Comparing Conventional Reactive Protocols and Swarm Intelligence based Reactive Protocols in MANETs

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Abstract*: Mobile Ad-hoc Network (MANET) is a unique kind of wireless networks. It contains non-stationary mobile nodes and does not use any still host for communication purpose. All mobile nodes help the peer nodes in transferring the information by playing the role of router also. To route the data to end nodes always remain the main challenge in MANETs due to the motion of nodes. So, as breakage in connection are repeated. Routing is characterized into three major categories i.e. Proactive, Reactive and Hybrid. Ant Colony Optimization (ACO) is swarm intelligence based technique and can fit better in solving the problems of optimization. Therefore ACO can also be applied to the problem of routing in MANETs and numerous routing protocols have already been publicized by many researchers by using the techniques of ACO. This paper has reread some of the ant based and few traditional reactive protocols in MANETs. After reviewing the articles a comparison table was made to analysis those protocols on the basis of some parameters.

***Index Terms*: ACO, AODV, A-AODV, A-DSR, A-DYMO, DYMO, MANET, TORA**

I. INTRODUCTION

The wireless networks are classified two types as: Infrastructure-based network and Infrastructure less network. In the infrastructure-based network, cellular nodes have fixed base station to converse by each other. In infrastructure less network, ad hoc network is converse each other the wireless nodes without infrastructure place or regional place [1].

In the network nodes can take action equally crowd and router [2].

The mobile ad hoc network is, self-maintain self-configuring and self-organize [2]. The nature of mobile nodes has dynamic topology the mobile ad hoc network. Direction-finding protocols are most important and helpful in MANET to transmit the facts. In MANETs the cellular nodes and multi-hop nodes to travel without restraint and network topology could modify repeatedly [2]. Routing protocols is able to classify into two modes: Proactive i.e. table driven and Proactive i.e. on-demand routing protocols or Reactive. In the first case proactive, all nodes maintain the information of network in form of routing table by sharing data among neighbour nodes [3].

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Then second case Reactive a route to searches an on-demand way and locate the connection with the purpose of send out as well as accept a data from font node to target node.

II. ANT COLONY OPTIMIZATION (ACO)

The ordinary globe the ants roam at random, and in the lead discovery food come back to their colony. While lay downward the pheromone trails [4,5]. If the additional ants discover a pathway, they are liable not to maintain travelling at unsystematic, other than to as a replacement for follow the trace, returning and reinforcing it if they eventually find food,

An ant runs comparatively at unsystematic something like in the city state; if any food source is identified, the ants send this information along with path to the nest by depositing a chemical called pheromone on the lane. These for the pheromones are gorgeous, close by ants will be disposed to follow, more or less in a straight line, in the road; returning to the city state, these for the ants force reinforce the way.

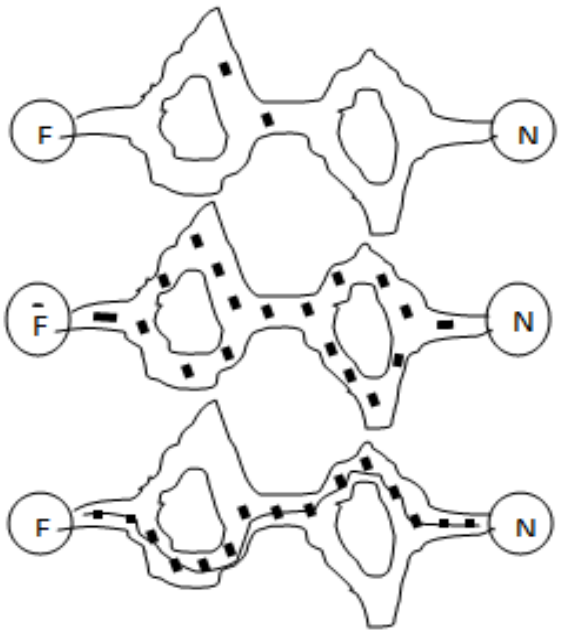

Fig: 1 Ant Colony Optimization

1. The ants are reached two and three paths are same food Source then, in a given quantity of time, shorter path will be more ants compared to other long paths
2. There for the short path will be increasingly more improved and the longest path will ultimately disappear.

