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# Trustworthy Data Communication with Multi-Path QoS Parameters Using AODV Protocol

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**ABSTRACT:** The main objective of this system is to reduce the transmission delay and packet dropping rate by improving the routing methodology using MANETs. MANETs have an advantage to choose the path dynamically and move the packets with limited amount of bandwidth and limited power consumption of nodes. Due to these advantages it affects in some complex network scenarios such as, when multiple source nodes connecting with destination it is unstable and go down at any time, making communication over mobile ad hoc networks difficult. A new methodology is required to solve these issues over MANET, so that a new mechanism called "Traffic Aware Routing Identification" is established to provide the transmission capacity of MANET more perfect as well we this scenario works fine for all cases like single path and multi-path terminologies. This methodology clearly checks the neighbor nodes bandwidth, delay and path stability before going to start transmitting data to the destination via that defined path. If the path does not satisfy the routing constraints, then the traffic can be distributed along the multiple disjoint paths, using the Traffic Splitting algorithm. For the entire network scenario clearly illustrates the trustworthy and successful transmission of with reduced delay between source and destination.

**KEYWORDS:** Multipath, WSN, MANET, High Speed Data Communication, QoS Routing.

## I. INTRODUCTION

In this project, we created a network region with n-number of nodes. Once the nodes are formed we start transmit the data between source and destination via multiple paths instead of selecting a single route to transmit the data. MANETs (Mobile Ad Hoc Networks) is a group of wireless nodes which are capable of developing a network without using existing network since they are infrastructure less. Hence these MANET have become increasingly popular in the computing production.

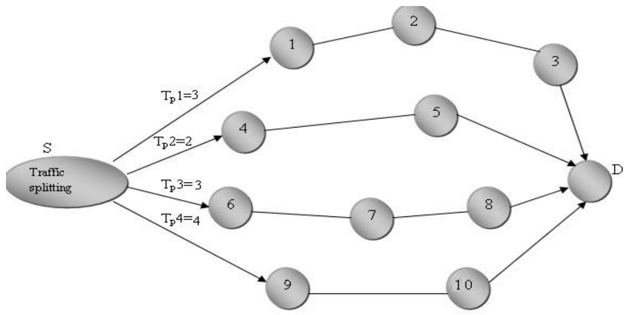


**Fig. 1. (a) Path finding in Traffic splitting**

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In MANET when the node needs to exchange packets with other nodes, node communicates with other nodes by multi -hop. Communication in such a decentralized network typically involves temporary multi-hop relays, with the nodes using each other as the relay routers without any fixed infrastructure. In MANET each node is free to move randomly. In MANET each node is considered to be equal to other nodes. Each node is capable of transferring the data between the arbitrary source and destination. Thus, each node in MANET can act as a source or destination or router. The main advantage of these MANETS is due to instant formation of infrastructure less network, they support various services. Also with the usage of MANETs in emergency situations like natural disasters, military conflicts, medical facilities etc, even it is widely used in the multimedia communications. But the issue of the MANETs is it is difficult for maintaining real -time media traffics such as audio and video in existence of dynamic network topology due to high rate requirements and severe delay constraints.

## II. LOAD BALANCED ROUTING

The load balancing is a technique in which the existing multi-paths will forward the packets from mobile nodes which have enough capacity remaining. Hence the potential local network congestion can be moderated and it also increases the rate of transmitting with dynamically changing load in the network. Due to load balancing the overall network throughput can be increased and a better QoS can be provided. In the network if all paths have same bandwidth, load-balancing means, the router sends one packet to the destination over the first path, the second packet to the same destination over the second path, and so on.

Load balancing guarantees equal load across multiple paths. Through the load balancing in the network it is possible to distribute workload across multiple paths in order to achieve optimal resource utilization, minimize response time, maximize throughput, increase network life time and avoid overload. Applying the load balancing in the multiple paths it is possible to increase reliability through redundancy.

