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"The Split Multipath routing approach for reducing routing overhead and Energy Drainage in MANET"

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Abstract: The Mobile Adhoc network is formed of various mobile nodes. Since the nodes are free to move in direction. The data sending from source to destination causes problem as In MANET, for sending data the path is provided by the routing protocols .The routing protocol manage path for sending data in network for mobile nodes .the multiple path are provided in the network for efficient transmission.. The proposed algorithm is suitable for route recovery process. For sending data through multiple path in comparison with simple AODV protocol. The split multipath provides various route in network for transmission with the failure of any path another path will selected for transmission instead of discovery new route for transmission due balancing load on routing.The proposed algorithm for increases Packet Delivery and reduces energy consumption and routing overhead.

Keywords: Routing Overhead, Energy Drainage, SMR.

1. INTRODUCTION

In the past ten years ,for a long time peer-to-peer (P2P) networks, in which each peer without delay of the information pass and share resources with other peers have instantaneously develop process and received substantial research and commerce attention. With the increase in technologies for communications, networking, information management, and position systems, people now can use mobile devices for a way of getting near to the information which is ordinary as well as common. Each mobile device can convey knowledge with others and set up a network in an ad-hoc mode of operation. This has shifted the researchers' form the act of seeing someone to mobile peer-to-peer (MP2P) systems, where the body of members among peers is more dynamic and ad hoc [1]. Mobile Ad hoc Networks (MANET) can be defined as collections of existing mobile nodes, which communicate wirelessly without any obligation for antedate network infrastructure. In addition, MANET do not depend on consolidate control. Each node gets involved in the MANET is not only get considered as an end system but also as a router relaying messages to other participating nodes [2]. MANET is used in applications the main applications are search and rescue operations, automated in battlefields as well as emergency relief description, law constrain, meeting in public, data networks, device networks, virtual classroom, disaster recovery, sensor networks [3].

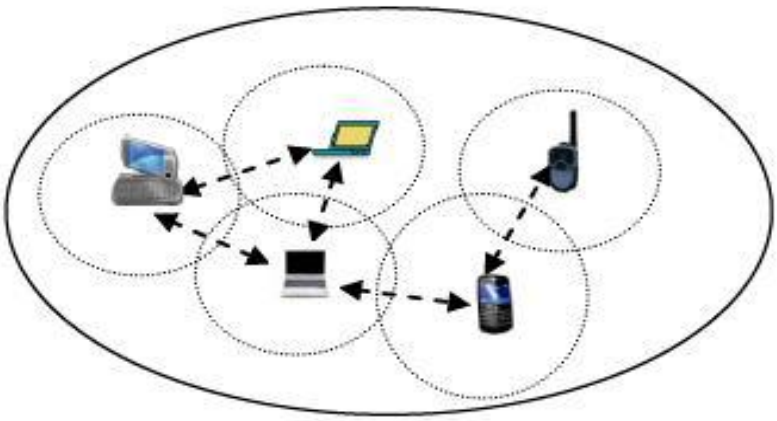

Fig1 Example of typical Manet[4]

By a multicast fashionable routing protocol, multicast paths will be formed from a multicast source node to multiple destinations. (These multicast paths results in a multicast tree.) Then, the multicast source node can carry and transfer a

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packet to multiple destinations simultaneously. Multicast means to send data across computer networks to several users at the same time [5]. Their high physical force and heterogeneity(consisting of dissimilar constituents), with frequent and severe uncertainty in channel stipulation(something that is required), node mobility, disconnected operations, and network partitioning not being the exclusion but the rule, make the adoption of end-to-end communications particularly challenging [6]. Traditional routing algorithms such as AODV, DSR and TORA ignore the remaining battery of nodes. The act or process of sending the data between two nodes is generally done in these protocols through the shortest path routes [7].

The main design standard for the routing protocols in MANETs is as follows:

a. Scalability and Reliability
b. Simplicity and ease of implementation
c. Fault Tolerance.
d. Dynamic topology maintenance
e. Distributed and Lightweight

Energy drainage in Manet: The lifetime duration of a node is straightway proportional to its battery's energy. The node battery's energy is initially consumed while transmitting and receiving packets . The nodes taking part in packet transmission can exhaust their energies and discarded from the network. Due to this the reliability of the packet delivery service of the network gets affected. That's why in a multi hop communication, the selection of the accurate nodes by the routing protocol is very important task. Thus, routing protocols plays a vital role in saving the communication energy, as a result the battery e life of the nodes get extended and therefore the whole network.

