

Performance Comparison Between AODV and DSR In Mobile Ad-Hoc Network (MANET)

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Abstract—Wireless communication technology has advanced rapidly, thanks to the proliferation of wireless devices and services. The spectrum depletion issue was discovered due to the growing number of users and to the fixed spectrum assignment strategies. A mobile ad hoc network (MANET) is a network that doesn't require a central server, specialized gear, or fixed routers to function. As it operates in a distributed peer-to-peer style, each system acts as an individual router and produces individual data where MANET may be used as a stand-alone network or as part of a cellular network that connects to the internet. There are different types of a routing protocol can be applied in MANET, each with its capabilities, advantages, and disadvantage. There is a need to investigate the performance of routing protocol for better network planning. The Ad Hoc On-Demand Distance Vector (AODV) and Dynamic Source Routing (DSR) are two MANET routing protocols investigated in this paper. Four different performance metrics are used to measure these protocols: throughput, path discovery time, traffic received and sent delay, and media access delay. To investigate the behavior of these protocols in the Manet context, a Manet simulation is run using OPNET Modeler Student Edition. According to the data, AODV outperforms other protocols in terms of throughput, amount of traffic received, and transmit performance, whereas DSR has the longest delay. Even when run in the same environment with the same number of nodes, different protocols produce different readings and behaviors. This proves the theory that AODV performs better in terms of performance, delay, and packet transfer ratio.

Keywords— throughput, delay, packet received, packet send, security

I. INTRODUCTION

Mobile Ad Hoc Network (MANET) co-operates with a mobile node-set, without a central access point or the required infrastructure[1]. MANET is an ad-hoc network that can alter and customize the mobile node locations anytime or anywhere. MANET can alternatively be defined as a set of mobile nodes that communicate with one another to form a network independently. Therefore it is capable of fully functioning without the need for any infrastructure, centralized access point, or centralized administration.[2], [3].

By operating as both host and router, MANET keeps its topology dynamically[4]. The MANET nodes are subjective and can be freely and altered to switch out or join the network.

Nodes collaborate to route packets in MANET. For instance, for node S to communicate with node D, both can act as router and hub at the same time, passing parameters in the network. Through the MANET nodes, packets must be re-routed to other nodes to allow contact between nodes beyond the broadcasting range. The node at MANET, therefore, modifies its connection case to other mobile nodes in order[5].

In MANET, there are various protocols including topology-based, location-based, and energy awareness-routing. For topology-based routing, there are three which differentiate by the mechanism of the protocol. Proactive routing protocols are also known as routing table protocols which maintain the update path of the nodes in the routing table. Therefore, the route is always available when it is needed for communication. The reactive protocol is known as a demand-based protocol in which the route is only established when there is demand, by using the flood determination procedure. Hybrid protocol both a mechanism of the reactive and proactive protocol.

There are multiple issues are highlighted when it comes to MANET. Performance and security features are among the aspects that need to be considered in the MANET routing protocol. The MANET application should emphasize secure routing and transfer protocols, node pair discovery, bi-directional transmission between nodes, and service quality. Due to MANET's mechanism, it is easy for intruders to attack the architecture due to its open links and mobility capability[6]. Therefore, security feature such as source authentication and validation of message is a crucial aspect that needs to be highlighted[7]. In terms of the performance of MANET, it is related to the quality of service. Some of the important constraints, such as link constraints, path constraints, and tree constraints, have a significant impact on QoS needs. The bandwidth, end-to-end delay, and delay-jitter are the three fundamental constraints. MANETs development should concentrate on modeling various methods that may successfully satisfy the needed QoS while also providing a secure routing environment[8].

The comparison study between AODV and DSR still relevant in order to get a better perspective on how to improve the current MANET's routing protocol, it is important to get a clear picture of how this protocol works. understanding the broadcasting process and the performance of both protocols