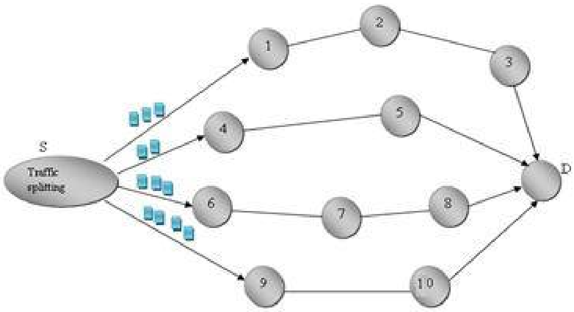


**Fig.1. (b) Data transfer in Traffic Splitting**

### Multi-Path Routing

Routing in the MANETs can be classified according to the nodes and the number of paths available in the network i.e. uni-path routing and multipath routing. Uni-path routing is the routing protocol where only one route is provided to send the data from source node to destination node. In the multipath routing, the protocol provides more than one route to send the data from source node to destination node in the network. Through the multipath routing the load balanced and fault tolerance can be achieved. The multipath routing aims to set up the multi paths between the source nodes and destination nodes.

In MANETs there are many multipath routing approach are proposed. For example there is routing algorithm which provides more than one path between the source node and destination node is the Temporally Ordered Routing

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Algorithm (TORA). The Dynamic Source Routing (DSR) provides an option to the nodes to use an alternate route if the primary path route.

**Advantage of Multipath**

In network the communication between the nodes can be beneficial when the multiple paths specifically disjoint paths. In this process the routes are broken and the routing process still alive. Since the node in the network have mobility property and also nodes have poor wireless link quality, the nodes between the source and destination can utilize these routes as backup and primary routes. Also the data packets can be distributed among all discovered multiple paths. Through this way it is possible to increase network lifetime and enhancing load balancing. Through the multipath routing some of the main advantages can be achieved such as tolerance capability, higher aggregation of available bandwidth and load balancing.

Also it is possible to overcome the issues like congestion and bottlenecks in the network. The efficiency of the network will be increased by providing route resiliency. We know that the bandwidth of the nodes is limited in a network also a single path may not provide enough bandwidth for routing process. So the aggregation of the multiple paths it satisfies the bandwidth requirement and a less end-to-end delay may be achieved.

**Table.1. Simulation Parameters**

| | |
|---|---|
| No. of Nodes | 50. |
| Area Size | 1000 X 1000 |
| Mac | 802.11 |
| Simulation Time | 50 sec |
| Traffic Source | CBR |
| Packet Size | 512. |
| Transmission Rate | 250m |
| Routing Protocol | MQRTS |
| Rate | 250Kb. |
| Speed | 5,10,15,20 and 25m/s |

**Issues of Multi Path Routing**

Normally in the MANETs the main issue they are facing is in applying the multipath routing techniques. Since the most of the routing protocols distributes the traffic mainly into the primary routes. In this kind of routing the load balanced routing is not achieved. Since only when the primary route breaks the data packets get shifted to alternate routes in the network where the load balance is not achieved. Also if the bandwidth and delay constrained paths cannot be discovered, then the traffic can be distributed along the multiple disjoint paths. Even though there exist some routing protocols which split traffic simultaneously on multiple paths, they have to split up the traffic flow between the source and destination efficiently. So that if one path fails also other paths should send the data packets to the destination.

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**Traffic splitting in MANETs**

In MANETs the traffic splitting is one of the contexts of multiple path routing which refers to the method of distributing the data packets of a particular node in different paths in the network. The optimal approach in terms of possible to reduce the video gaps occurrence which is generated by node mobility in the MANETs thus improving the quality of the received video data packets. Through the traffic splitting in the network we can reduce the end to end delay between the source node and destination node and also possible to control the congestion. By using traffic splitting there is an increase in parallel transmission i.e. maximum throughput can be achieved and latency can be reduced. Splitting the traffic to multiple routes in the network can provide a better load balancing, higher aggregate and fault tolerance and also improves network resource utilization and bandwidth optimization.