2. ROUING PROTOCOLS IN MANETS

1.Proactive Routing Protocols: Proactive protocols is dependent upon maintaining routing tables of familiar destinations, this minimize the amount of control traffic overhead that proactive routing produce because packets are forwarded frequently using known routes. OLSR(Optimized link state routing protocol) relies on the exchange of control packets at regular intervals in order to maintain topology information of the network at each node. OLSR is a pro active, or table-driven protocol, in that it engage the periodic distribution of control messages to enable the immediate retrieval of routes by nodes in the network [8].

2. Reactive Routing Protocols: Reactive routing broadcasts routing requests (RREQ) whenever a packet requires routing. This can result in delays in packet transmission as routes are calculated, but features very small control traffic overhead as well as have regular lower memory usage comparable to proactive. Example of this type consists of Dynamic Source Routing (DSR) and Ad Hoc On Demand Distance Vector (AODV) [9].

3. Hybrid Routing: Hybrid protocols combine the characteristic from both reactive and proactive routing protocols that strive to exploit the reduced control traffic overhead from proactive systems while lowering the route spotting delays of reactive systems by conserving some form of routing table. Example of this type consists Zone Routing Protocol (ZRP)[9]

1. Single path routing Single path routing learn routes and choose single best route to every destination. A simple example of single path routing is BGP (Border gateway protocol).BGP will publicize information of only a single best path it knows towards a destination.

Drawbacks in single path routing protocols are:

a. Incapable of load balancing
b. It will only add a single path to destination in the IP routing table.
c. Routing overhead
To overcome drawbacks Multipath routing protocol is used which allows BGP to load balancing and load sharing so as to control the **Routing Overhead.**

2. Split Multipath Routing with Maximally Disjoint Paths in Adhoc Networks: In QoS (Quality of service) routing for wired networks, multiple routing paths are used in wide variety and are very popular. Multiple routes are constructed using distance vector algorithms which are not acceptable for ad hoc networks. The on demand routing scheme known as Split multipath routing (SMR) utilizes multiple routes of maximally disjoint paths. By providing multiple routes helps to minimize route recovery process and control message **overhead**[10].

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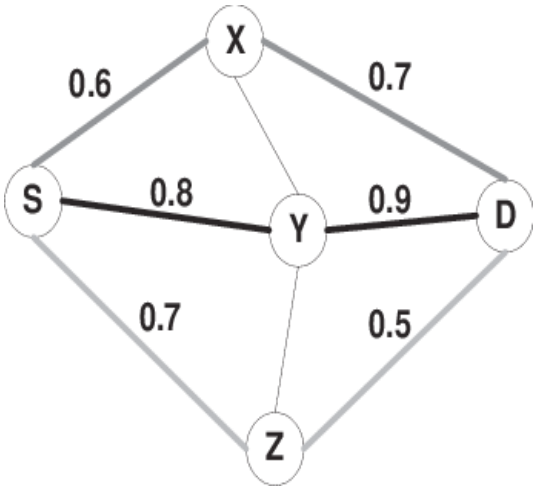

Fig2.1 Split Multipath routing

3. RELATED WORK

Sachidananda S. Joshi et.al (2016) studied that the up gradation into smart mobile devices has increased the adoption of various existing computing based familiar applications, where Mobile Adhoc Network (MANET) has expanded its usage from hard core military applications to civil society applications. The paper presents a framework of novel routing technique in order to jointly address the problem relating to **routing overhead** as well as **Energy drainage** between all the mobile nodes.[11]

Chuan-Ming Liu et.al(2016) studied that the node mobility create the communication links disconnected most of the time. frequently. The maintenance on data density in an MP2P system thus gets challenging. Technique which is introduces is heuristic data update mechanism (HDUM) for maintaining **density of wide range of data** in a MP2P system with **low overhead**. The experimental results described that HDUM can store and organize the maximum coverage of successfully synchronized nodes while reducing a large amount of redundant messages.[12]

