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**RESEARCH ARTICLE**

# Impact of Pause Time on the Performance of DSR, LAR1 and FSR Routing Protocols in Wireless Ad hoc Network

**[1]Pankaj Kumar Varshney, [2]G.S.Agrawal, [3]Sudhir Kumar Sharma**

[1, 2]Institute of Computer Applications, Mangalayatan University, Beswan, Aligarh-U.P. (India)

[3]School of Engineering, Jaipur National University, Jaipur-Raj. (India)

[1] pankaj.surir@gmail.com [2] gs.agrawal@mangalayatan.edu.in [3] sudhir.732000@gmail.com

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***Abstract- The performance analysis of the protocols is the most important step prior to selecting a meticulous protocol. In this paper, the performance of Dynamic Source Routing (DSR), Location-Aided Routing1 (LAR1) and Fisheye State Routing (FSR) protocols using Qualnet 5.0.2 simulator have been evaluated. The performance of above routing protocols has been evaluated on the basis average jitter, average end-to-end delay and throughput metrics. The simulation results show that average jitter, and average end-to-end delay is less in DSR protocol as compared to LAR1 protocol and FSR protocol. The throughput of FSR protocol is better in comparison of DSR protocol and LAR1 protocol. At the same time average jitter and end to end delay is less in LAR1 protocol as compared to FSR protocol. However throughput of LAR1 protocol is higher than that of DSR protocol.***

***Keywords: Wireless Ad hoc Network, DSR, LAR1, FSR, Qualnet 5.0.2(Simulator), Jitter, Delay, Throughput***

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## I. INTRODUCTION

Wireless Ad hoc network is a network in which collection of mobile nodes form a temporary network without any centralized control or administration. In this all nodes work as router and take part in discovery and maintenance of route. In this type of network the availability of routers at an instant can change due to the mobility of nodes. The topology of this type of network is not fixed and may change frequently.

We can distinguish Ad hoc network from other networks on the basis of various characteristics like: absence of centralized control, each node has wireless interface, nodes can move around freely which results in frequent changes in network topology [1].A key issue in Wireless Ad hoc networks is the necessity that the routing protocols must be able to respond rapidly to topology changes in the network. The performance analysis of the protocols is the most important step prior to selecting a particular routing protocol. In this paper researchers show the effect of varying pause time on the performance of DSR, LAR1 and FSR routing protocols in Wireless Ad hoc Network through the measure the value of performance metrics i.e. average jitter,

 

average end-to-end delay and throughput. The rest of this paper is organized as follows. Section 2 gives a brief idea on the different routing protocols used for performance analysis. Section 3 explains the simulation methodology and performance metrics. Sections 4 illustrate the simulation results followed by conclusion.

## II. ROUTING PROTOCOLS

The process of sending messages or packets of data requires a special method called routing. Routing refers to sending the data from the source node to the destination node through the intermediate nodes. A routing protocol specifies how routers communicate with each other, disseminating information that enables them to select routes between any two nodes on a computer network [2]. The routing algorithm is the algorithm used for service discovery and for caching, maintaining and updating the routing table. Routing algorithms determine the specific choice of route.
The routing protocols in Wireless Ad hoc Network can be categories into three types [3, 4]:

- Proactive or table-driven routing protocols
- Reactive or on-demand routing protocols
- Hybrid routing protocols

Proactive Protocols keep track of routes for all nodes in the ad- hoc network. It is also called Table-driven Protocols. In this a table is constructed and maintained within nodes, so that each entry in the table indicates the next hop node towards a certain destination. It also leads to the maintenance of unused data paths, which causes the reduction in the available bandwidth. All the nodes continuously search for routing information within a network so that when a route is needed, the route is already known [5]. Reactive Protocols These protocols are also known as on demand or source initiated routing protocols. Reactive routing protocols a request is made for the route only when it is necessary for a node to communicate with another node. It maintains the routes that are currently in usage. As a result it reduces the burden in the network [5]. When a node requires a route to destination it initiates route discovery process within the network. This process completes once one best route is found.
Hybrid Protocols are the combination of proactive and reactive routing protocols. Hybrid routing protocols are used the proactive as well as reactive routing strategies for the route finding [6].

### *A. Dynamic Source Routing Protocol (DSR)*

DSR is a reactive protocol based on the source route approach. DSR allows the network to be self organizing without the need for any fixed network infrastructure or administration. Dynamic Source Routing (DSR), the protocol is based on the link state algorithm in which source initiates route discovery on demand basis. The sender determines the route from source to destination and it includes the address of intermediate nodes to the route record in the packet. DSR was designed for multi hop networks for small diameters.

