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# ROUTE MECHANISMS FOR WIRELESS ADHOC NETWORKS: -CLASSIFICATIONS AND COMPARISON ANALYSIS

Ramesh Kait[1], R. K. Chauhan[2] and Kuldeep Kherwal[3]
Department of Computer Science & Applications
Kurukshetra University, Kurukshetra, Haryana
E-mails: [1]rameshkait@kuk.ac.in, [2]rkc.dcsa@gmail.com, [3]ks.kherwal@gmail.com

**Abstract:** Routing is the core problems in the networks for delivering data from one wireless node to another. As wireless adhoc network is also called as mobile adhoc networks because of its predefined/predetermined topology or central control. In this paper I present a number of ways of classifications of different kind of networks routing protocols. In comparison analysis I compare their properties according to different criteria and characterize them according to their routing strategies and relationships, for more that dozen of typical existing routing protocols using simulator NS-2. The routing protocols falls into three categories: (1) Flat routing Protocols (2) Hierarchal Routing Protocols (3) GPS augmented i.e. Geographical routing scheme.

**Keywords:** Mobile adhoc networks, adhoc routing proactive routing, on-demand routing, hierarchal ad hoc routing, and geographical positioning assisted routing.

## 1. INTRODUCTION

Routing is the core problem in all kind of networks for delivering information from one networks node to another. Wireless network is a multi-hop wireless network, which consists of number of mobile nodes. These nodes generate traffic to be forwarded to some other nodes or a group of nodes. Due to a dynamic nature of adhoc networks, traditional fixed network routing protocols are not visible. Based on these reasons several proposals

for routing protocols have been presented.

The emerging technology of *mobile ad hoc networking* (MANET) is based on wireless multihop architecture without fixed infrastructure and prior configuration of the network nodes. The salient features of this new networking paradigm includes: A) collaborative support of basic networking functions, such as routing and data transmission; B) lack of administrative boundaries of the network nodes; C) absence of a central entity in the network; and D) transient, in general, associations of the network nodes. As a result, a node cannot make any assumption about the trustworthiness of its peers, which assist the node with its communication and, in general, does not possess their credentials. Mobile Ad hoc Network (MANET) is emerging(4,6,7) as an important area for new developments in the field of wireless communication. The premise of forming a MANET is to provide wireless communication between heterogeneous devices, anytime and anywhere, with least or no infrastructure [1], [2], [3], [4]. These devices, for instance cell phones, laptops, palmtops remote systems, etc. carry out communication with other nodes that come in their radio range of connectivity. Each participating node provide services such as message forwarding, providing routing information, authentication, etc. to form a network with other nodes spread over an area.

Ad hoc networks have various implementation areas, like military,emergency, conferencing, sensor applications. All applications area has some feature and requirements for protocols in common.

## 2.0 Classifications of the Routing Protocols:

There are different criteria for designing and classifying routing protocols for wireless ad hoc networks. For example, what, when and how routing is to be exchanged and when and how route are to be computed and so on. Classifications of ad hoc networks fig (1.0) review and performance comparisons of ad hoc networks have been presented in many earlier placations. While some overlap with pervious surveys is inevitable in order to preserve the integrity of my presentation, this paper includes recent examples that reveal features in terms of comparative analysis.