Meng-Shiuan Pan et.al(2016) In many Internet of Things (IoT) applications, messages sometimes needed for dissemination to some specified nodes by implementing **multicast transmissions**. The multicast routing protocols are divided into non geographic-based. However, we have been observing that recent geographic-based multicast routing schemes have **two drawbacks**. One is a network node needs a lot of computational activities for deciding directions of sending multicast packets. , Second is when a network has some holes, the constructed multicast paths will become lengthy, and in few of the cases, paths may contain loops. In this work, lightweight and distributed geographic multicast routing protocol is proposed to **solve and overcome the given drawbacks**. It contains three phases. The first phase selects intermediate nodes to reach multicast destinations. Then, the second phase removes loops and cuts routes made in the first phase. Finally, the last phase checks whether the selected multicast links can further be mixed. The simulation results indicate that the proposed technique can **reduce overhead transmission links** between different nodes in constructed multicast paths. [13]

Andrea Gorrieri et.al(2015) studied that broadcasting is very common transmission strategy used by number of ad-hoc routing protocols in order to solve many issues, such as finding a route to a new host or sending control messages to all nodes in the network. In this paper, the well-known Ad-hoc On demand Distance Vector (AODV**) routing protocol is altered by replacing flooding mechanism** which is efficient in its route discovery process, with the probabilistic forwarding technique introduced by Irresponsible Forwarding . The performance of the new routing protocol is considered as irresponsible AODV. (iAODV) is analyzed in two characteristic (pedestrian(unusual), pedestrian–vehicular (designed for vehicle).

Mrunal Gavhalea et.al(2015) studied Mobile Ad-hoc Network (MANET) is dynamic and self-configuring network that is created by collecting various number of mobile nodes. Group of nodes form one cluster. **It is must to have better and efficient cluster formation as well as cluster head selection algorithm to connect with other nodes in the neighborhood so as to remove the energy drainage mechanism.** The various techniques are always available to make cluster. Battery life, speed, packet delivery ratio(PDR), delay these are some important parameter followed with the help of this efficient algorithm can be made. Attention is given on the Comparison between Lowest ID (LID), Highest Degree (HD), LEACH (Low Energy Adaptive Clustering Hierarchy).

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4. PROPOSED METHODOLOGY

We propose a Split Route Multipath technique the technique will be able to make multiple path transmission in the Network. The Technique is used to identify data loss path cooperating with each other and a solution to discover a efficient route avoiding routing overhead where each participating node will be assigned a Split path level that will be used to measure the of reliable path of that node. In case the level of any node drops to 0, it is considered to be a path is not efficient, termed as a 'Route breakage' and it is alerted by the node to its upstream and downstream neighbor node in each of the received RREP the Split path level of the neighbor node, and each of its Next available hop's level are checked. If two or more routes seem to have the same level, then select the one with the least hop count; else, select the one with the highest level.

Step1. Initiate the network

Step2. Route discovery protocol is applied on the network. AODV is the type of route discovery protocol.AODV knows the complete path from source to destination. AODV is reactive protocol. It is on demand

Step3. If the destination is found from the source for sending the message then next step is further applied. If the destination path is not found then again previous step is applied.

Step4. When the destination is found then find maximum disjoint route. Maximum disjoint route means the maximum multiple routes which reach towards the destination using AODV protocol.

