

A Survey of Route Optimization Technique in MANET

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Abstract- In MANET nodes are mobile and communicate with other nodes through wireless connection. The nature of MANET is dynamic so route discovery is quite challenging task. In MANET mobile nodes are operated by batteries and it is not an easy task to replace and recharge them. The conventional routing protocols do not consider energy of nodes while selecting routes. Therefore some type of route optimization is necessary to enhance the network lifetime. The main objective of this survey paper is to study and analyze various route optimization techniques and performance evaluation of existing techniques.

Keywords- MANET, ACO, Quality of service, Multipath routing, Pheromone trails.

INTRODUCTION

All nodes in network are versatile and speak with one another by means of wireless associations are Mobile Ad hoc Networks (MANETs). Nodes can join or leave whenever. There is no settled base, all nodes are equivalent and there is no concentrated control or outline. There are no assigned switches: all nodes can serve as switches for one another, and information packets are sent from node to node in a multi-jump design.

1.1 Mobile Ad Hoc Networks (MANET)

Mobile Ad-hoc Networks (MANETs) are extraordinary sort of systems in which the portability of the nodes is very high. All nodes should be equivalent in handling power. Mobile ad- hoc systems are the system which includes nodes without framework. The system over radio connections are brought about because of the self-association of the versatile hubs. Particular directing conventions are required for building up courses among the nodes.

The variety between the remote qualities and nature of system topology is because of the high portability of the specially appointed systems. Mobile ad hoc system can be introduced effortlessly anyplace and at whatever time.



Figure 1.1 Mobile Ad hoc Network (MANET)

Route maintenances are very troublesome undertaking because of the dynamic way of MANETs. Fundamentally, Routing is the procedure of picking best way in a system along which the source can send information packet to the destination. Routing is a vital part of system correspondence in because of the fact that the qualities like throughput, reliability quality and blockage relies depends on the information routing data. A perfect routing algorithm is one which can convey the packet to its destination with least measure of postponement and system overhead. The nodes upgrade the data by exchanging so as to routing tables routing data between alternate nodes in the system. MANET is a network in which numbers of nodes are connected with each other by using different topologies. Here different topologies use for different networks. It depends on number of networks.

Categorization of various ACO routing algorithms

Due to nature of ants the ant colony optimization can be applied to the various problems of MANETs. As the MANETs can be classified into (1) Proactive, (2) Reactive, (3) Hybrid categories, over MANETs can also be categorized into similar categories depends upon various performance metrics as follows.

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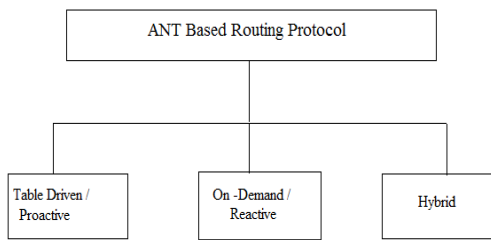


Fig. 1.3 Categorization of ant based routing protocols for MANETs

The ant colony optimization due its inclination can be connected to the different issues of MANETs. As the MANETs can be ordered into Proactive, Reactive and Hybrid classifications, over MANETs can likewise be arranged into comparative classes based upon different execution measurements as takes after. Routing protocols for MANETs are grouped into three unique classes: proactive, reactive and hybrid protocols.

PROACTIVE PROTOCOL: The proactive protocols are derived from the static networks and paths require global dissemination and periodic advertisement of routing information for operation which leads to frequent system-wide broadcasts. These are also called stable driven protocols which indicate that they maintain a routing entry for every possible destination in the network.

REACTIVE PROTOCOL: The reactive routing protocols make courses just when the source node needs to correspond with alternate node in the system. At the point when a node requires a course to a destination, it starts a route discovery process inside of the system. Once a course has been set up, it is kept up by a route maintenance system until either the destination gets to be blocked off along each way from the source or until the course is no more craved.

HYBRID PROTOCOL: Hybrid directing conventions utilizes the mix of both proactive and reactive conventions. Here Hybrid means half and half protocol. It combines both the protocols. [1]

The nodes in an ad hoc remote system are regularly battery worked with a restricted energy supply. Step by step instructions to ration energy, amplifying the lifetime of its nodes and consequently of the system itself is a standout amongst the most critical and testing issues in ad hoc remote systems. As the directing is one of the fundamental capacities in these systems, in this way creating power-mindful routing protocols for specially appointed remote systems has been a serious exploration territory as of late.

