

# A Review on Interference-Aware Multipath Routing Protocol for MANET

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**ABSTRACT:** The dynamic nature of ad-hoc mobile networks with its various topographies is vulnerable to interference and security attacks. The range within which the nodes interact with each other to make possible the transmission of data packets is often corrupted by interference between node-disjoint schemes. This severely affects throughput and data delivery ratio. This paper focuses on to study Advanced Disjoint Multipath Routing protocol (ADMR) as possible solutions to this problem of interference in comparison to Split Multipath Routing protocol (SMR). A metrics of routing overhead, throughput with average number of dropped packets, packet delivery ratio, speeds of mobile nodes, terrain area and pause time will be used to gauge the success ADMR as resolutions. The aim of this paper is to give a detailed insight into their advantages as well as their shortcomings.

**KEYWORDS:** Wireless ad hoc networks, MANET, EDMSR, EDMR, multipath routing, interference.

## I. INTRODUCTION

The lack of a central server in MANETs allows the nodes to communicate freely with each other without depending on an overall structure. Nodes may transverse freely within a limited transmission range till the packets ultimately reach the destination node. It is routing these packets that offers grounds to study where and how the throughput of MANETs can be bettered in terms of performance. While MANET solve infrastructural hindrances that plague wired networks in a cost-effective manner, there are internal problems within wireless networks that call for redressal. One such issue is that of interference as it brings with itself data loss, channel share, transmission issues and other such related deterrents.

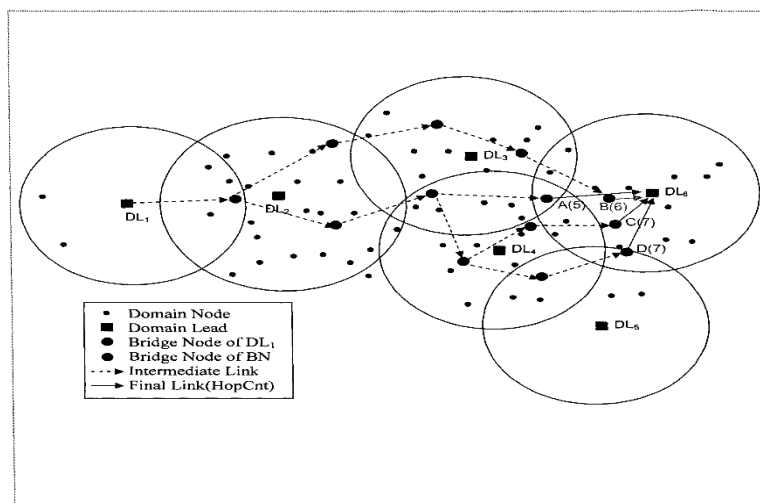


Fig 1. Interference between nodes in MANET

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To address interference in selected node-disjoint multipath schemes and readdress the impact of hidden terminal problem, technique to reduce overhead control packets can be proposed. This proposal is based on the fact that packet delivery rates are positively impacted by increasing the channels available between selected disjoint routes. Within this context, the hypothesizes proposes an on-demand multipath routing protocol – Advanced Disjoint Multiple Routing Protocol (ADMR) as possible solutions to the problem of interference

## II. RELATED WORK

Interference is a situation which arises when a receiver node is placed in the carrier sensing range of any other neighbouring node apart from the previous node all in same network.

Due to this interference, nodes may not be able to select the shortest or the most viable path for data packet delivery. Also, in effect, packets that are exchanged in this interfered wireless are often corrupted. Therefore, an improvement in throughput cannot be establish without addressing the problem of interference.

Sung-Ju Lee and Mario Gerla proposed Split Multipath Routing (SMR) as the multi-route option [8]. SMR offers two routes of which one has the shortest delay. However, more than required RREQ packets are often transmitted and SMR selects the route at the destination which causes these routes to be ‘maximally’ disjointed [9]. In comparison to SMR, ADMR can deliver a better throughput.

Several studies [2] [3] [4] [5] [6] have proposed different solutions along various parameters. These studies also reveal the failure of multiple disjoint transfer paths to substantially increase data rate and throughput. It is deduced that the efficiency of multi-path routing offers no betterment to single routing due to the presence of a terminal problem that severely impacts delivery ratio. This paper looks at Advanced Disjoint Multipath Routing protocol (ADMR) as solutions to this problem.