## III. EXISTING SYSTEM

In previous approaches, the researchers intended to design multipath stable QoS routing for real time traffic in MANET. In this technique, multiple disjoint paths are discovered among source and destination. Among the discovered routes, the optimal paths are selected based on bandwidth constraints, delay constraints and path stability. When any flow request is received, it is initially categorized as real time and non-real time flows where real time flows are given higher priority. For real time flows, bandwidth and delay constrained paths are chosen. For non-real time flows, the stable paths are chosen.

Normally in the MANETs the main issue they are facing is in applying the multipath routing techniques. Since the most of the routing protocols distributes the traffic mainly into the primary routes. In this kind of routing the load balanced routing is not achieved. Since only when the primary route breaks the data packets get shifted to alternate routes in the network where the load balance is not achieved. Also if the bandwidth and delay constrained paths cannot be discovered, then the traffic can be distributed along the multiple disjoint paths. Even though there exist some routing protocols which split traffic simultaneously on multiple paths, they have to split up the traffic flow between the source and destination efficiently. So that if one path fails also other paths should send the data packets to the destination. In the case of security issues MANET data are getting affected in worst case.

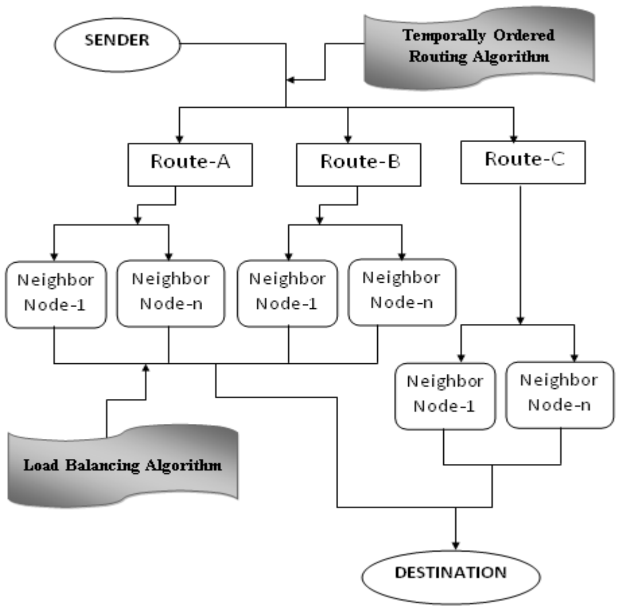


**Fig.1. (c) System Architecture**

## III. PROPOSED SYSTEM

In proposed approach we implemented Traffic Aware Routing Identification methodology, with this Traffic splitting in the context of multipath routing refers to the technique of distributing the packets of a certain stream

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through different paths. Splitting the traffic to different routes can provide better load balancing, fault tolerance and higher aggregate bandwidth. Splitting of the traffic can be helpful in reduction of congestion, bottle necks and to minimize the mean system delay, this also improves network resource utilization.

## IV. LITERATURE SURVEY

In the year of 2003, the authors "I. F. Akylidiz, X. Wang, and W. Wang" proposed a paper titled "Wireless mesh networks: a survey", in this they described such as wireless mesh networks (WMNs) consist of mesh routers and mesh clients, where mesh routers have minimal mobility and form the backbone of WMNs. They provide network access for both mesh and conventional clients. The integration of WMNs with other networks such as the Internet, cellular, IEEE 802.11, IEEE 802.15, IEEE 802.16, sensor networks, etc., can be accomplished through the gateway and bridging functions in the mesh routers.

Mesh clients can be either stationary or mobile, and can form a client mesh network among themselves and with mesh routers. WMNs are anticipated to resolve the limitations and to significantly improve the performance of ad hoc networks, wireless local area networks (WLANs), wireless personal area networks (WPANs), and wireless metropolitan area networks (WMANs). They are undergoing rapid progress and inspiring numerous deployments. WMNs will deliver wireless services for a large variety of applications in personal, local, campus, and metropolitan areas. Despite recent advances in wireless mesh networking, many research challenges remain in all protocol layers.

This paper presents a detailed study on recent advances and open research issues in WMNs. System architectures and applications of WMNs are described, followed by discussing the critical factors influencing protocol design. Theoretical network capacity and the state-of-the-art protocols for WMNs are explored with an objective to point out a number of open research issues. Finally, testbeds, industrial practice, and current standard activities related to WMNs are highlighted.

