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Comparison of Table Driven and Source Begin protocol of Mobile Infrastructure less Network: a review

Pragati H. chandankhede, Namrata A. Sable

Abstract : Highly capable routing is an important issue for the design of wireless network protocols to meet the severe hardware and resource constraints. In the past few decades due to the colossal use of wireless network, important and challenging area of research is the field of Infrastructure less routing. The algorithm working in such environment needs to find the routing solution online. Various protocols has been anticipated for different type of network including ad-hoc, wireless. Routing protocol basically can be categorized in two provinces as proactive and another are reactive routing protocol. This paper provides the overall survey of the entire routing protocol. It started by giving detail description of problem domain. And then this paper provides the comparison of routing protocol for infrastructure less routing

Index Terms- Routing, wireless sensor network, ad-hoc, protocol.

1 INTRODUCTION:

Ad hoc or infrastructure less networks have become more and more popular in the computing engineering. As wireless network are providing mobility from last few decades. There are currently two branches for mobile wireless networks. The first is the infrastructure network (i.e., a network with fixed and wired gateways). The bridges for these networks are called as base stations. Connection, communication of devices in this network is always within the fix communication medium. But “handoff” problem occurred when mobile travel beyond the range from base station. Wireless local area networks (WLANs) are typical applications of this type of network.

The second type of mobile wireless network is the infra structure less mobile network, also called as an ad hoc network. These networks have capability that all nodes are able of movement and can be connected dynamically in an arbitrary manner no fixed routers. They do not have a fix route to travel. In such a network the nodes act as routers which discover and maintain routes to other nodes in the network. Case applications of ad hoc networks are emergency search-and-rescue operations.

Numerous protocols have been developed for infra structure less mobile networks. Such protocols must deal with the typical limitations of these networks, which include high power consumption, low bandwidth, and high error rates. These routing protocols may generally be categorized as:

1. Table-driven
2. Source-begin (demand-driven)

1. Table-Driven Routing Protocols

Table-driven routing protocols maintain current routing information from each node to every other node in the network. Such protocol needs that every node should maintain one or more tables in order to store routing information, and thus they respond to changes in network topology by propagating
update throughout the network as to maintain a consistent network view. The vicinity of their difference is the number of necessary routing-related tables and the methods by which changes in network structure are broadcast.

2. Source-begin On-Demand Routing

A new and different approach then from table-driven routing is source begin on demand routing. When desired by source node, the routing technique is going to create route .i.e., Whenever a

node needs a route to a destination, it start a route discovery process inside the network. This progression is finished when a route is found or all possible route permutations have tested. Once a route has been established, it is maintained by a route maintenance procedure in anticipation of either the destination becomes unreachable along every path from the source or until the route is no longer preferred.

2 CONCEPT OF TABLE DRIVEN (PROACTIVE) PROTOCOL:

In the Table Driven protocol every node within the network consist of routing table for the illustration of the data packets, it also explains how to establish connection to other nodes within the network. These nodes trace for all destinations, number of hops which are required to arrive at each destination in the routing table. The routing entries are tagged with a sequence number created by the destination node. In order to maintain stability each station transmits and modifies its routing table from time to time. At every broadcast, node will have unique sequence number for a particular route. Motivation to table driven routing protocol are Bellman Ford algorithm and routing loop problem illustrated as below.

2.1 BELLMAN FORD ALGORITHM:

That states that it compute shortest path from single source vertex to all other vertices in weighted digraph. It further states that if graph conatins negative cycle i.e., a cycle whose edges sum to negative value, then there is no cheapest path. In such case, the bellman ford algorithm can detect negative cycle and report their existence. But it cannot produce a correct shortest path.

2.2 ROUTING LOOP PROBLEM:

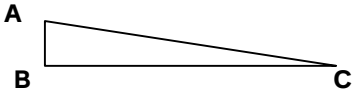

Figure 1: Routing loop problem

For an understanding the concept of routing loop problem, consider three node as shown in the above figure, in the network given below, node A is transmitting data to node C via node B. If the link between node B and C goes down and B has not yet informed node A about the breakage, node A transmit the data to node B assuming that link a-b-c is operational and of lowest cost. Node B knows about the breakage and tries to reach node C via node A, thus sending the original dat back to node A. Furthermore, node A receives the dat that is originated from node B and consults its routing table.and routing table will say that it can reach node C via node B , thus sending its back to node B creating an infinite loop.

The notable table driven (proactive) involves two protocols Destination Sequenced Distance Vector (DSDV) and Optimized Link State Routing Protocol (OLSR)

2.3 DESTINATION SEQUENCED DISTANCE VECTOR ROUTING (DSDV):

Destination Sequenced Distance Vector Routing is table driven routing scheme for ad hoc mobile network based on Bell man ford algorithm, and the main contribution is to solve the routing loop problem . here each entry in routing table contains a sequence number, the sequence number are are generally even if the link is present, else an odd number is used. The number is generated by destination, and emitter needs to send next number update.

