

# Routing Overhead in MANET - Minimization with Multipath Local Route Discovery Routing Protocol

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**Abstract**—MANET: A mobile Ad – Hoc network, is a collection of autonomous system, with frequent mobility, can be set anywhere dynamically on the existing network structure. The connections were made by wireless links presented. They are based on the wireless connection, arbitrarily changing topology, and distributed architecture and deployment defects. Mobile – Ad hoc networks underwent many issues as above said in which routing is the major issue. Transmission of data through shortest path, with minimal delay is considered a major drawback in the wireless transmission. In this paper a novel technique is proposed to find shortest path between large numbers of nodes, that the time to access is minimized. The multipath local route discovery protocol is used for the minimization of the path selection between multiple paths. It creates cache routes on some metrics such as bandwidth and sorted based on the availability of the network. If route failure occurs, source node finds the nearest neighbor through multipath local routing thus minimize the over heading issue in Manets. It establishes a local recovery path with maximum bandwidth from its route cache. The performance metrics which are packet delivery time notations normalized routing overload, end to end delay and throughput.

**Index terms:** Routing Overhead, Multipath local route discovery protocol, MANETs, Wireless Transmission.

## I. INTRODUCTION

Communication in the wireless network includes security threats, minimum time to deliver the message, retransmission of the messages, packet delivery ratio, throughput etc. As a special case Mobile Ad hoc Network (MANET) is a self-configured network of autonomous systems associated via the wireless links with random topology to create network architecture with the pre-existing network. The nodes travel in the random manner [10]. Ease of deployment, strength, node availability, scalable transmission and required mobility support are some of the merits of the ad hoc networks.

The Mobile ad hoc network is beneficial in nature, hence utilized in many real world scenario and applications, in collective and distributed computing, wireless mesh networks and sensor networks and even also at hybrid networks. The wireless transmission limit has undergone an extension with the help of the ad hoc networks on account of multi-hop packet forwarding strategy [2]. This dynamic and mobility nature enhances the Manet with effective transmission of packets. This can support the situation during the pre-build infrastructure cannot cope up with the application. The mobile nodes within radio

limits interact directly through wireless routes and routers take the work of distant interaction.

Mobile ad-hoc networks have a lot of importance in wireless transmission media. Wireless communication is established by nodes acting as routers and transferring packets from one to another in ad-hoc networks [4]. Routing in these networks is highly complex due to moving nodes and hence many protocols have been developed. The MANET routing protocols were devised into two types namely the Table – driven and on- demand routing protocols. The multipath routing includes three components namely the route discovery, maintenance of route as well as the traffic allocation between them. To overcome the problem of route delay and packet loss, the route maintenance technique is incorporated within the components.

To measure the performance evaluation of the MANET routing protocols are measured. They are already defined as two types: Proactive and Reactive. When nodes move over time from one position to another, it's less efficient to use proactive protocols, whereas route will be already established before a packet is sent is reactive protocols. MANET focuses at On- Demand DSR (Dynamic source Routing) Protocols which yields better results.

The paper is organized as follows. The literature review is placed on section 2 followed by description of Multipath Local Route Discovery, Dynamic source routing in the section3. Section4 includes the proposed methodology procedure along with the experimental results obtained. Section 5 consists of the future enhancement and conclusion of the proposed technique.

## II. LITERATURE REVIEW

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. Ammar Odeh, Eman AbdelFattah and Muneer Alshowkan, explains the performance evaluation of AODV and DSR protocols in routing in MANET. By using network simulator NS2, a setup is created and evaluation of the protocols taken place based on their packet size. They show that the DSR has better performance in terms of efficiency for a packet size, rather than AODV [1].

In the paper proposed by V. Jayalakshmi and R. Rameshkumar, [2] a new protocol named, the RFTA a multi objective routing protocol that meets diverse application requirements by considering the changing conditions of

the network. The efficiency of the proposed protocol has been evaluated on different scenarios and there has been a noticeable improvement in the packet delivery ratio and also in the reduction of end-to-end delay comparing to SMR, SMS and MDSR.