In the year of 2010, the author "V. Jacobson" proposed a paper titled "Congestion avoidance and control", in this they described such as in October of '86, the Internet had the first of what became a series of 'congestion collapses'. During this period, the data throughput from LBL to UC Berkeley (sites separated by 400 yards and three IMP hops) dropped from 32 Kbps to 40 bps. Mike Karels1 and I were fascinated by this sudden factor-of-thousand drop in bandwidth and embarked on an investigation of why things had gotten so bad. We wondered, in particular, if the 4.3BSD (Berkeley UNIX) TCP was mis-behaving or if it could be tuned to work better under abysmal network conditions.

The answer to both of these questions was “yes”. Since that time, we have put seven new algorithms into the 4BSD TCP: round-trip-time variance estimation exponential retransmit timer backoff slow-start more aggressive receiver ack policy dynamic window sizing on congestion Karn's clamped retransmit backoff fast retransmit Our measurements and the reports of beta testers suggest that the final product is fairly good at dealing with congested conditions on the Internet. This paper is a brief description of (i) - (v) and the rationale behind them. (vi) is an algorithm recently developed by Phil Karn of Bell Communications Research, described in [KP87]. (viii) is described in a soon-to-be-published RFC. Algorithms (i) - (v) spring from one observation: The flow on a TCP connection (or ISO TP-4 or Xerox NS SPP connection) should obey a 'conservation of packets' principle.

And, if this principle were obeyed, congestion collapse would become the exception rather than the rule. Thus congestion control involves finding places that violate conservation and fixing them. By 'conservation of packets' I mean that for a connection 'in equilibrium', i.e., running stably with a full window of data in transit, the packet flow is what a physicist would call 'conservative': A new packet isn't put into the network until an old packet leaves. The physics of flow predicts that systems with this property should be robust in the face of congestion. Observation of the Internet suggests that it was not particularly robust. Why the discrepancy? There are only three ways for packet

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conservation to fail: The connection doesn't get to equilibrium, or A sender injects a new packet before an old packet has exited, or The equilibrium can't be reached because of resource limits along the path. In the following sections, we treat each of these in turn.

Each routing protocol varies in the way it reacts to link failures. Routing protocols also differ in the way they form the routes. More routing overhead reduces the overall throughput of the network. More number of collisions due to increased routing overload makes the situation worse for TCP performance. In this study we have not considered the effects of non-congestion losses on the performance of high-speed TCP variants. Also the performance of high-speed TCP variants is not studied with respect to parameters such as Convergence speed, RTT fairness and TCP fairness. In future, we intend to study the performance of high-speed TCP variants with above mentioned parameters and also the effects of non-congestion losses on the performance of TCP.