Power Aware Routing must be considered in a manner that it minimizes the vitality utilization while steering the activity and in this way minimizes the aggregate power utilization of the considerable number of hubs in the system, minimizing the overhead and so on and along these lines, expands the lifetime of the system. [13]

1.2 Ant Colony Optimization (ACO)

Ant colony optimization (ACO) is a populace based meta-heuristic methodology; it was presented by Marco (1992). As the name recommends the method was motivated

by the conduct of "real" ant. Ant colonies can locate the most limited way between their home and a food source by storing and responding to the trail of pheromone which give assistance to future ants towards ideal ways to sustenance. Figure 1.3 (a) and (b) illustrates how, after some time, the ants on the shorter way achieve the food source prior a contrast with the ants on the longer way. Ants on achieving the destination; begin another course in reverse towards the source home by taking after the same way and predispositions the way by storing contrast with the ants on the longer way.

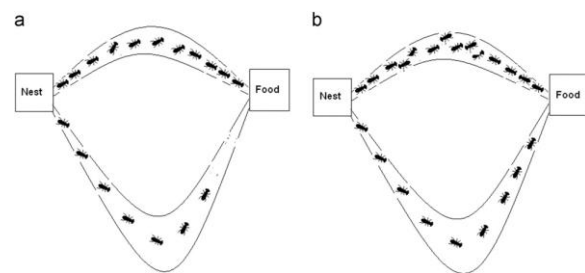


Fig 1.2 (a) Double bridge experiment — ants on shorter path reaches of food source earlier. (b) Ants on the shorter path return to nest before the ants on longer path.

Ants on achieving the destination; begin another course in reverse towards the source home by taking after the same way and predispositions the way by keeping more pheromone on the shorter way. As time advances, the pheromone on non-ideal ways dissipates while the pheromone on close ideal ways is fortified. The essential rule of ACO calculations can likewise be connected to numerous other combinatorial optimization issues.

LITERATURE SURVEY

P. Venkata Krishna et. al (August 2010) The quality of service enabled ant colony based multipath routing (QAMR) algorithm based on the foraging behavior of ant colony for selecting way and transmitting information is propose by authors. In this approach, the way is chosen taking into account the stability of nodes and the way inclination probability. The authors have considered consider the (a)bandwidth, (b)delay and (c)hop count as the QOS parameters alongside the stability of node, number of jumps and way inclination probability elements. Simulations performed by using network simulator 2 and that shows the proposed algorithm is versatile and performs better at higher movement load contrasted with the current algorithms. [7]

Yong Min Kim et. al (2011) An ant colony optimization based energy saving routing in this letter proposes an A-ESR for energy efficient networks. The A-ESR algorithm firstly re-formulates the energy utilization minimized network (EMN) issue, which is NP-finished, into a more straight forward one by utilizing the idea of traffic centrality. After that, it takes care of the re-formulates issue by (a) letting the flow to self-rulingly be collected on some particular heavy-loaded links and (b) exchanging off the other light-loaded connections. Reenactment results demonstrate

that the An ESR calculation can show signs of improvement execution than past works as far as vitality productivity. [5]

Gurpreet Singh et. al (2012) In this paper it has been found that ant colony optimization (ACO) algorithms can give better results as they are having characterization of Swarm Intelligence (SI) which is exceedingly suitable for finding the adaptive routing for such kind of unstable system. ACO algorithms are inspired by a foraging behavior of gathering of ants which can discover ideal way based upon some characterized metric which is assessed amid the movement of ants. ACO routing algorithms use basic specialists called artificial ants which set up ideal ways between source and destination that speak in a roundabout way with one another by method for stigmergy. Keeping in perspective of the above, in this paper we give scientific classification of different ant colony algorithms with favorable circumstances and demerits of every others as for different measurements. [1]

Deepender Dhull et. al (Feb. 2013) To take care of the traffic engineering multicast issue which enhances numerous targets all the while this study offers a configuration on Ant Based Multicast Routing (AMR) algorithm for multicast routing in mobile ad hoc networks. Aside from the current requirements, for example, separation, deferral and transmission capacity, the calculation computes one more extra limitation in the cost metric which is the result of normal postponement and the most extreme depth of the multicast tree. Besides it likewise endeavors to decrease the consolidated cost metric. By lessening the quantity of gathering individuals that take part in the development of the multicast structure and by performing so as to give strength to versatility telecasts in thickly bunched neighborhood areas, the proposed convention accomplishes bundle conveyance measurements that are tantamount to that with a pure multicast protocol however with fundamentally bring down overheads. By this protocol we accomplish expanded Packet Delivery Fraction (PDF) with lessened overhead and directing burden. By recreation results, it is clear that our proposed calculation surpasses all the past calculations by creating multicast trees with various sizes. [10]

Kalpana. R et.al (2013) In this paper the author proposed a mechanism to address anonymous routing with trust to enhance overall ad hoc network security and execution is proposed. Enhancing the ad hoc network security and its execution utilizing anonymity mechanisms and trust levels is researched in this paper. Anonymous networks hide identification information, for example (a) traffic flow, (b) system topology, ways from malicious attackers. Trust is an essential as selfish/ malicious nodes are a security danger, diminishing Quality of Service (QOS). Routing in light of security mechanism is ended up being a NP Hard issue. To conquer this, it is proposed to utilize Ant Colony Optimization (ACO) for quicker union of the proposed solution. Result shows that general system security enhances when the trust component is brought into record with definite improvement in the QOS.