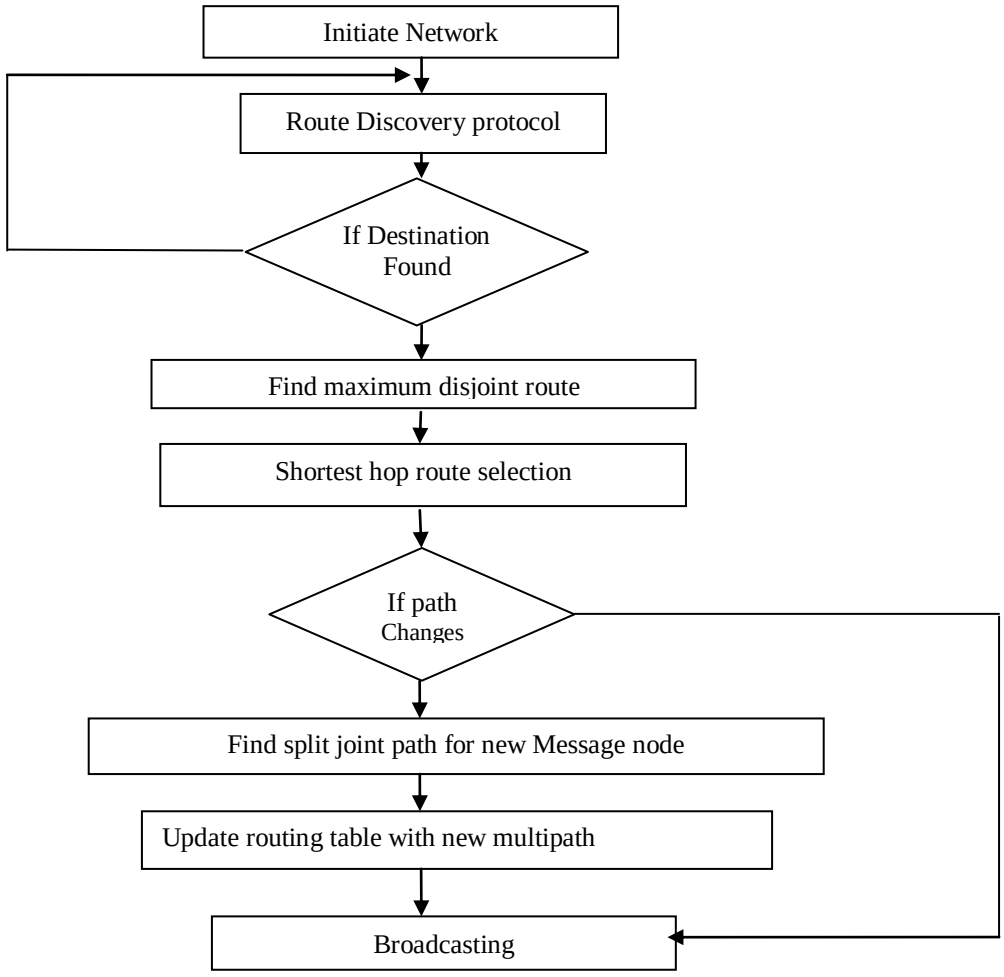
Step5. Find shortest -hop route selection from the maximum disjoint paths. From the number of maximum disjoint paths which reach toward the destination, among allthe shortest path which reaches toward destination should be chosen which saves time.

Step6. If the path does not change then the message is being broadcasted and there will be no affect on the routing table. Routing table remains the same.

Step7. If path changes then find the split joint paths from the new message nodes which reaches toward destination.

Step8. After finding the split joint path s for new message node then the routing table changes if the path changes. Routing table is updated

Step9. The message is broadcasted to the final destination node from the sender node called as source node.



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5. PROPOSED ALGORITHM

The proposed algorithm of security scheme is given the whole steps misguide the attacker in and provides Efficient data delivery in network.

Initialize
S: Sender Nodes

Ss: Sink Node

Link breakage Type: link broken at hop

Link Monitors: Location and Id(for Capturing)

Normal Routing: SRM Technique

Prevention: Location and Id Updating

Step 1: Begin

Step 2: Source Node detects the event

{

Step 3: Source Node S Search Sink Ss Node for Message Transfer

Step 4: If (S found and link break present in network) Capture Location and id of S node using SRM technique Target to Source S

Not Apply transmission through SRM multipath

}

Else If (Ss found and Source S send updated Location and ID info)

{

Capture Location and id of S node using SRM Routing protocol Target to Source S

{
Normal Data Delivery to Ss sink Node
}
Step 5: Stop

Configuration Table

S. No.	Parameter	Value(s)
1	Simulator used	NS 2.35
2	Simulation Time	100 Secs
3	Simulation Area	1500 X 1500
4	MAC	802.11
5	Number of nodes	30
6	Speed of Nodes	2 to 16 (m/sec)
7	Mobility Model	Random Waypoint
8	Transmission Range	250m
9	Packet Size	512 KB
10	Packet Rate	4 packets/sec
11	Traffic Type	CBR

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Comparative Analysis

The figures below show the comparitive graph of throughput, PDR and end to end delay results depending ujpon the network scenario which is after link breakage , previous technique and Split Route Multipath technique. It is evident from the graph that results of proposed technique are better than other techniques for efficent transmissions in a particular mobile adhoc network.

