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# Scenario Based Performance Evaluation Of Dsr Routing Protocol For Vbr Traffic In Manets

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**Abstract:**

**Mobile Ad hoc network (MANETs) are rapidly growing as an important area of wireless communication with the technological advancements in the mobile devices. Efficient routing protocols make MANETs reliable. Despite the considerable simulation works, still more investigation is required in the performance evaluation of routing protocols for multimedia traffic especially Variable Bit Rate (VBR).In this paper, we will conduct a number of simulations for the performance evaluation of popular routing protocols of MANET, named DSR, for VBR multimedia traffic using Real Time Protocol (RTP) by changing the terrain size, connection rate and data send rate for 50 nodes. We will investigate the performance DSR and DSR after scenario change i.e. Enhanced DSR using three metrics- packet delivery ratio, average end to end delay and optimal path length.**

***Keywords:*** MANETs; DSR; VBR; RTP.

## I. INTRODUCTION

A Mobile Ad hoc network (MANET) [1] [2] is an autonomous collection of mobile routers or nodes communicating over radio links. MANET is a temporary network without infrastructure. The wireless routers or nodes moves randomly and organize themselves arbitrarily. The nodes directly communicate via wireless links within each other's radio range, while that are distant apart use other nodes as relay in a multihop routing function. As the nodes are mobile, the structure of the network changes dynamically and unpredictably over time.Adhoc networks are self-configuring and self-organizing, so to maintain communication between nodes in the network, each node behaves as a transmitter, a host and a router.

Due to growing usage of the portable devices and progress in the wireless communication, Mobile Ad hoc networks are gaining importance due to its wide range of applications [3].Mobile Ad hoc networks are used in military communication and operations, home appliances, emergency services, educational applications and entertainment.

MANET has few challenges and limitations that have to be addressed [4].Limited radio transmission range, routing overhead, battery constraints, security, etc. are some of inefficiencies in a MANET environment.

This paper is organized as follows: The next section presents the main Ad hoc routing protocol DSR that is used in the performance evaluation process. Section III presents the simulation set up and the performance evaluation metrics. In section IV, we present the simulation results and performance comparison. And finally, we conclude the paper and present the plans for the future work in section V.

## II. MOBILE ADHOC ROUTING PROTOCOLS

There are many different ways to classify the routing protocols of MANETs depending upon their network structure, communication model, routing strategy and state information [5] [6]. Depending upon the routing strategy, there are two types of routing protocols: Table Driven and Source Initiated (On Demand).

The first type is a proactive approach i.e. table driven. Routing information in the network maintained up to date. Table driven protocols have lower latency but have high routing overhead. The routing overhead is high due to periodic updations of routing tables. Some of main proactive protocols of MANET are DSDV, FSR and OLSR.

The second type is source initiated. It is also known as On Demand or Reactive. Route id created only when demanded by the source node. When a node wants to communicate in the network, it initiates a route discovery process within the network. So, there is no need of periodic updates. Hence, the routing overhead is low but the latency is high. Some of main reactive protocols of MANET are AODV, DSR and TORA. The mobile Ad hoc routing protocols considered in this study are described below.

### A. DYNAMIC SOURCE ROUTING (DSR)

DSR [7] [8] is an On Demand routing protocol. DSR is based on the theory of source based routing and is a very simple and efficient routing protocol. DSR is designed for use in

multihop wireless Ad hoc networks of mobile nodes. The DSR protocol works into two main mechanisms called Route Discovery and Route Maintenance. Route Discovery is the mechanism in which a source node tending to send a packet to a destination obtains a source route to destination. It is initiated only when a source node wants to send packet to a destination and doesn't already know the route to it. And, then it maintains that route in the cache of the nodes. Route Maintenance is the mechanism in which source node is able to detect the link failures to the destination. It then repairs the route or finds an alternate route. It is used only when source is sending packets to a destination

## III. SIMULATION ENVIRONMENT

To evaluate and compare the performance of this routing protocol in Mobile Ad hoc network, we performed extensive simulations using NS-2.34 simulator [10]-[13]. Each simulator is carried out under the constant mobility.

**TABLE 1**
**THE SIMULATION PARAMETERS**

| Experiment Parameter | Experiment Value | Description |
|---|---|---|
| Simulation Time | 200 S | Simulation Duration |
| Terrain Dimension | 1000*1000 m, 1500*1500 | X,Y Dimension of Motion |
| No. of Mobile Nodes | 50 | No. of nodes in a network |
| Node Placement | Random waypoint | Change Direction Randomly |
| Mobility Speed | 0-50 mps | Mobility of Nodes |
| | | |
| Mobility Model | Random | Mobility Direction |
| Routing Protocols | DSR | Path-finding |
| MAC protocol | 802.11g | Wireless |
| Traffic | VBR | |
| Traffic rate | 25 pkt/sec, 35 pkt/sec | |
| Packet Send rate | 256kb, 512kb | |
| Packet Size | 1 kb | |
| Pause Time | 100 sec | |

***Performance Metrics***

**Packet delivery Ratio (PDR) [14]:** It is the ratio of all the received data packets at the destination to the number of data packets sent by all the sources. It is calculated by dividing the number of packet received by destination through the number of packet originated from the source.

$$PDR = (P_r / P_s) * 100$$

Where, $P_r$ is total packet received and $P_s$ is total packet sent.