The Routing overhead minimization using the Dynamic source routing protocol is explained by R.Ranjithkumar in [7]. In that work, a new technique is proposed in which the NCPR Method is used to reduce the overhead in routing. In order to efficiently develop the information of nearby coverage, the method NCPR is to determine rebroadcast delay in the rebroadcast order, and get the additional accurate coverage proportion by sensing neighbor coverage information. By using the NCPR technique in manet, because of less redundant rebroadcast, the proposed protocol mitigates the network collision and contention, so as to increase the packet delivery ratio.

D. Jagadeesan and S.K. Srivatsa,[3] explains in their proposed work multipath routing protocol for effective local route recovery in Mobile Ad hoc Networks (MANET). In this protocol, each source and destination pair establishes multiple paths in the single route discovery and they are cached in their route caches. The cached routes are sorted on the basis of their bandwidth availability. The proposed route recovery management technique prevents the frequent collision and degradation in the network performance. The simulation results show that the proposed approach improves network performance.

Richa Sharma and Maninder Singh Nehra[8], verifies the broadcasting issue over the MANET, with AODV and DSR protocol respectively. Broadcasting is an important in MANET for routing information discovery, and location aided routing use broadcasting to establish routes. Broadcasting in MANETs poses more challenging problems because of the variable and unpredictable characteristics of its medium as well as the fluctuation of the signal strength and propagation with respect to time and environment such as bandwidth congestion, channel contention problem, and packet collision problem. Their proposed scheme combines the advantages of the neighbor coverage knowledge and the probabilistic mechanism, which can significantly, optimizes the routing mechanism in comparison to the AODV protocol.

Saichand G and S Muruganandham,[9] discuss the Anonymous Location Based Service with Routing Overhead in MANET's Using NCPR technique. An Anonymous Location-based Efficient Routing protocol (ALERT) was used to offer high anonymity protection at a low cost. Their proposed methodology shows a new technique for reducing routing overhead in Manet's using Ncpr routing Protocol. The protocols are on-demand routing protocols, and they could improve the scalability of MANETs by limiting the routing overhead when a new route is requested. In order to keep the network connectivity and reduce the redundant retransmissions, a metric named connectivity factor have to be determined.

### III. PROPOSED METHODOLOGY

The following section describes the existing DSR protocol working methodology, the NCPR technique to reduce the overhead in the routing, along with the proposed Multipath

Local Route discovery Protocol working procedure. The Dynamic source routing protocol is one of the routing protocols that is on – demand in nature. It is simple as well as efficient routing protocol, with rebroadcast possibility. It would be small while the number of nearby nodes is high. The possibility will be large when the amount of neighbor nodes is small.

#### A. *Dynamic Source Routing Protocol (On – demand)*

The Dynamic Source Routing protocol (DSR) is one of the simple and efficient routing protocols designed specifically for using in multi-hop wireless ad hoc networks of mobile nodes. It allows the network to be completely self-organizing and self-configuring, without the need for pre existing infrastructure. The protocol is composed of the two mechanisms of Route Discovery and Route Maintenance, which work together to allow nodes to discover and maintain source routes to arbitrary destinations in the ad hoc network. The traffic allocation is next made by the protocol based on the requirement and availability of the network structure.

The DSR works as follows, when the source node wants to send a packet to a destination, it looks up its route cache to determine if it already contains a route to the destination. If it finds that an unexpired route to the destination exists, then it uses this route to send the packet. But if the node does not have such a route, then it initiates the route discovery process by broadcasting a route request packet. A route reply is generated when either the destination or an intermediate node with current information about the destination receives the route request packet. DSR protocol uses two types of packets for route maintenance, namely Route Error packet and Acknowledgements

#### B. *Neighbor Coverage Based Probabilistic Rebroadcast (NCPR) Protocol*

This protocol is used to calculate the rebroadcast delay and rebroadcast probability. Using the upstream coverage ratio of a Route Request packet received from the previous node to calculate the rebroadcast delay and use the additional coverage ratio of the packet and the connectivity factor to calculate the rebroadcast probability in NCPR protocol, which require that each node needs its single-hop neighborhood information.

A Rebroadcast Delay and Uncovered Neighbors Set are now calculated. The node receives the Route Request packet from its earlier source node, to use the neighbor list in the Route Request packet to estimate how many its neighbors have been not covered by the Route Request packet from source. Based on the available preexisting network, then the transmission as well as the rebroadcasting takes place.