## V. EXPERIMENTAL RESULTS

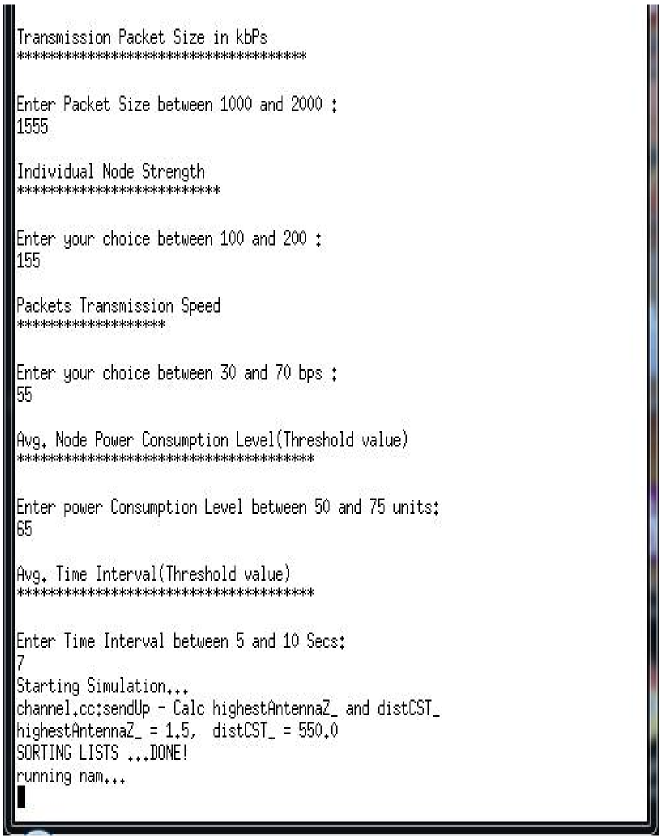


**Fig. 2. Input Parameters**

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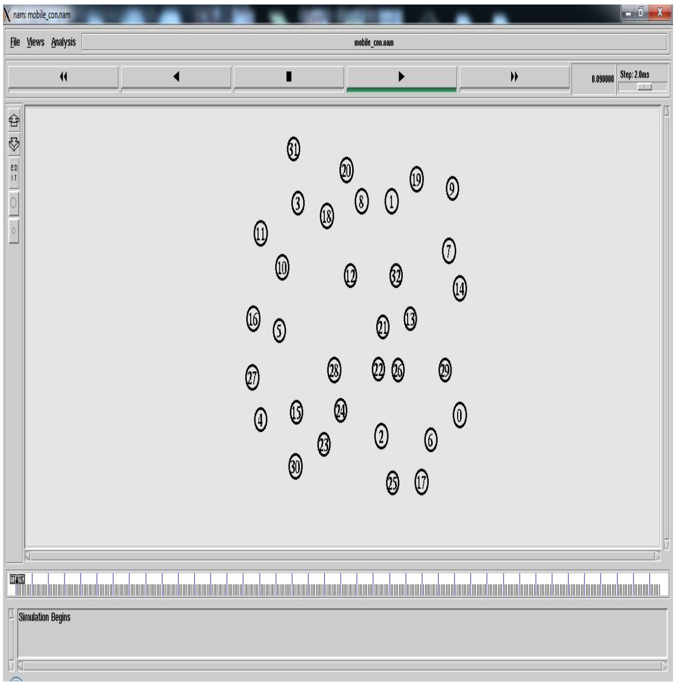