Richa Sharma et.al (May 2014) DSR protocol is utilized to locate the accessible routes to send the packets. Be that as it may, it doesn't generally give the best way. Because of this limitation, another form of DSR protocol is required. To do as such, ACO is combined with DSR protocol. The principle target is to discover the improve way to send the packets. It additionally increases the lifetime of system. This is accomplished by adjusting the residual energy of all nodes in system. No of Dead nodes will be computed in DSR and in addition in DSR-ACO. Simulation results are acquired as far as metric-system lifetime. It is watched that the DSR-ACO gives better result over DSR. [12]

Pradeep Reddy et.al (2015) Author means presented in this paper a novel on-interest multicast routing protocol known as Cross-Layered Ant Colony Optimization Multicast Routing Protocol (CLAMR). This chose protocol is an enhanced and improved version of the effectively existing on-interest multicast routing protocol (ODMRP) with the upgrade of Bio-inspired Ant Colony mechanism. The principal component of ODMRP is used in the proposed strategy alongside the upgraded elements of cross layer, applying ACO. This CLAMR is a effective and strong protocol with negligible overhead. The scalability and enhanced execution levels of the used algorithm at higher traffic load in contrast with the current algorithms are obvious from the simulations performed using network simulator 2.

Amandeep Kaur et. al (May 2015) Since the mobile nodes are powered by batteries, so in this manner to replace or recharge them won't not be conceivable. With a specific end goal to appreciate full point of interest of node's life time routing of the movement ought to be done in a manner that power utilization is minimized. The greater part of conventional routing protocols they don't consider energy of nodes while selecting courses. Creator utilizes the same course for a more extended term then it will prompt apportioning of the system. In this way, in the event that we consider vitality of the nodes while selecting a course proficiently, then it will prompts full use of the hub's vitality furthermore helps in expanding the lifetime of the system. In this paper, upgrade of using so as to exist AODV convention is proposed Ant Colony Optimization (ACO). To decrease vitality utilization by hubs in versatile specially appointed system (MANET) and to make existing AODV convention more vitality effective by better course disclosure is the fundamental reason for this upgrade. [13]

Algorit hm	Author & year	Featu res	Findings
(QAMR) algorithm Quality of service enabled ant colony based multipath routing	P. Venkata Krishna & G. Vedha In 2010	Perfor ms better at higher traffic load compared to the existing algorithms	Calculate multipath disjoint paths, the network life time is also increased as battery of node is also considered

			for path computation .
(A-ESR) algorithm ACO based energy saved routing for energy efficient networks	Yong-Min Kim In 2011	Concept of traffic centrality, get better performance	Reduce the energy consumption by making use of pheromone trails, simulation result shows that A-ESR algorithm can get better performance .
ACO combined with OLSR (optimized link state routing)	Bibhash Roy & Suman banik In 2012	In OLSR only symmetric links are used for route setup process, OLSR supports node's mobility	Identify multiple stable paths between source and destination.
(AMR) algorithm Ant Based Multicast Routing	Deepender Dhull & Swati Dhull In 2013	Reduce the cost metric.	Increased packet delivery fraction (PDF) with reduced overhead & routing.
Routing protocol mobile anonymity based on ACO	Kalpna. R & Rengarajan In 2013	This method increases the control overhead of the network by almost 100%.	Result shows overall network security.
(DSR-ACO) DSR protocol used Dynamic Source Routing	Richa Sharma & Rajesh Kumar In 2014	Optimize path to send packets.	Find available routes to send the packets, the throughput of DSR-ACO are also good.

Cross Layered Ant Colony Optimization Multicast Routing Protocol (OLAMR)	Pradeep Reddy & Jagadesh Gopal In 2015	Effective protocol with minimal overhead.	Find multiple path during route discovery phase, obtained QOS factor, effective throughout and less delay.
Enhancement of existing AODV protocol using ACO	Amandeep Kaur & Ashdeep Singh In 2015	Full utilization of node energy.	Reduce energy consumption by nodes, better route discovery, maximize the lifetime of network.

I. CONCLUSION

Various papers have been studied for route optimization. ACO is an effective optimization technique which is used by many researchers. Cross Layered Ant Colony Optimization Routing Protocol the throughput is high and less delay. The Quality of service enabled ant colony based multipath routing algorithm calculates multiple disjoint paths. Battery consumption is reduced in ACO based energy saving routing algorithm. Ant based multicast routing algorithm achieve higher packet delivery fraction (PDF) with reduced overhead.

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