid Routing Protocol: Hybrid routing protocol overcome the drawbacks of both the routing protocols. Proactive protocol has more overhead and less latency whereas the reactive routing protocol has more latency and less overhead. Hybrid routing protocol has medium latency and less overhead inside the zone and outside the zone overhead is similar to the reactive protocols. This protocol is suitable for the large networks. Many popular hybrid routing protocols for MANET are: ZRP, SHRP.

4. OVERVIEW OF AODV, DSR AND DSDV

4.1 AODV(Ad Hoc On Demand Routing Protocol) : This protocol is the modified form of the destination Sequenced distance Vector(DSDV) routing protocol and based on the both DSR, DSDV protocol. ADOV uses an on demand approach for finding the route between the source nodes to the destination nodes [4]. Routes are created only when the source node wants to send the packet to the destination node. The main steps of the algorithm used by ADOV for the establishment of the unicast route are given below:

4.1.1 Route Discovery:
When the node wants to transmit the data packet to the destination node, Corresponding entries in route table are checked to ensure the whether the current route to the
destination node is available or not. If the appropriate route is

available the data packet is forwarded to the next hop towards the destination. If it is not available then the route discovery procedure is initiated. This protocol initiates the route discovery mechanism using the two major components: Route Request (RREQ) and Route Reply (RREP). The route request packet contain the IP address, current sequence number destination IP address destination sequence number and broadcast ID of the source node. When the source node starts the RREQ then the broadcast ID is incremented each time. The broadcast ID and IP address together is used to uniquely identify each request. The request is sent using the RREQ message and the information in connection with the generation of route is sent back in the route request reply message. The main difference between ADOV and the other on demand protocol is that the timeliness of each data packet is determined by the sequence number. The source node sends the RREQ packet to its neighbor's node and set the timer to wait for reply from these nodes. If the request is lost during the transmission then the source node again transmits the message packet using the route discovery mechanism.

4.1.2 Expanding ring search Technique:
This technique is basically used in case of large networks to
control the wide broadcast of route request message. The source node broadcast its request packet to the neighbor node. These nodes receive the packets form its source node and check their routes to the destination nodes. If the route to the destination node is not available node forwards the packet to another node. Packet is forwarded from node to node until it finds its destination node. In this technique the source node set time to live value of the source node. If the reply of the request packet does not come with in the specified time period then the source node again broadcast the packet with time to live value is incremented by one. The process of incrementing the time to live value continue until the threshold value is reached after that the message packet is broadcast to the entire network.

4.1.3 Setting up of forwarded path:
When the destination node receives the request message packet from the source node it creates the route request reply message. When RREP is received by the intermediate node then this node set up the packet forwarded entry to the destination node in routing table. When this reply message packet is received by the source node it means that a path from the source to the destination node is established and the source node again starts the data transmission.

4.1.4 Route Maintenance:
On demand routing protocols the route is maintained between the source and destination as long as the route is needed. Due to dynamic nature of mobile ad hoc networks mobile node are free to move in any direction within the network. If any node moves during the active session the link breaks between the nodes. The node initiates the route error message. This message propagates until the source node receives this message. When the source
node receives this message it either stop sending the message or again initiate the route discovery mechanism if the route is required.

4.1.5 Merits and Demerits of ADOV:
In ADOV protocol routes are created on demand only. Destination sequence numbers are used to find up to date route

information to destination node [4]. This protocol responds very fastly to the topological change and does not put any additional overhead on the data packets.

Due to the periodic beaconing this protocol leads to the unnecessary bandwidth consumption. AODV is vulnerable to many types of attacks

4.2 DSR (Dynamic Source Routing): DSR is an on demand routing protocol which is based on the theory of source routing rather than table based. Dynamic Source routing protocol is the source initiated rather than hop by hop. It is very simple and efficient routing protocol designed to restrict the bandwidth consumed by the control packets in the ad hoc wireless network. The difference between this and other reactive routing protocol is that DSR is beaconless [5]. It does not require any existing infrastructures because this protocol does not allow the network to be self Configuring and self organizing. It is on demand routing protocol and use the source routing to send the packets because the source knows the complete sequence of the nodes to destination. Each node maintains its route cache in which all the available routes are stored. Whenever the source nodes require the path it first check its route cache if the valid path is not available in the cache it initiate the route discovery mechanism. In this protocol source knows the complete node sequence that each packet traverse. This requires that in each packet sequence of hop is included. The drawback of the source routing is that each routing packet has to carry unnecessary overhead and the benefit of this is that the intermediate node can find the route from the source node easily because finding the path from the source node is very costly and difficult operation in terms of bandwidth consumption. Another advantage of this routing is the complete route is determined by single node. This protocol is the composed of the two major components: Route discovery and Route maintenance. Route discovery mechanism is used when the source node wants to transmit the packet to the destination node. The source node checks its route cache for the available routes. If the route is present in the cache then the source node use this route to send the packet to the destination node. Otherwise the route discovery mechanism is initiated. The route request message contains the source address, destination address and identification number. When the message packet arrives at any node it check the destination address of the packet if the packet is for the node then it give reply by using the route request reply and the entries in the table are changed otherwise it transmit the packet to the another node. Route maintenance mechanism is used to handle the broken routes. In the mobile ad hoc networks due to the dynamic nature of the topology nodes are free to move in any direction in these networks links may fail at any time when the node encounters the link failure problem at the data link layer it removes the path from the route cache and generate the route error message. Consequently the entries in the route table are also changed.