**Fig.3. Wireless Node Formation**

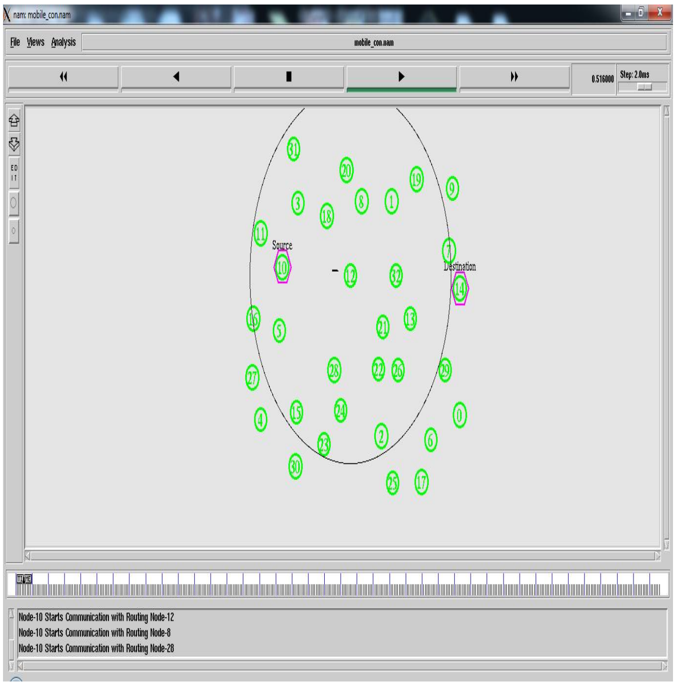


**Fig.4. Source and Selection**

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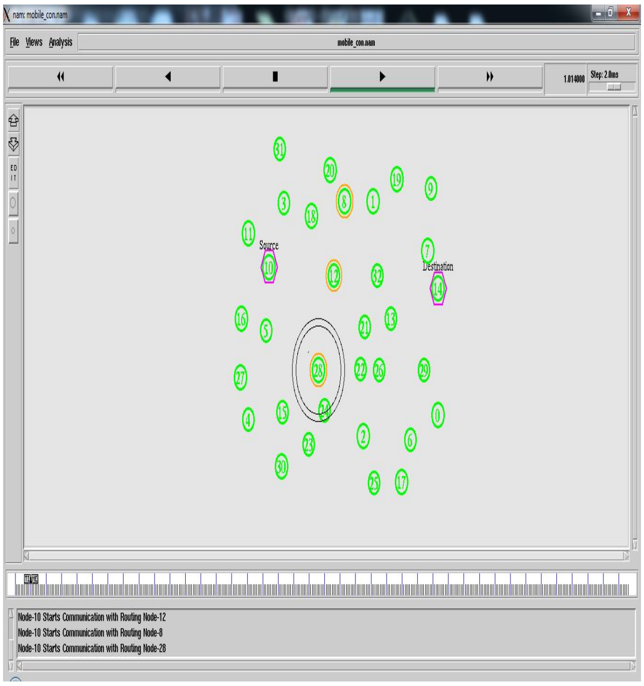


Fig. 5. Route Establishment

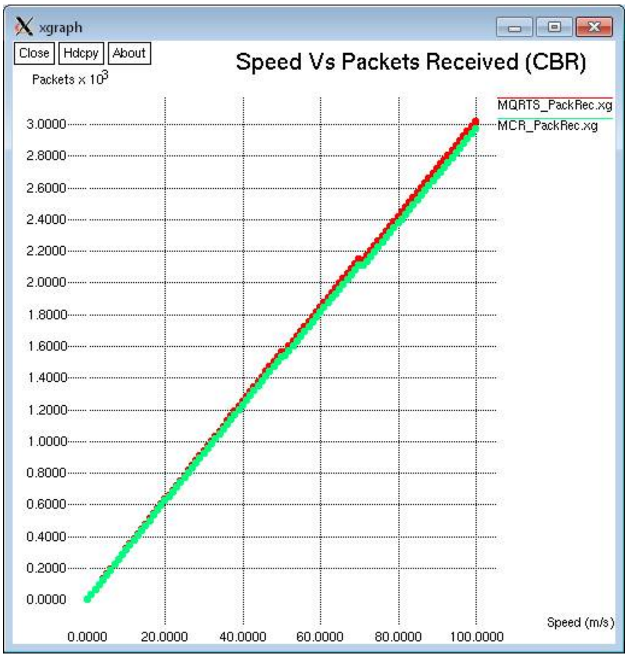


Fig. 6. Speed Vs. Packet Received.

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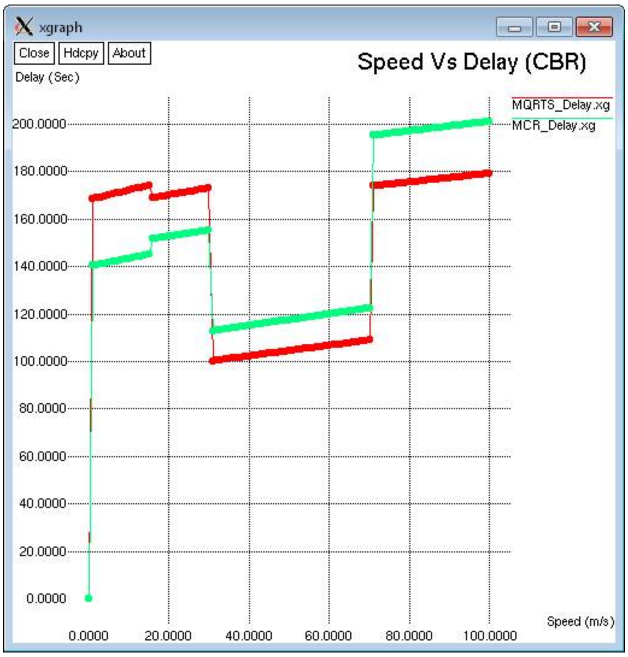