Suppose there are three nodes A, node B, node C

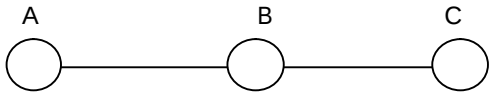

Figure 2: Showing three node A,B,C.

So the routing table can be drawn as follows

Destination	Next hop	Number of Hops	Seq.Number
A	A	0	A
B	B	1	B
C	B	2	C

Figure 3: Routing Table

If the router receives new information, then it uses the latest sequence number. If the sequence number is same as the one already in table, the route with the better metric is used.

Shortcoming of DSDV: DSDV require a regular update of its routing tables, which uses up battery power and a small amount of bandwidth even when the network is idle.

2.4 OPTIMIZED LINK STATE ROUTING PROTOCOL (OLSR)

Optimized Link State Routing Protocol is an IP routing protocol optimized for mobile ad hoc network. It is proactive link state protocol where any topological change causes, flooding of topological information is provided to all available hosts. And to reduce the overhead within the network, it uses the concept of Multipoint relay(MPR). The MPR is a host's one hop neighbor which can forward its messages. The MPR set of host is kept small in order for the protocol to be efficient. In OLSR only the MPRs can forward the data throughout the network. Another important parameter in OLSR is to reduce time interval for control message transmission which can be achieved by using appropriate shortest path algorithm. OLSR uses hello and topology control message (TC) to discover and then disseminate link state information throughout mobile ad hoc network. i.e., individual node use topology information to compute next hope destination from all nodes in network using shortest hop forwarding paths. The Hello messages are drive only one hop away but the TC messages are broadcasted throughout the entire network. TC messages are used for broadcasting information about Own advertised neighbours which includes atleast the MPR Selector list. Multiple Interface Declaration (MID) are the other message used in OLSR for informing other host involve in transaction.

Shortcoming of OLSR: Since link state routing protocol require the topology database to be synchronized across network. Such a algorithm is difficult to design for ad hoc wireless network, so OSLR does not bother with reliability, it simply floods topology data often enough to make sure that database does not remain unsynchronized for extended previous time.

3 CONCEPT OF SOURCE BEGIN (REACTIVE) PROTOCOL :

Proactive protocol provides high link reliability, topological stability, high bandwidth but it may not give same result in wireless network. As the network gets larger there is the need to share more dynamic behavior than traditional. Therefore the concept of Reactive algorithm has emerged. The proactive protocol, maintains fresh list of destination and their routes by periodically distributing routing tables throughput the network. The main disadvantage of this approach is there is respective amount of data for maintenance and there is slow reaction on restructuring and failures.

While reactive routing protocol finds route on demand with a route request packets. In reactive algorithm the node play the special task where node who want to send packet to unknown destination send a request message to the destination, if the message reaches to destination it in turns send reply message. And this is considered as a route to forward message until it breaks by network. Reactive algorithm departs from top down approach discussed earlier from the sense that each node is given the tool to act individually and total routing solution lies on this node action. Figure 4 shows basic working of reactive protocol, where whole transaction is monitored by sending request message and as a acknowledgement reply message is sent for routing.

FIGURE 4: Basic node working in Reactive Algorithm

The notable Reactive algorithm involve protocol as On Demand Distance Vector Routing (DYMO), Dynamic Source Routing (DSR) Protocol, and Ad hoc on Demand Distance Vector routing protocol (AODV),:

3.1 DYNAMIC MANET ON DEMAND ROUTING PROTOCOL (DYMO):

The main operations of the DYMO protocol is for route discovery and route maintenance. in route discovery, the originator's DYMO router start distribution of a Route Request (RREQ) throughout the network to find a route to the target DYMO router. During this hop-by-hop distribution process, each intermediate DYMO router account a route to the originator. while the target's DYMO router receives the RREQ, it act in response with a Route Reply (RREP) sent hop-by-hop toward the originator. Every intermediate DYMO router that get the RREP creates a route to the target, and then the RREP is unicast hop-by-hop toward the originator. When the originator's DYMO router obtain the RREP, routes have then been recognized between the originating DYMO router and the target DYMO router in both directions. Route maintenance consists of two operations. In order to preserve routes in use, DYMO routers extend route lifetimes upon successfully forwarding a packet. And to react to changes in the network topology, DYMO routers check links over which traffic is flowing. After a data packet is received for forwarding and a route for the destination is not known or the route is broken, then the DYMO router of source of the packet is notified. A Route Error (RERR) is sent toward the packet source to indicate the current route to a particular destination is invalid or missing.

3.2 DYNAMIC SOURCE ROUTING PROTOCOL (DSR):

It is a reactive protocol that creates a route on demand using source routing protocol. In point of fact, when source node sends the packet, sender node caches entire hop by hop route to receiver node. These route list are stored in Route Cache. And in the packet header the source route is stored such a process is also called as route discovery and in route discovery, within network DSR floods data by sending route request message(RREQ) packet these RREQ packets are send to all neighbors nodes and process is continued route destination is identified in Route Cache. Once destination is achieved node reply by sending Route reply (RREQ) packet. Path traverse by route reply is towards back of the path as of RREP built while traversing across network. But if any connection on source route is broken a route error (RERR) packet is notified to source node

Shortcoming of Distance source Routing (DSR) : It requires a full series of paths to be established between source and destination nodes to transmit packets and each packet follows the same path. The major motivations of this protocol are to limit the bandwidth by avoiding the periodic table updates and long convergence time. The underline fact to this protocol is that it floods a route request message in the network to establish a route and it consists of two procedures: Route Discovery and Route Maintenance.

