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# A New AOMDV Lifetime Prolonging Routing Algorithm for Ad-Hoc Networks

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## ABSTRACT

Network lifetime is a key design metric in MANETs, it is considered as one of the most important parameters algorithms to be used in ad hoc networks. Each network node works completely independently and acts as a router for relaying communications. If some nodes die prematurely because of battery depletion, the network lifetime will be adversely affected, and the network will get disconnected. This article presents AOMDV-LP, a new AOMDV lifetime-prolonging routing algorithm for MANETs. This new algorithm helps to maximize the network lifetime by managing nodes energy, link cost and controlling the networks congestion. Simulations quantify the performance gains of the authors algorithm.

## KEYWORDS

AOMDV Routing, Energy, Link Cost, MANETs, Network Lifetime, Networks Congestion, Protocol

## 1. INTRODUCTION

Recent evolution in wireless communication technologies and the emergence of mobile terminals have made it possible to access the network anytime and anywhere without the need to connect communicating equipment to an infrastructure. An undeniable advantage of these wireless technologies is the possibility to be mobile while staying connected. But unfortunately, this mobility creates new problems such as frequent disconnection, low communication rate, modest resources and, a limited power source…etc. (Blum, Eskandarian, & Hoffman, 2004). Wireless mobile networks are classified into two main classes (Sarkar, Basavaraju, & Puttamadappa, 2016): Wireless networks with infrastructure that typically use the cellular communication model (an infrastructure that can be an access point or a base station) and Infrastructure Less Networks also named Mobile Ad-hoc networks or "MANETS" that are represented as a set of mobile entity which may be combined routers and hosts themselves form the network routing infrastructure in an Ad-hoc mode, interconnected by a wireless technology which communicate only through radio waves and self-organize quickly. MANET can be represented as directed graph $G = (V, E)$ (Pan & Xiao, 2006). The vertices V ∈

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$V$ are a symbol of the mobile stations. An edge $(u,V) \in E$ is a symbol of a wireless link between this stations $u$,V, which forward packets to others. In this class, the wireless network can adapt to different traffic conditions, propagation and movements due to the mobility of the nodes knowing that the network size can contain hundreds or thousands of mobile nodes which means that the area size is not limited. Mobile Ad-hoc networks are characterized by the absence of the infrastructure as we have said before that mobile nodes are responsible for establishing and maintaining network connectivity in a continuous manner, MANETs are also characterized by the dynamic topology due to the mobility of the nodes who move in a free and arbitrary way. Therefore, the network topology can change, at unpredictable moments, in a rapid and random manner. Mobile nodes are powered by independent energy sources, such as batteries or other consumable sources. This is why the energy parameter must be taken into account in any control performed by the system. Mobile devices have limited batteries, and consequently a reduced processing time knowing that some of the energy is already consumed by the routing functionality, it limits the services and applications supported by each node. This is why, the routing in such a network is complex. The routing problem has always aroused great interest in the research community. Although the proposal of several protocols, the latter represents certain limits especially if we consider the high mobility of nodes and high network density (Naimi, 2015). It has given birth to several routing mechanisms, among these mechanisms, we find the multipath routing, which allows finding multiple paths between a source and a destination node for the data's transmission. These multiple paths can be used to compensate for the mobile nature of nodes and the unpredictable nature of ad-hoc networks (Mueller, Tsang, & Ghosal, 2004). Our work is based on this type of routing.

Mahesh K. Marina and Samir R. Das have proposed AOMDV ad-hoc on-demand multipath distance vector routing with the route discovery and route maintenance phase similar to AODV (Marina & Das, 2006). It has almost the same feature as AODV. AOMDV has been demonstrated to be a favorable protocol that uses multipath routes, all of its paths are disjoint paths, and it ensures that multiple paths are loop-free because it allows only alternate routes with lower hop counts. When the source needs to communicate with the destination by sending the data packet, AOMDV protocol executes a route discovery algorithm between the source node and the required destination node. Every node in the network broadcasts the (RREQ). The destination sends a route reply (RREP) message for all of the received (RREQ) packets. When an intermediate node receives (RREQ), it sets the reverse path to all the multiple paths that are warful and sends a route RREP packet to the source. The same for the destination node when it receives a route request. Each packet is examined to see if it provides a node-disjoint path to the source. Route maintenance in AOMDV is also identical to that in AODV. However, in AOMDV, a node only forwards a (RREQ) packet for a destination when all proposed paths are broken. The majority of the multipath routing protocols use the data flow to update the time-tags of the paths and keep them fresh, AOMDV makes use of periodic HELLO messages to detect the efficacy of the links as link breaks. AOMDV uses only the best in terms of the number of hops for transmission of Data between a source and a destination; the rest calculated paths will be used when the main road is broken.

This new study focuses on the lifetime and congestion network because there are considered as one of the most important parameters algorithms to be used in MANETs (Lochert, Scheuermann, & Mauve, 2007). Each network node works completely independently and acts as a router for relaying communications. If some nodes die prematurely because of battery depletion, the network lifetime will be adversely affected, and the network will get disconnected.

This paper proposes a new routing protocol inspired from AOMDV protocol (Marina & Das, 2006) by adding features that make it possible to prolong the network lifetime, our protocol introduces link cost and link quality notions which are calculated during the data packet routing process. the routing decision is a probability taking into account these two parameters, this concept makes it possible to select the optimal routes by preserving nodes energy and controlling the congestion of the network. The first version of AOMDV protocol generates many performances problems due to the

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