**Fig. 7. Speed Vs Delay.**

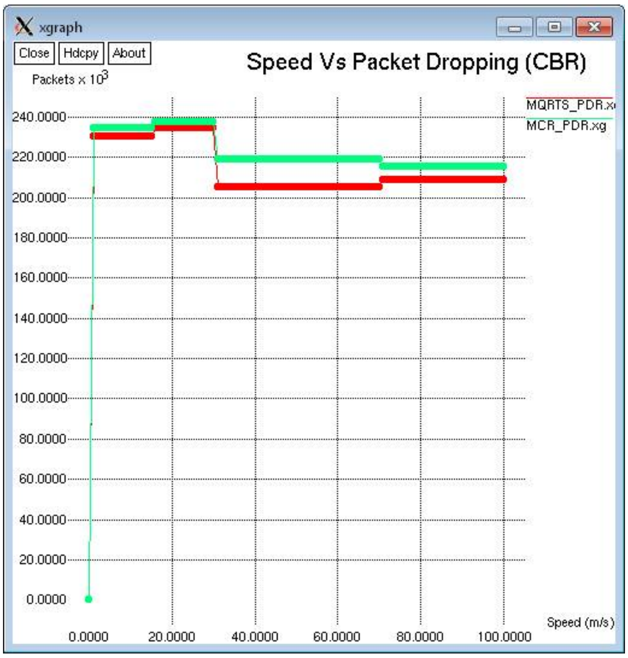


**Fig.8. Speed Vs Packet Dropping**

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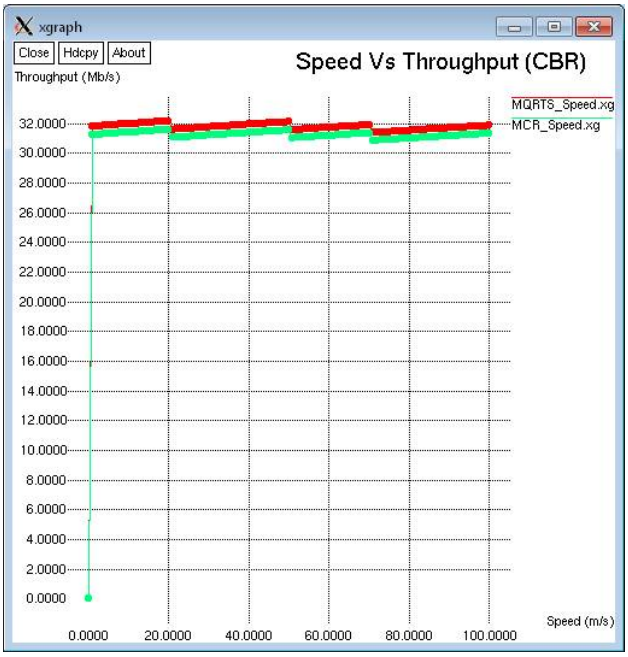