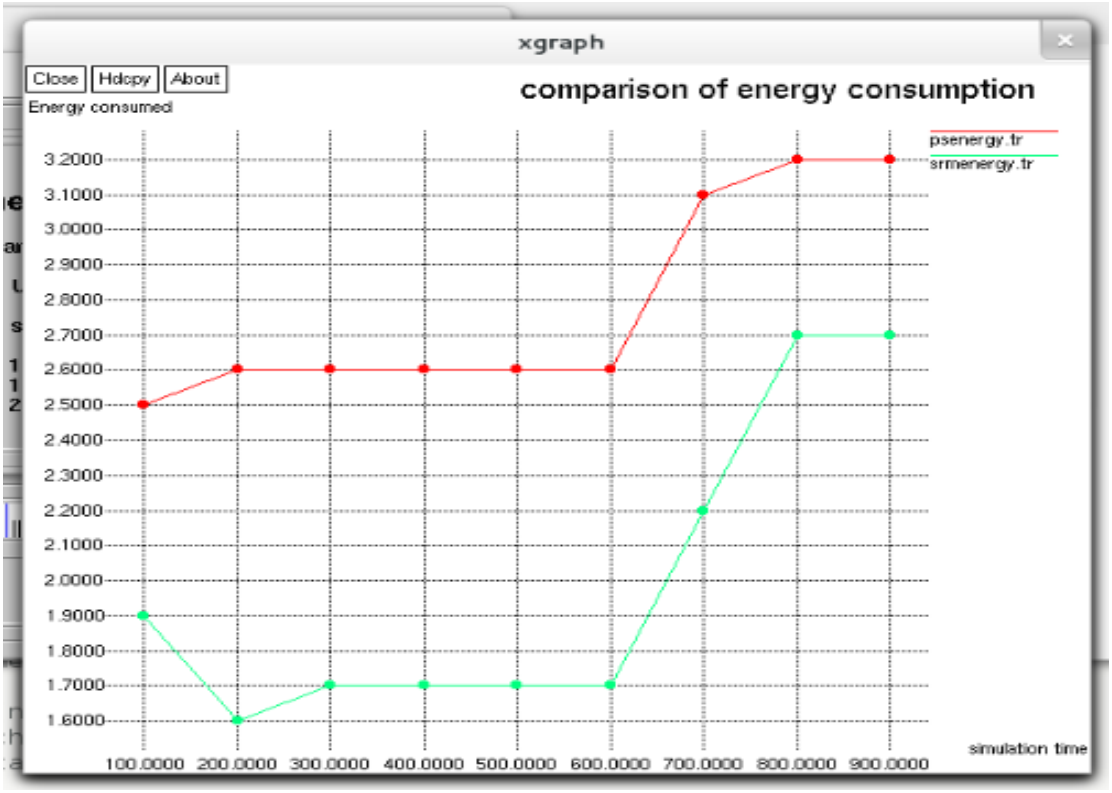

Figure 4.16 Comparison of Energy consumption

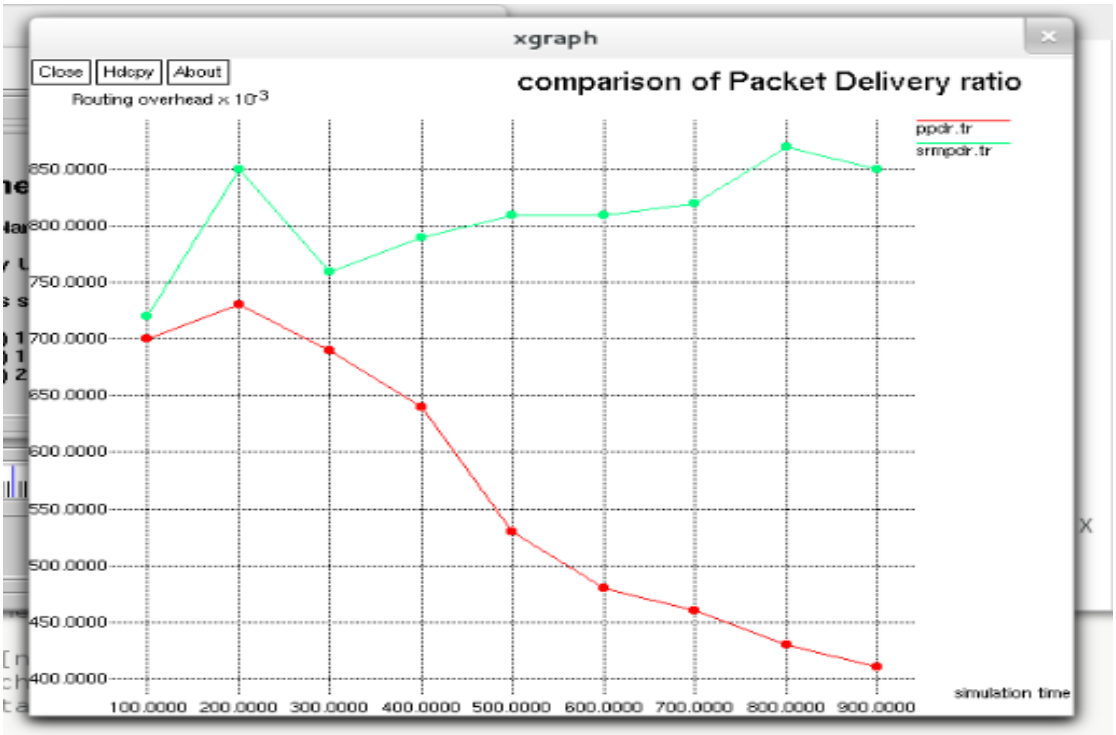

Figure 4.17 Comparison of Packet Delivery ratio

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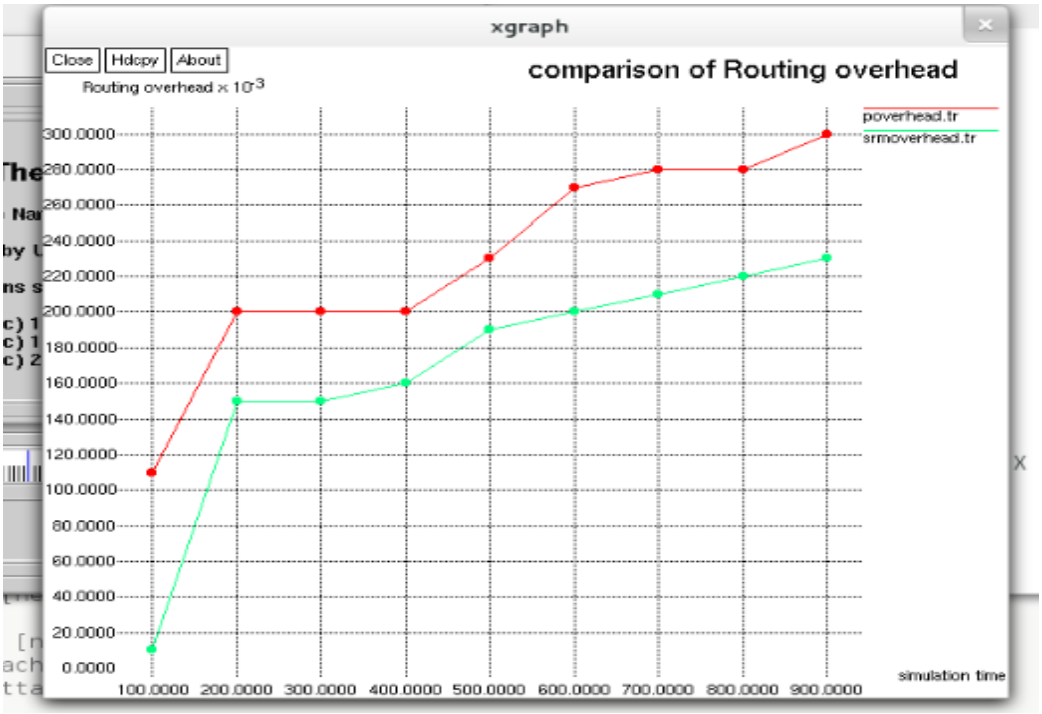

Figure 4.18 Comparison of resulting Routing Overhead

6. CONCLUSION

Because of high mobility of the nodes in MANETS, always there is a greater chance of frequent link breakages between nodes. These frequent link failures will cause a number of rebroadcasts between nodes which upon build unnecessary routing overhead. The SRM rebroadcast protocol is mainly based on neighbor coverage so as to reduce the routing overhead in MANETs which is discussed. This neighbor coverage knowledge also consists of additional coverage ratio and mainly connectivity factor. Because of lesser redundant rebroadcast, the proposed protocol restrained the network collision and contention, so as to increase the packet delivery ratio and decrease the energy consumption. And thus by reducing the routing overhead, Quality of Service (QoS) routing is MANETS is maintained.

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