## III. PROPOSED PROTOCOL: ADMR

ADMR can rectify the issue of interference by providing a route of minimalistic interference. As the main route the most stable path is chosen with minimum interference. An analysis of the four chief processes under ADMR –Data relay phase, route reply phase, route maintenance and route request phase depicts how this selection of the route with minimal interference is done and the impact it has on overall performance.

It analyses interference node sets of different routes on a comparative basis and deduces the route with least interference. It numbers the routes on the basis of a stability criteria. Instead of using the route with shortest relay the most stable route with least interference is selected for transmission of data packets. The route request section is automatically initiated when there arises any necessity to communicate with the destination node. The selection of route set that are dissevered and interference node being derived for each route that is selected becomes the sole responsibility of destination node.

### A. Route request phase

Scheme of Route request forwarding introduced by ADMR is similar to SMR but with specific Modification. More request packets with less overhead packets are allowed to be passed by the intermediate nodes in ADMR, the link stability value is calculated by the intermediate node after appending the address of the intermediate nodes when the RREQ packets are received; Comparison of the link solidity value is done with the already recorded one on route request packet. The sole motive of RREQ packet is that it should always carry the lower link solidity or stabilized value for the route. The Intermediate nodes only tends to forward the request packets in a different arriving link instead of dropping duplicate packets. In order to reduce routing overhead packets are transmitted within a specified period of time as shown in the Equation 1.

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$$t = \frac{\alpha * RREQhopcount}{\beta * MaxRREQDest} \quad (1)$$

In this Equation (1)  $\alpha$  represents that there is no change in time for a constant period, the amount of node jumps that the Route Request packet travelled is denoted by the RREQhopcount whereas the utmost distance that the route request messages can travel in the network is shown by MaxRREQDest and  $\beta$  is variable which depends upon the number of nodes.

## B. Route Reply Phase

Receiving the first RREQ packets by the destination nodes is when the phase of Route Reply phase comes into play. The responsibility of transmitting the complete required routing information to the source node is handled by this phase. Responding to the first received RREQ packet, choosing the primary route and selecting the disjoint routes with the main route is performed by Destination node. The derivation of the collection of interfering nodes for each route that is selected at the same time sending the RREP packets to the origin node comes under the roles of Destination node.

## C. Data Relay Phase

The aim of Data Relay phase highlights the process where the route set with the least interference through which the data will be sent is selected. Until the main node obtains the information for the other stable route it continues to forward data on the minimum delay path. This acquired routing information is arranged in a declining order respectively to their given stability value. After which the first route is considered to be the main route on which information transfer will take place along with finding other routes with least interference route acting as a secondary route. Least Interference route selection algorithm is used to search the least interference route with the main route.

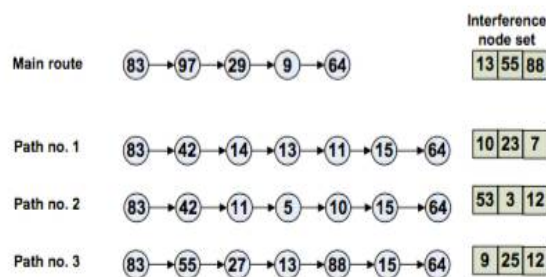


Fig 2. Interference set of addresses added to distinct routes and main route [1]

## D. Route maintenance

An error message (RERR) is fired by the ADMR when there is link breakage detected. The broken path that is carried by the RERR packet is sent from the intermediate node that help detecting the link disturbance toward the source node. It reduces routing overhead allowing greater reliance and a better solution to the problem of interference in MANET.

## IV. EXPECTED OUTCOME

The performance of the two are judged on seven crucial paradigms - packet delivery ratio, throughput, routing overhead, average number of dropped packets, speed of mobile nodes, terrain area and pause time. Graphical findings [1] are presented to validate the result that ADMR enable a 54 % reduction in the average frequency of packet collisions and

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performed remarkably better than SMR. More specifically, in other parameters, there was a significant improvement noted:

- ADMR performs better than SMR by 25% when the mobile node speed is 30 m/sec in packet delivery ratio.
- It improves the throughput of the SMR by 25%.
- The routing protocol reduced the average number of control packets by 80% compared with SMR.

## V. CONCLUSION

From the performance results, it can be concluded that in comparison to SMR, ADMR offer a solution to interference that could make wireless networks better. Less packet collision, reduced overhead, higher packet delivery ratio and throughput are parameters that bear witness to the better efficiency of this protocol. By choosing the node-disjoint routes with the minimal interference the goal of the developed routing protocol is achieved.

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