### *B. Location-Aided Routing1 (LAR1)*

LAR1 is an on-demand routing protocol [7] utilizes the location information for improving the efficiency of routing by reducing the control overhead. LAR assumes the availability of the global positioning system for obtaining the geographical position information necessary for routing. LAR designates two geographical regions for selective forwarding of control packets, namely, ExpectedZone and RequestZone. The expected zone covers the area in which the destination is expected. Since the expected zone need not contain the source node, a larger area must be covered by flooding [8]. This expanded expected zone is called request zone and is used to restrict the flooding; i.e. only nodes that are part of the request zone can forward a route request. On unsuccessful route discoveries, the request zone may need to be expanded further, possibly covering the whole network [9]. In scheme 1, the source defines a circular area in which the destination may be located, determined by the following information [10]:

- The destination location known to the source
- The time instant when the destination was located at that position
- The average moving speed of the destination.

### *C. Fisheye State Routing (FSR)*

FSR is a proactive routing protocol [11] and generalization of the GSR [12] (Gateway Switch Routing) protocol. FSR uses the fisheye technique to reduce information required to represent graphical data, to reduce routing overhead. The basic principal behind this technique is the property of a fish's eye that can capture pixel information with greater accuracy near its eye's focal point. This accuracy decreases with an increase in the distance from centre of the focal point. This property is

 

translated to routing in ad hoc wireless networks by a node, keeping accurate information about nodes in its local topology, and not so accurate information about for away nodes, the accuracy of the network information decreasing with increasing distance**.**

## III. SIMULATION METHODOLOGY and PERFORMANCE METRICS

*A***.** The Our aim of this simulation study is to analyze the performance of DSR, LAR1 and FSR wireless ad hoc routing protocol on the basis of varying pause time. The simulations have been performed using QualNet version 5.0.2, software that provides scalable simulations of wireless ad hoc networks. The simulation has carryout in terrine dimensions 500X500 with 100 nodes placed randomly and duration fixed 200 sec for each of simulation. The nodes moved following the random waypoint mobility model with 1 seed value and minimum and maximum speed of nodes are 2 and 20 metres per second respectively. The MAC protocol is used the IEEE 802.11b with the 2.4 GHz channel frequency. The nodes have application run on CBR (constant bit rate) traffic. We are taking 512 bytes size for the each packet to send the 10,000 packets in the said environment with the interval of 50 milliseconds.

*B. Table1. Simulation Parameters*

| | |
|---|---|
| MAC Layer Protocol | 802.11 |
| Routing Protocols | DSR , LAR1 and FSR |
| Traffic Type | Constant bit rate (CBR) |
| Mobility Model | Random Way Point |
| Radio Type | 802.11 b Radio |
| Channel Frequency | 2.4 GHz |
| Interval | 50 m/s |
| Start Time | 50 m/s |
| End Time | 0 m/s |
| Packet size | 512 |
| Item to be send | 10000 |
| Number of Nodes | 50 |
| Node Placement | Random |
| Terrine Dimensions | 500 X 500 |
| Seed value | 1 |
| Simulation time | 200 sec |
| Number of CBR | 1 |
| Pause Time | 0, 10,20 30, 40, 50 sec |
| Maximum Speed | 20 m/s |
| Minimum Speed | 2 m/s |
| Performance Matrices in Application Layer | Average Jitter, Average End-to-End Delay, Throughput |

*C. Performance Matrices*

To analyze the performance of routing protocols, metrics are needed. So, we use three different metrics to compare the performance. They are:

Average Jitter: It is the variation in the time between packets arriving. Jitter is commonly used as an indicator of consistency and stability of a network.

Throughput: Throughput is the number of packet that is passing through the channel in a particular unit of time.

Average End-to-End Delay: End-to-end delay indicates how long it took for a packet to travel from the source to the application layer of the destination.

 

## IV. Results and Discussion

In this paper the performance evaluation is carried out in wireless ad hoc network by varying pause time while keeping other parameters fixed. DSR, LAR1 and FSR protocols are considered for the analysis purpose.