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3. Finally, every ant have strong-minded and selected the shortest path [5].

Table 1.Comparison of Different Types of MANETS AND ACO

Parameters	MANETs	ACO
Objective Formation	amorphous, dynamic &circulated	---
Origin of route	Request for finding route and other local information is sent by source node.	To estabilish route, pheromones is used
Multipath support	Work multipath as well as single path	SupplyMultipath
Principal property	Nodes configure indirect themselves communication	---
Goal	Shortest path	Certain shortest path

III. Types of Routing Protocols

The Algorithms are separated keen on three types:

- Proactive Routing Protocol (table driven)
- Reactive Routing Protocol (on demand)
- Hybrid Routing Protocol

IV. On Demand Routing Protocol

A Reactive protocol has a superlative routing protocol to soaring nodes mobility for networks, the information's to transmit to nodes recurrently. This protocol to send information then searches its route to the end node. On the other hand the sender starts by transmitting the route demand during the network, after sender waits for the target node routes to counter a record of intermediary [6]. The main disadvantages of Reactive Routing protocols are:

1. The latency time elevated in searching the route to target,
2. Flooding to be able to guide to network blockage.
3. RREP, RREQ & RERR messages direct to manage overhead.

A. DYMO

The Dynamic MANET On-demand (DYMO) Protocol is a unicast, reactive and multi hop routing protocol. Mainly, this protocol focus on memory or storage so it stores minimum information regarding routing but due to this property it doesn't provide a valid routing information. The two main operations of DYMO are: Route Discovery and Route Maintenance. All through Route discovery action, the foundation router generates Route Request (RREQ) messages and floods them keen on the network for penetrating the new target routers which are not included in any route information. During Broadcasting Process, the transitional nodes also lay up a way generated by source router via counting it keen on routing table [6].when RREQ message is received by the target nodes then Route Reply message is send by all target node to the sender node as acknowledgment. Route maintenance Process per forms two tasks i.e. it deletes the outdated routes, but updates the information regarding expired good routes by updating reverse the backward route during receiving of data and forward route during sending data message about error in route (RERR) is generated on receiving data from unknown destination. This RERR message intimates to other nodes about the route failure. On getting route error message, the source node initiates route finding procedure again. All neighbor nodes send Hello messages to maintain routes and it shows route confirmation [7].

B. Ant-DYMO

Ant-DYMO is a combination of reactive and proactive approach i.e. hybrid routing protocol. It employing an ant-based looms within practical, sagely though DYMO is foundation for the reactive lone. The Ant-DYMO routing protocol is the hybrid and multihop algorithm [8,9]. Nodes collect information from the neighbors by the exchange of Hello messages. Every node in network creates a probability table influenced by chemical called pheromone. Ant-DYMO algorithm uses two kinds of synthetic ants. First are surveyor ants (EANT) which help producing ways to the starting node. Other ant is search ant (ARREQ) which search for a specific destination. The EANTs transport the collected data to the destination node and generate trails of pheromone along the travelled path [9]. The EANT forwards the source node's address to intermediate nodes which it traverses. ARREQ has aim to search for a target node, and it acceded to the same packet format of DYMO. RREQ, appending a mechanism by probabilistic search while taking into account the intensity of the chemical pheromones on the way.

C. Ant-DSR

Ant-DSR (Fenouche & Mellouk, 2007) comes under the category of reactive routing protocol and is used to implement a pro-active route optimization method via interminable corroboration of cached routes .This approach in-turn elevates the likelihood of a given cached route manifested with the help of network realness [10]. The nodes which are movable maintain route caches that grasp the font paths of the alert movable nodes. As the new routes are recognized, there is continuous updating of entries in the route cache. There are two segments in such routing protocols; route identification and route maintenance. The packets of forward ants are added in the way demand and the packets of backward ants are appended in reply of route DSR respectively [11]. The purpose of FANTs is to learn fresh paths in a network, and calculate a state of the present network with the help of hop counts, trip times or the Euclidean distance covered. The purpose of BANT is to update the creating node concerning the in sequence then composed with the Forward ANTs.