#### C. *Multipath Local Route Recovery Protocol in MANET*

A new hybrid routing protocol that involving multipath discovery and route recovery is the Multipath Local route discovery protocol. It works, when the source node needs to forward a data packet to a destination, it floods the Route Request packet to the entire network. The intermediate node updates its route cache of routing information. Whenever it receives the Route Request packet and continues packet

broadcasting. On the other end, the destination node, receives all request packet, attach the route code and other details such as the available bandwidth and feedback route reply. Based on the receiver receiving the packet, the source node selects the route based on the route code. In case of route failure in the primary route, the recovery node detects it and establishes the local recovery path with maximum bandwidth. The rout recovery management technique is handled to avoid the frequent collision and degradation in the network performance.

#### IV. EXPERIMENTAL RESULTS

The following section comprises the experimental results obtained by incorporating the Multipath local route discovery technique in the MANET, which is also a on – demand protocol usage. The simulation is made using NS2 (Network Simulator 2), and the total number of nodes taken is 100 i.e (0- 99). While in the existing NCPR network around 25 nodes were calculated. Along with the simulation result the performance metrics such as packet delivery ration, packet loss, simulation time, delay time as well as throughput are demonstrated using the graph.

The following is the calculation for the distance of neighboring nodes and which is the nearest node from its X and Y position. The Fig.1 shows the total number of nodes (100) created by using the NS2. The axis represents the nodes to the distance ratio. It is to be assumed that if the source node as 22 and the destination is 26, then the route calculation is explained as in Fig. 2.

The graphs from Fig.3 to Fig.7 show the various parameters based on throughput, delay time, packet size and packet delivery ratio between the existing Ncpr system with the proposed system.

node	neighbor_node	x-position	y-position	distance
0	14	854	815	153.1993087745503
0	24	854	815	147.644829787078522
0	30	854	815	171.77314091556937
0	94	854	815	113.02065578344699
1	55	441	441	172.00046488880666
1	38	441	441	130.08617439989541
1	39	441	441	150.35749064812165
1	88	441	441	181.69944361499847
1	89	441	441	101.3976267276509
1	98	441	441	175.8363607008577
1	99	441	441	176.72854601902884
2	9	1016	121	136.33682082636369
2	55	1016	121	121.94436067731877
2	56	1016	121	186.1327357693967
2	77	1016	121	108.29792407229932
2	2	882	98	136.33682082636369
3	15	882	98	145.09524492746127
3	7	882	98	121.9718764708328
4	9	159	521	144.57913966060246
4	13	159	521	155.5618627716961
4	18	159	521	100.43646290565991
4	35	159	521	176.0825397269944
5	19	877	482	138.92016615308231
5	22	877	482	134.04130243642644