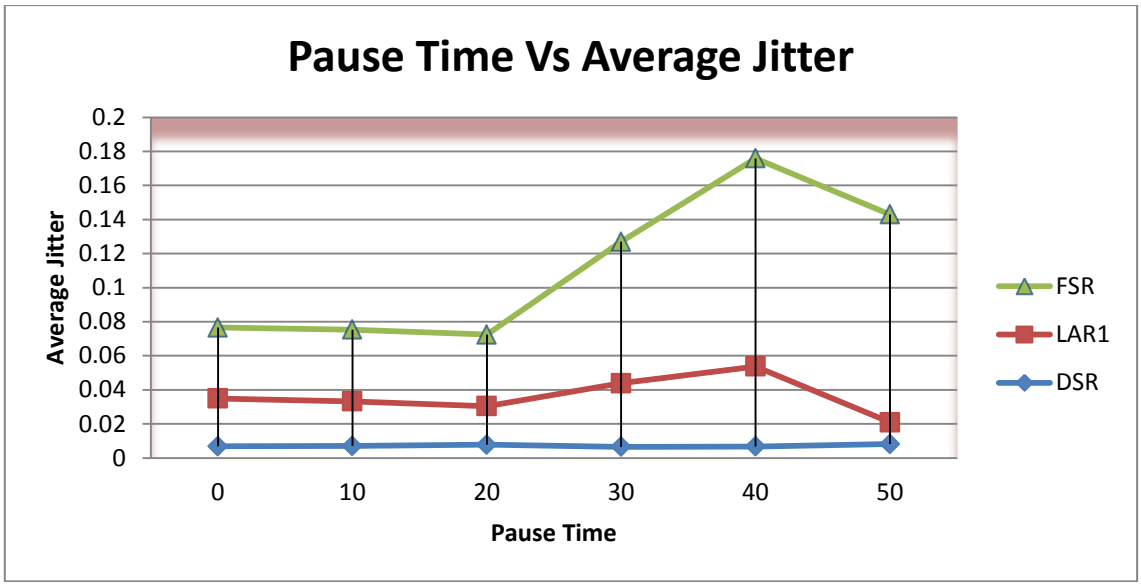


Fig. 1(a): Comparison of DSR, LAR1 and FSR Protocols with respect to Pause Time Vs Average Jitter

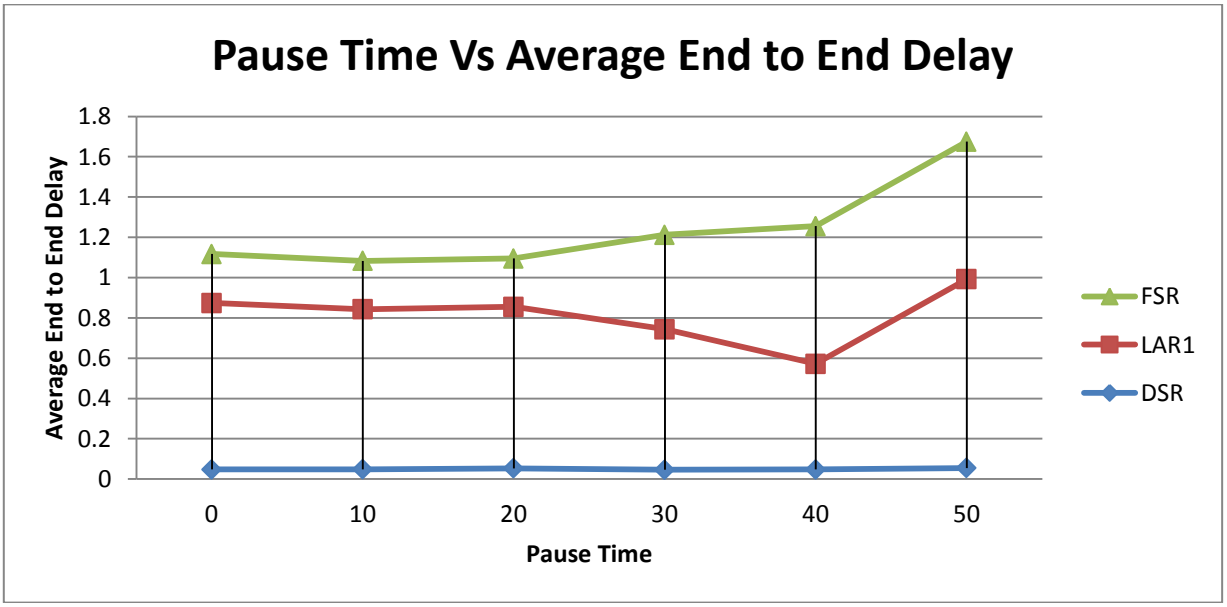


Fig. 1(b): Comparison of DSR, LAR1 and FSR Protocols with respect to Pause Time Vs Average End to End Delay