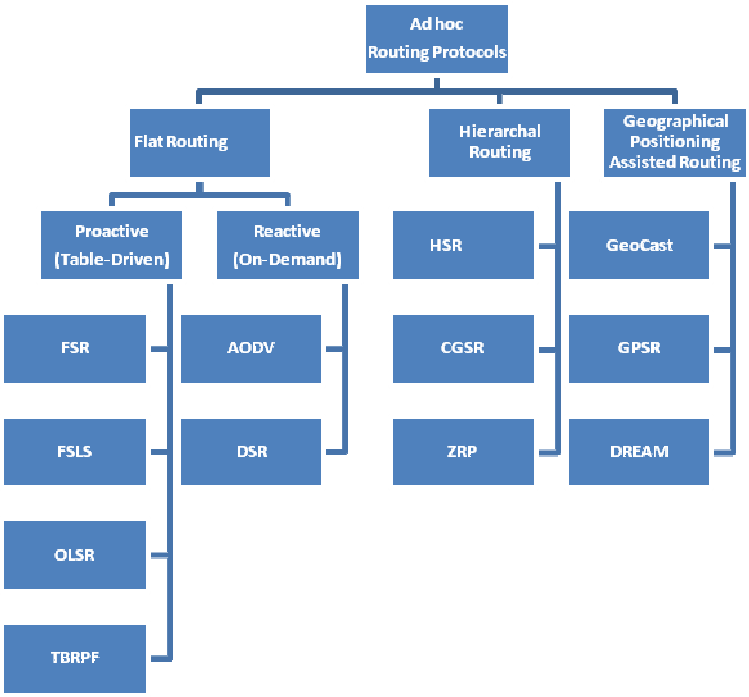


Figure (1.0) Classifications of adhoc routing Protocols

## 2.1 ROUTING IN FLAT NETWORKS STRUCTURES:

The protocols that I am going to review gets categorized into two categories one namely (7,11,12,13) known as proactive (Table-Driven) and another one is reactive (on-demand) routing. Many of the protocols from proactive are got birth from the conventional link state routing , and on the other hand reactive(on-demand) is new emerging techniques in recent era of the adhoc networks, so reactive is one that completely defer from conventional routing and no permanent routing information is maintained at networks node if there is no communication.

### 2.1.1 Proactive vs. Reactive Routing:

The proactive protocols maintain the routing information even before it is needed . Each and every node in the network maintains routing information to every other node in the network. Routes information is generally kept in the routing tables and is periodically updated as the network topology changes. Many of these routing protocols

come from the link-state routing [8]. There exist some differences between the protocols that come under this category depending on the routing information being updated in each routing table. Furthermore, theserouting protocols maintain different number of tables.The proactive protocols are not suitable for larger networks, as they need to maintain node entries for each and every node in the routing table of every node. This causes more overhead in the routing tableleading to consumption of more bandwidth.

The reactive protocols don't maintain routing information or routing activity at the network nodes if there is no communication. If a node wants to send a packet to another node then this protocol searches for the route in an on-demand manner and establishes the connection in order to transmit and receive the packet. The route discovery usually occurs by flooding the route request packets throughout the network.

**3.0 Simulation Based Analysis using Network Simulator (NS-2):**

In this section we have described about the tools and methodology used in our paper for analysis of adhoc routing protocol performance i.e about simulation tool, Simulation Setup(traffic scenario, Mobility model) performance metrics used and finally the performance of protocols is represented by using excel graph.

***Performance Metrics Used***

The following metrics are used in this paper for the analysis of AODV, DSR and DSDV routing protocols.

*i) Packet Delivery Ratio* = pkt received by appl layer/pkt sent by appl layer source.

ii) Average End to End Delay=pkt sent time – receive time/total no. of pkt received.