D. AODV

There is no interference of nodes in the maintainers of routes form to source to destination in the running path [12]. Dissimilar route significances in to Route Request (RREQ), Route Replies (RREP) moreover Route Errors (RERR) are used toward find out and maintain associations. The UDP/IP is to accept and

obtain messages. In this protocol the target node grenade the unique number that called the destination sequence number and that is used by each route. That route will be selected which have the maximum sequence numbers and that route is used to find out the new route source node, regularly sends Route Request message to the network until destination node is reached. As soon as new route is found in the network. Route Reply message sent by network to source node. After that the nodes of new route assure the activeness by passing the hello messages to each other. If any node does not get back reply messages then that node is deletes form the route and intimate its neighbour nodes by sending route error message.

E. TORA

Temporally Ordered Routing Algorithm (TORA) is a extremely well-organized, adaptive as well as scalable routing algorithm [13]. TORA basis-initiated on-demand and it gets numerous routes linking the cause with the objective. The main feature is TORA that a link fails the control messages are only propagates around the point of failure. As anther protocols require a re-initiate a route invention as soon as link not succeed, TORA would be able to patch itself up around the point of failure [14]. In the TORA permit a characteristic to scale up superior networks other than the elevated overhead in favor of minor networks.

F. Ant- AODV

Ant- AODV is a merge of protocols i.e. both reactive with proactive protocols. It has the capability to afford the peer and delay sand issues, relating to connectivity more efficiently, as compared to traditional AODV routing protocol. The reactive element is performed via AODV and the proactive element is done via ant-based approach [15, 16]. The objective of the ant- based algorithm at this time is to endlessly make paths in the effort to lessen delay hold up moreover the network is time of latency, growing the possibility to the discovery routes hurriedly, Ant-AODV's routing is mainly depends on the count of hops and its objective is to learn the topology of the network, lacking other precise occupations, as different to the majority ant-based algorithms. Route construction in ant-based technique is independent of the ants allocated on the nodes. Nodes as well contain competence of introduction to on-demand route sighting to get the routes of objectives [17]. The usage of ants in AODV enhances the connectivity among various nodes, which in-turn diminishes the number of discoveries of various routes and furthermore the route discovery latency.

TABLE 2 Comparison of various traditional MANET.

Algorithm/ Parameters	AODV	A-DSR	TORA	A-DYMO	DYMO	A-AODV
Year	1997	2007	2013	2010	2009	2002
Routing type	whollyOn Demand	On Demand	On Demand	Hybrit	On Demand	Hybrit
End-to-end delay	Elevated	Low	Elevated	Low	Elevated	Low
Connectivity	Low	High	Low	High	Low	High
Route Nature	Solo lane	Multiple Path	Multipath	Multiple Path	Solo lane	Multiple Path
Overhead	Low	High	Low	High	Low	High
Works For	MANETs	MANETs	MANETs	MANETs	MANETs	MANETs
Types of Ants	-----	onward ant , toward the back ant	-----	Ant agents	-----	traveler ant Search ant (ARREQ)
Topology Structure	Flat	Flat	Flat	Flat	Flat	Flat
Path Type	Solopath	Multiple Path	Multipath	Solopath	Multiple Path	Multiple Path
Congestion control	Yes	Yes	No	Yes	Yes	Yes

V. CONCLUSION

Mobile Ad-hoc Network (MANET) is not a simple type of wireless networks. It consists of only mobile nodes and does not use any stationary host for communication purpose. Reactive routing has got a special corner while discussing the data transmission in MANETs due to the lower communication overheads as compared to proactive and hybrid approaches. This paper has also focused on review of reactive routing protocols in two categories i.e. traditional and ant based. Ant based routing is getting popular

among the discussions of various researchers. We have also reviewed and discussed few reactive routing protocols. After that we have created a comparison table to analysis and compare that these algorithms depending on different metrics relating to performance topology structure, routing type, congestion control and information inside routing table. The comparative table helps in elaboration various competencies in different situations.

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