 

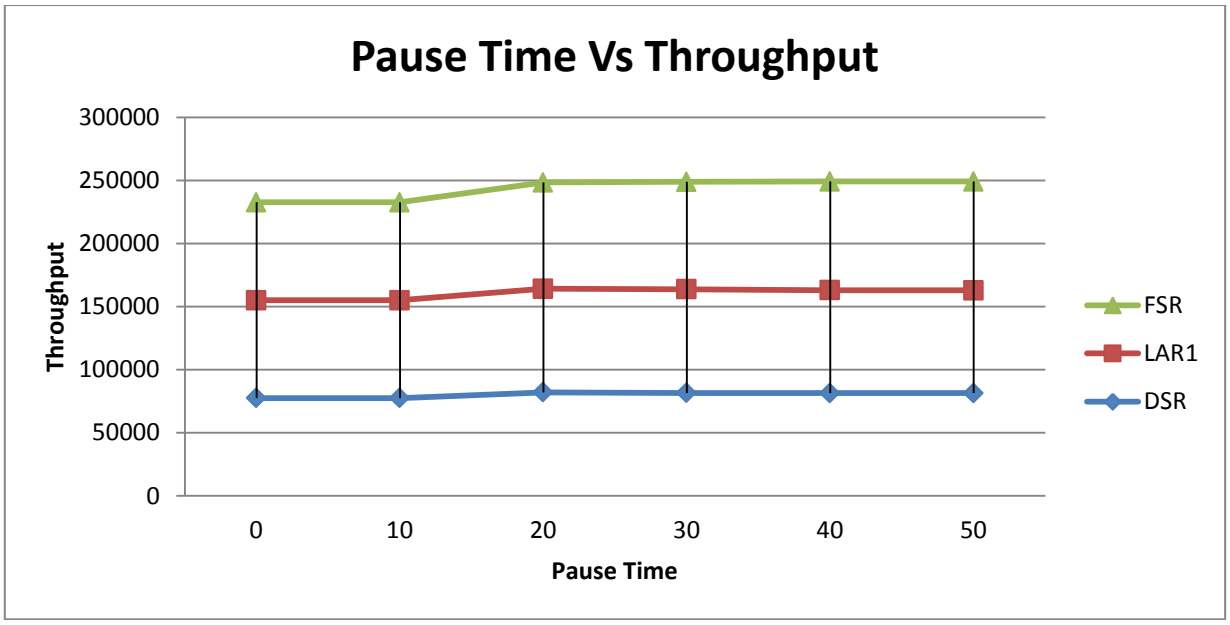


Fig. 1(c): Comparison of DSR, LAR1 and FSR Protocols with respect to Pause Time Vs Throughput

In simulation we considered the following pause times: 10s, 20s, 30s, 40s, and 50s with minimum and maximum speed of nodes is 2s and 20s respectively. And the number of nodes is fixed at 50 for each scenario of different pause time keeping all other parameters constant as shown in table 1. The performance plots i.e. Pause time Vs Average jitter, Pause time Vs Throughput, and Pause time Vs Average End-to-End delay is shown fig 1(a), (b), and (c). As increase pause time the average jitter value of LAR1 and FSR is grown but in case of DSR is slightly change. At 50s pause time the average jitter value of LAR1 and DSR routing protocol is same. As per the fig 1(a) the average jitter is higher in FSR routing protocol as compared to the DSR and LAR1 routing protocol. Similarly fig 1(b) shows as varying the pause time Average end-to-end delay is greater than in FSR routing protocol as compared to DSR and LAR1 routing protocol. But throughput is higher in FSR routing as compare to DSR and LAR1. In fig1(c) shown that the throughput of DSR is same at 0 to 50s pause time. But the throughput of LAR1 and FSR is slightly increased when pause time as increase.

## V. CONCLUSION

The performance of DSR, LAR1, and FSR routing protocols has been evaluated on the basis average jitter, average end-to-end delay and throughput metrics. The simulation results show that average jitter, and average end-to-end delay is less in DSR protocol as compared to LAR1 protocol and FSR protocol. The throughput of FSR protocol is better in comparison of DSR protocol and LAR1 protocol. At the same time average jitter and end to end delay is less in LAR1 protocol as compared to FSR protocol. However throughput of LAR1 protocol is higher than that of DSR protocol.

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