Fig.9. Speed Vs Throughput

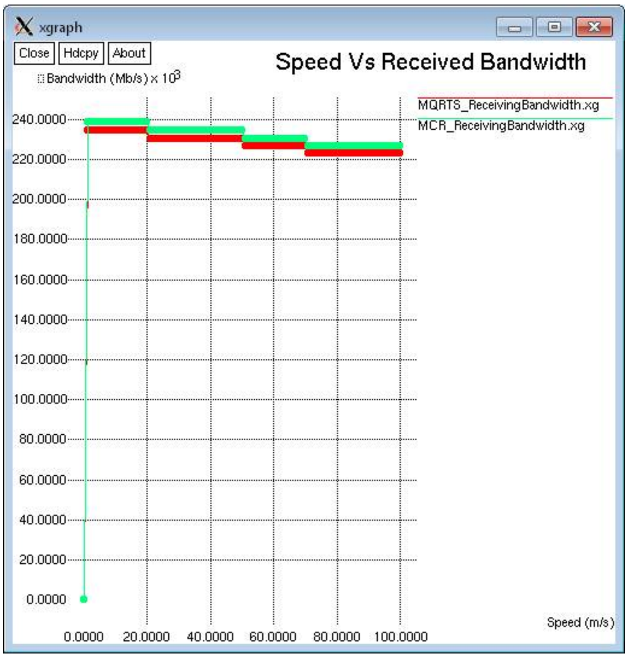


Fig.10. Speed Vs Received Bandwidth

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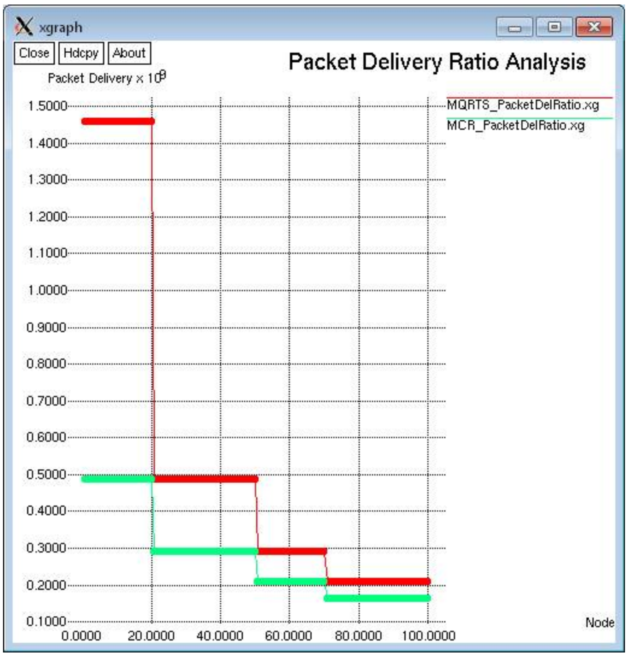


**Fig.11. Packet Delivery Ratio Analysis**

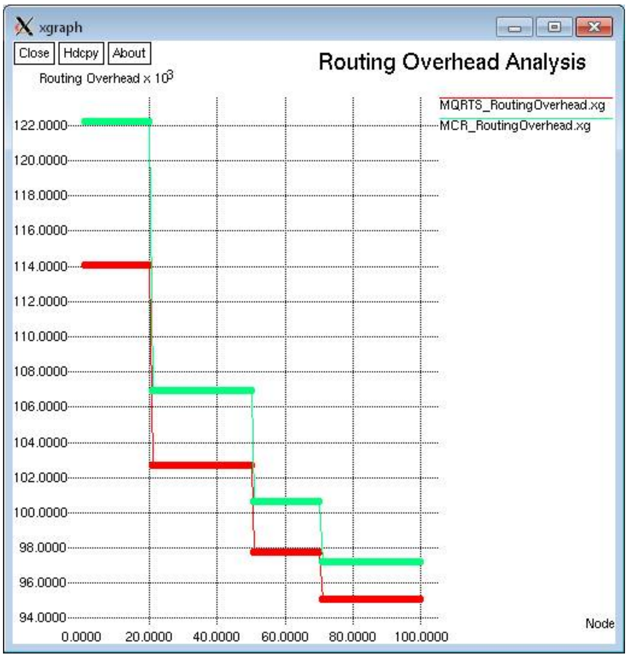


**Fig.12. Routing Overhead Analysis**

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## VI. CONCLUSION

In this proposed work, we reported the working of a quality of service based multipath routing in Mobile Ad hoc Networks (MANETs) based on Temporary Ordered Routing Algorithm (TORA). The approach uses bandwidth, hop count and delay to calculate multiple disjoint paths between source and destination to satisfy given QOS constraints. The best path(s) gets strengthened by deposition of pheromone substances on that link. Thus as the routes are selected completely satisfying stability and QoS constraints, it fully complies with Q0S objectives. Simulations performed with network simulator 2 shows that the proposed algorithm performs better with 20-30% improvement compared to the other existing optimization algorithms. However, in an adverse environment, both route discovery and data transmission are vulnerable to attacks. Yet, a misbehaving node may well be placed in line of valid routes. Later, it could tamper the network and may degrade the network performance. This behaviour can be nullified by including the security protocols and better communication scenario via Load Balancing Approach.

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