Fig.2 Nearest Neighbor Node from X- Axis and Y – Axis

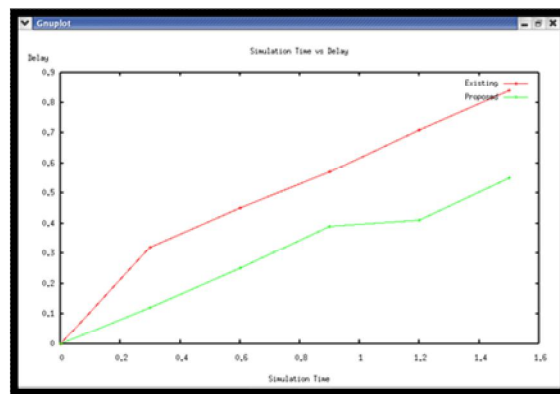


Fig.3 Simulation time with Delay Chart

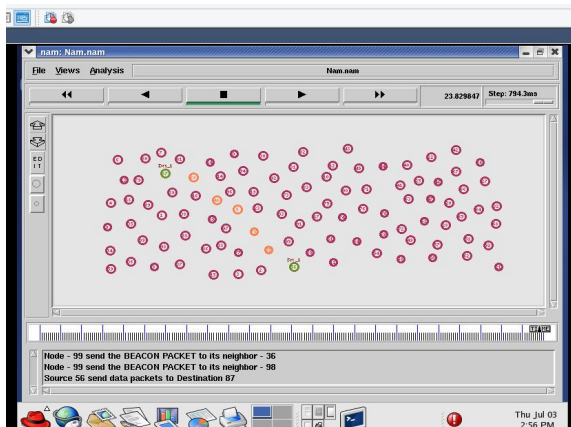


Fig. 1 Nodes created in Simulator with source and destination indication

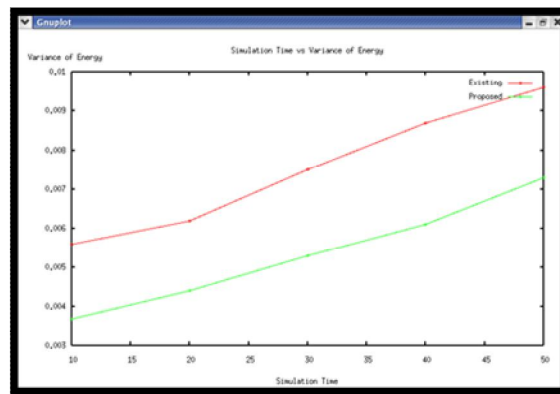


Fig. 4 Simulation time with Variance of Energy Chart

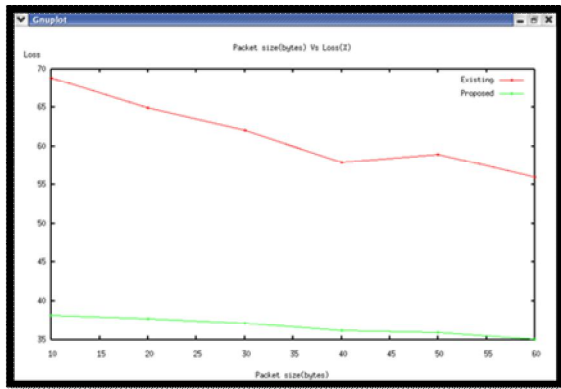


Fig. 5 Packet Size Vs Packet Loss Chart

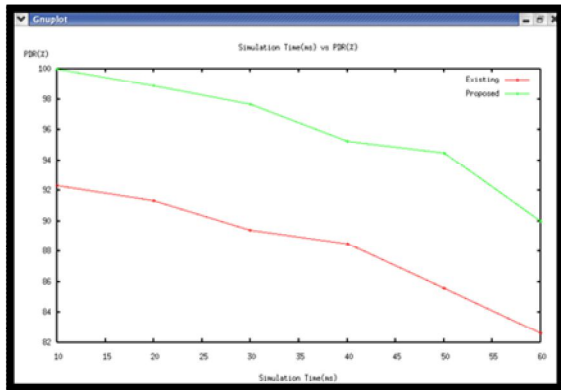


Fig. 6 Simulation time with Packet Delivery Ratio Chart

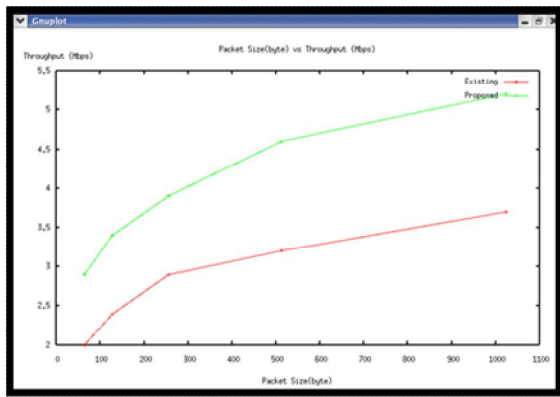


Fig.7 Simulation time with Packet Delivery Ratio Chart

## V. CONCLUSIONS

The Simulation results show that the Multipath local route discovery protocol can be employed in large network area. Around 100 nodes were simulated and the transmission is taken place. The main objective is to find the nearest neighbor in the network. By using the multipath route request and their

acknowledgement, the next nearest neighbor is cached and the transmission is taken place. From the experimental results, it is obtained that the Packet size is increased without delay, when comparing the existing NCPR network. The loss of the packet is considerably reduced, since the local routes between the multipaths were cached and the transmission is dynamically converted and reaches the destination within shorter period. The average throughput time is increased by convergence of paths. Hence, the proposed technique, works efficiently for reducing the overheads in the MANET compared with the existing network.

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