4.2.1 Benefits and Limitations of DSR: The benefit of the dynamic source routing protocol is that there is no need to maintain the routing table because the complete route is given in the header of the packet.

The main limitation of this protocol is that it uses the source routing that cause the unnecessary overhead to be carried out by the data packet and the connection setup delay is very high. The

performances of the protocol degrade very fastly with the increasing mobility and are not suitable for the large networks.

4.3 DSDV (Destination Sequenced Distance Vector): DSDV is a table driven routing protocol which is based on the distributed Bellman Ford algorithm. This protocol was developed by C. Perkin and Bhagwat in 1994. The main aim of this algorithm was to solve the routing loop problems. Each node maintain its routing table with the help of this table each node transmits the packets to another node in the network and also maintain the list of all the available destination and the number of hops required to reach the destination. The entry in the routing table contains the sequence number which is generally even if the links are presents. Otherwise these numbers are odd [4]. These sequence numbers are generated by the destination. Each node transmits and updates its routing table periodically to maintain the consistency in the network. Routing information is distributed between nodes by broadcasting the packets. And by transmitting the full dumps infrequently and smaller incremental updates were frequently. Destination Sequenced Distance Vector protocol requires that entries in the table may change very frequently when the node advertise its routing table to its neighbor nodes. The improvement in the DSDV protocol is the avoidance of routing loop in the network of routers. Due to this improvement the information is easily available to the source node whether the source node requires the information or not. The data transmit by each packet node contains the destination Sequence number, its own sequence number and the number of hops required to reach the destination. In this protocol the sequence number is generated by the destination node and is linked to that node non owner node updates the routes only when it detects link break on that route. The owner node use the even number as the sequence number while the non owner node use the odd number as the sequence. These numbers are basically used to differentiate the stale routes from new routes. This thing may avoid the information of loops. The routing table contain the hardware address, network address of the mobile node there are two ways in which the routing updates are performed: full dump and incremental updates in the full dump node sends the complete routing table and incremental updates in which the node transmit only these entries that has changed since last update if the space is present in the incremental update packets in this packet those entries are included whose sequence number is changed [6]. Behind these two types broadcasting is also done ion the network protocol unit. Full dump may require multiple network protocol data unit in fit in all information. The rout labeled with the highest Sequence is received in this case old route is received when the two route have the same sequence number then the route with the best metric is used. To avoid the Confusion in route updates destination Sequenced Distance Vector Routing Protocol used the Settling time data. This data is basically used to determine the time when the route become Stable. Based on this the node eliminate the Settling time of route. The node delays the transmission of routing updates. By settling the time so as to eliminate these updates that would occur if a better route were found When a node receive an information packets from the another node then the node compare the sequence number with an available sequence number if the sequence number is greater than the node will update the routing information with the new

sequence number. If the packets Comes with the Same Sequence number then the route with the better metric is selected if the new node enters in the networks ii will announce itself in the network and the node change their routing information with the new entry for the new node in the network. The mobile host broadcast its routing table periodically but due to the movement of the node in the network will lead to the burst of the new routes. The Solution provided for this is to delay the advertisement of these route until this shows the better metric. DSDV does not obtain 100% Packet delivery information

4.3.1 Benefits and Limitations of DSDV:

DSDV protocol is simple and loops free through destination

sequence number. In this no latency is caused by route discovery. It has low and stable routing overhead.

The drawbacks of this protocol are that it requires the small

amount of bandwidth even when the network is idle. This protocol is not suitable for highly dynamic networks and does

not contain sleeping nodes.

Table 1 Comparison table between the AODV, DSR, DSDV Protocol

Parameters	ADOV	DSR	DSDV
Routing Scheme	On Demand	On Demand	Table Driven
Loop Free	yes	yes	yes
Unidirectional/Bi directional links	Support Only Bidirectional link	Yes Support both links i.e. the unidirectional and bidirectional	Support only bidirectional link
Sleeping Mode	No	No	No
Multicasting	Support both unicasting and multicasting	Support only unicasting	Support only unicasting
Node with Special task	No	No	No
Routing Metric	Shortest path	Shortest path	Shortest path
Type	Distance Vector	Source Routing	Distance Vector
Message Overhead	High	high	Low
Security	No	no	no
Periodic Broadcast	Yes	No	Yes
Routes Maintained in	Route table	Route Cache	Route Table
Quality of Service Support	No	No	No
Power Management	No	No	No

5. Conclusion

In this Paper the effort has been made on the comparative study of the three protocols i.e. DSDV, DSR, and ADOV. ADOV protocol performs better in case of the packet delivery and the ability of ADOV protocol to maintain the connection by periodically exchange the data which is required by the TCP. It is very difficult to maintain the security in the mobile ad hoc network due to the decentralized nature.

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