iii) Throughout= total no. of pkt received/ unit time

**Simulation Result**

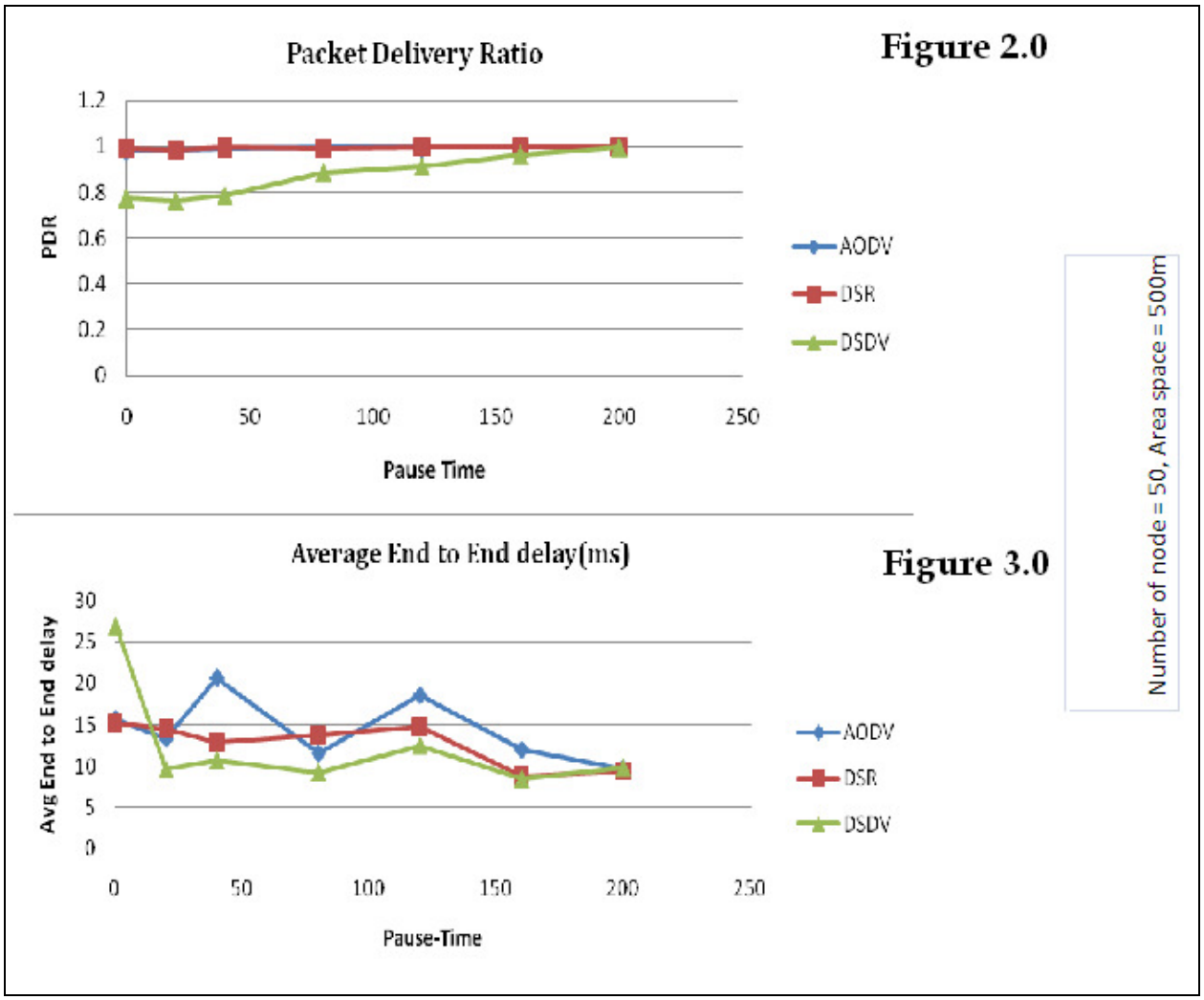


Figure2. Packet delivery ratio versus pause time for AODV, DSR and DSDV

Figure3. Avg. end to end delay versus pause time for AODV, DSR and DSDV

**4.0 Discussion and comparision issues:** After reviewing the concept of wireless ad-hoc networks and two routing protocols namely, AODV and DSDV. We would like to make a comparative discussion( as plotted in the graph in figure 2 and 3) of both the protocols with their pro's and con's.

DSDV is a proactive routing protocol, which maintains routes to each and every node in the network, while AODV is a reactive routing protocol which finds the path on demand

or whenever the route is required.

- Broadcasting in DSDV is done periodically to maintain routing updates and in AODV, only hello messages are propagated to its neighbors to maintain localconnectivity.
- DSDV routing algorithm maintains a sequence number concept for updating the latest information for a route. Even, the same concept is adapted by AODV routing protocol.
- Due to the periodic updates being broadcasted in DSDV, bandwidth is wasted when the nodes are stationary. But, this is not the case with AODV, as it propagates only hello messages to its neighbours
- For sending data to a particular destination, there is no need to find a route as DSDV routing protocol maintains all the routes in the routing tables for each node.While, AODV has to find a route before sending a data.
- Overhead in DSDV is more when the network is large and it becomes hard to maintain the routing tables at every node. But, in AODV overhead is less as it maintains small tables to maintain local connectivity
- DSDV cannot handle mobility at high speeds due to lack of alternative routes hence routes in routing table is stale. While in AODV this is the other way, as it find the routes on demand.
- Throughput decreases comparatively in DSDV as it needs to advertise periodic updates and even-driven updates. If the node mobility is high then occurrence of event driven updates are more. But in AODV it doesn't advertise any routing updates and hence the throughput is stable.

**5.0 Conclusion:** In this paper the analysis of adhoc routing protocol is done in the above mentioned mobility and traffic pattern on different pause time. We analyzed that when pause time set to 0 each of the routing protocols obtained around 97% to 99% for packet delivery ratio except DSDV which obtained 77%. DSR and AODV reached approx 100% packet delivery ratio when pause time equal to 200 while DSDV obtained only approx 94% packet delivery ratio.

DSR and DSDV has low and stable routing overhead as comparison to AODV that varies a lot. Avg. End to End delay of DSDV is very high for pause time 0 but it starts decreasing as pause time increases. DSR performs well as having low end to end delay.

The study reveals that, DSDV routing protocol consumes more bandwidth, because of the frequent broadcasting of routing updates. While the AODV is better than DSDV as it doesn't maintain any routing tables at nodes which results in less overhead and more bandwidth. From the above, chapters, it can be assumed that DSDV routing protocols works better for smaller networks but not for larger networks. So, my conclusion is that, AODV routing protocol is best suited for general mobile ad-hoc networks as it consumes less bandwidth and lower overhead when compared with DSDV routing protocol.

When we compare the three protocols in the analyzed scenario we found that overall performance of DSR is better than other two routing
protocols.

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