3.3 AD-HOC ON DEMAND DISTANCE VECTOR ROUTING PROTOCOL (AODV):

Ad hoc on Demand Distance Vector routing protocol is routing protocol for mobile adhoc network (MANET). AODV uses both Table driven and on demand technique for routing. One entry per destination is maintained within the routing table, the way DSR differentiate is DSR maintain multiple route cache entry for every one destination. AODV avoids the counting to infinite problem of distance vector protocol by using sequence number on route update. AODV compromise the trade-off problems like large packet header in reactive source protocol and large messaging overhead due to periodic updates in proactive protocols. It uses a distributed approach i.e. it keeps track of the neighbor nodes only and it does not establish a series of paths to reach the destination. It also uses route discovery and route maintenance mechanism like DSR. , AODV uses sequence numbers maintained at each destination in order to determine newness of routing information and to prevent routing loops. There is use of both Sequence number of destination and source. All routing packet carry these sequence numbers. Routing table is expired if routing table is not used recently, i.e. timer based state maintenance is done in AODV.

4 COMPARISON OF INFRASTRUCTURE LESS ROUTING

PROTOCOL: the comparison of protocol by their protocol property is shown in Table 1.

Sr.No.	Protocol Property	DSDV	OLSR	DSR	AODV	DYMO
1	Reactive/Proactive	Proactive	Proactive	Reactive	Reactive	Reactive
2	Route Discovery	Periodic	Periodic	On demand	On demand	On demand
3	Table driven /Source Routing	Table driven	Table driven	Source Routing	Table driven and Source Routing	Source Routing
4	Need of Hello Message	Yes	Topology Control Message+ Hello Message	No	Yes	No
5	Route Mechanism	Route table with next hop	Route table synchronized for entire network	Complete Route cache	Route table with next hop	Complete Route cache
6	Network overhead	High	High	Low	Low	Medium
7	Multihop wireless support	Yes	Yes	Yes	Yes	Yes
8	Routing Efficiency	Medium	High	Medium	High	High
9	Routing Overhead	Medium	Low	Low	High	High
10	No of nodes support	Less no of nodes	Dynamic nature	Upto 200 nodes	Dynamic nature	Dynamic nature

Table 1: Comparison of protocol by Protocol Property

5 CONCLUSION

The paper does the comparison of five routing protocol DSDV, OLSR, DSR, AODV, DYMO. The important observation is, comparison illustrate reactive routing protocol act is the best considering its ability to maintain connection by table and source routing feature exchange of information, which is required for TCP, based traffic. Due to these reason AODV is preferred then DSR. Also DSR and AODV perform better then DSDV due to larger number of node existence. OLSR is preferred as best routing technique due to its dynamic route is synchronized for entire network and control overhead is reduced due to use of Multi Point relay (MPR). But as AODV is related to discovery of new route and form update of usable route, this situation will break repeated route discovery. While OLSR and DYMO has higher efficiency in scattered traffic. Network overhead in OLSR and DSDV increases as it must maintain routing table for all possible route while there is less overhead in AODV and DSR. OLSR need to keep topology information in topology set, MPR information up to date in order to maintain state information and hence TC messages are supported by OLSR.

6 FUTURE WORK EXPECTED WITHIN ROUTING PROTOCOL

The forthcoming Gbps high-speed networks are estimated to carry a wide range

of communication-intensive, real-time multimedia applications. The requirement for appropriate delivery of digitized audio-visual information raises new challenge for the next generation broadband networks. One of the key issues is the Quality-of-Service (QoS) routing. It selects network routes with sufficient resources for the requested QoS parameters. The goal of routing solutions will be dual: (1) satisfying the QoS requirements for every admitted connection and (2) achieving the global efficiency in resource utilization. QoS routing in sensor networks have several applications including real time target tracking in battle environments, emergent event triggering in monitoring applications etc. Currently, there is very little research that looks at handling QoS requirements in a very energy constrained environment like sensor networks. Also, routing protocols should node mobility. Most of the current protocols assume that the sensor nodes and the sink are stationary. However, there might be situations such as battle environments where the sink and possibly the sensors need to be mobile. In such cases, the frequent update of the position of the command node and the sensor nodes and the propagation of that information through the network may excessively drain the energy of nodes. New routing algorithms are needed in order to handle the overhead of mobility and topology changes in such energy constrained environment. We hope that this will encourage protocol designers to take into account the various protocol characteristics when designing an efficient protocol; QoS awareness, energy efficiency, mathematical models, simulation environment and settings, and finally real time implementation. This will then enable and facilitate more research on the set goals as well as allow researchers to perform fair comparison.

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