Design and Simulation Analysis of Multipath Extended Routing Information Protocol (MERIP) for Mobile Ad-Hoc Networks

Student's Name	**K. K. Suhas**	**CSN (FT-2012)**
Academic Supervisor(s)	K. R. Narasimha Murthy and Rinki Sharma	
Industrial Supervisor(s)		

K. K. Suhas

suhas.best@gmail.com
Ph. No: 0 77606 40166

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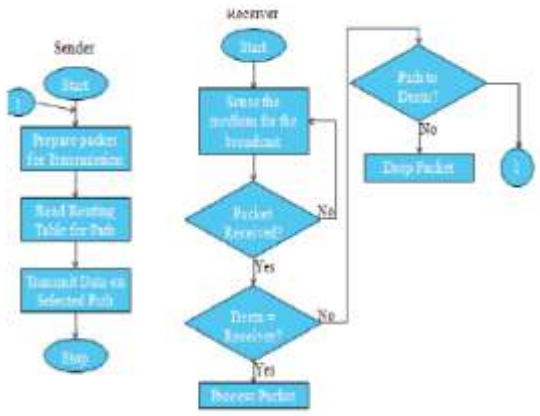
Abstract:

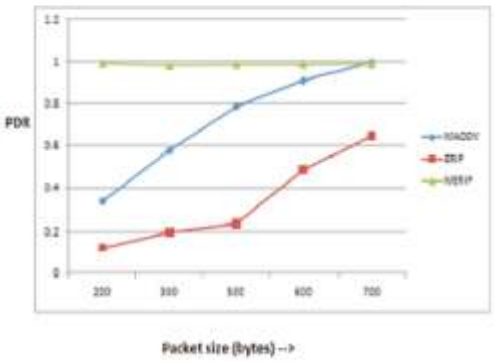
A Mobile Ad-hoc Network (MANET) is a non-centralised wireless network of mobile nodes that does not have an access point. The non-centralised nature of a MANET, coupled with node mobility, underlines the need for robust and low-overhead routing protocols for MANETs. The Extended Routing Information Protocol (ERIP) is one such routing protocol developed at MSRSAS. ERIP does not work very efficiently if routes fail between route updates, because the protocol is not able to discover alternative routes till the next route update. A possible solution would be to provide multipath extensions to ERIP, so that alternative routes are available in case of a route failure.

This project deals with the design and development of the MERIP (Multipath ERIP), which is an ERIP based multipath routing protocol. MERIP retains the major characteristics of ERIP, such as its proactive nature and incremental routing update strategy. At network startup, MERIP builds neighbour tables and exchanges them to build a distance-vector based routing table at each node. This routing table may contain multiple entries for one source-destination pair, indicating the multiple routes available between them. The multiple entries are sorted by hop count, making the shorted path the first-preferred route. In case of a link failure, indicated by no acknowledgement received by the previous hop, a failure packet is generated and unicast back to the source. On reception of this packet, the source chooses the next entry for the same source-destination pair from the routing table and uses it to transmit data.

The performance of MERIP was compared against that of ERIP and MAODV (Multipath Ad-hoc On-demand Distance Vector) protocol. The initial delay of the MAODV was least as it is a reactive protocol. MERIP had the highest initial delay as it discovers multiple routes at network startup. For relatively low node mobility scenarios, MERIP and ERIP showed almost similar behavior in terms of end-to-end delay. As node mobility increased in the network, MERIP had the best Packet Delivery Ratio (PDR) of the three protocols. Areas of future work that can be looked into are the security aspects of MERIP, as well as its usefulness in providing different Classes of Service (CoS).



Flowchart depicting data exchange



Performance of MERIP in terms of PDR