**End to End Delay [14]:** This includes all possible delays caused by buffering during route discovery, latency, and retransmission by intermediate nodes, processing delay and propagation delay. It is calculated as

$$D = (T_r - T_s)$$

Where, $T_r$ is receive time and $T_s$ is sent time of the packet.

**Optimal Path Length [15]:** Path Optimality is the ratio between the numbers of hops of the shortest path to the number of hops in the actual path taken by the packets. It is the total number of forwarding packets of the total number of received packets.

## IV. SIMULATION RESULTS AND PERFORMANCE COMPARISON

Performance of DSR and Enhanced DSR routing protocol is evaluated under Variable Bit Rate multimedia traffic.

***RESULT TABLE***

| **Parameter** | **DSR 50 Node (1000*1000m) Conn. Rate – 25 pkt/sec Send rate – 256 Kb** | **DSR 50 Node( 1500*1500m) Conn. Rate – 35 pkt/sec Send rate – 512kb** |
|---|---|---|
| PDR Ratio | 0.12 | 0.82 |
| Avg. End to end delay | 3.02 | 3.66 |
| Optimal Path Length | 8.62 | 4.01 |

***1) PDR Ratio***

PDR is better for Enhanced DSR protocol than existing DSR protocol.

| **DSR 50 Node (1000*1000m) Conn. Rate – 25 pkt/sec Send rate – 256 Kb** | **DSR 50 Node( 1500*1500m) Conn. Rate – 35 pkt/sec Send rate – 512kb** |
|---|---|
| 0.12 | 0.82 |

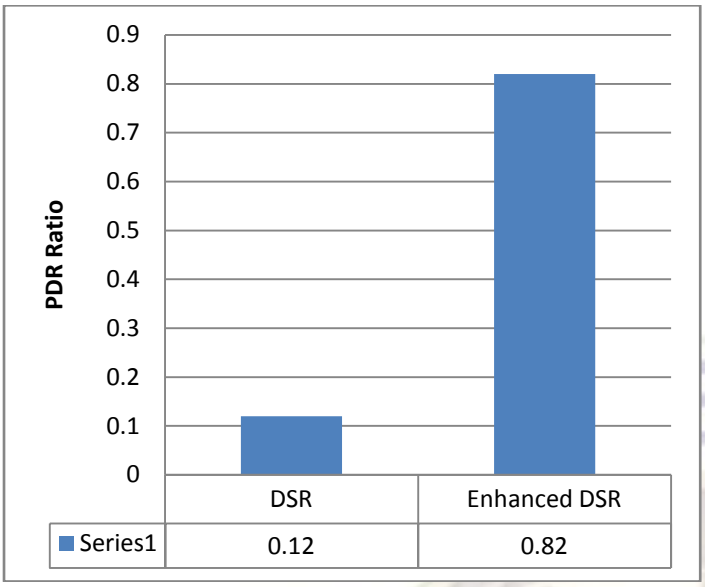


Figure 2: PDR of DSR and Enhanced DSR for 50 nodes

From above figure, it is observed that the Enhanced DSR protocol outperforms the existing DSR protocol in terms of Packet delivery ratio when the number of nodes is 50.

***2) Average End to End Delay***

Average end to end delay is higher in case of Enhanced DSR than existing DSR.

| **DSR 50 Node (1000*1000m) Conn. Rate – 25 pkt/sec Send rate – 256 Kb** | **DSR 50 Node( 1500*1500m) Conn. Rate – 35 pkt/sec Send rate – 512kb** |
|---|---|
| 3.02 | 3.66 |


Figure 3: Average end to end delay for DSR and Enhanced DSR for 50 nodes

It is observed from the figure above; in which existing DSR present the slightly less Average end to end delay measurements than Enhanced DSR for VBR traffic.

***3) Optimal Path Length***

Optimal Path Length is high for existing DSR protocol than Enhanced DSR protocol.

| **DSR 50 Node (1000*1000m) Conn. Rate – 25 pkt/sec Send rate – 256 Kb** | **DSR 50 Node( 1500*1500m) Conn. Rate – 35 pkt/sec Send rate – 512kb** |
|---|---|
| 8.62 | 4.01 |

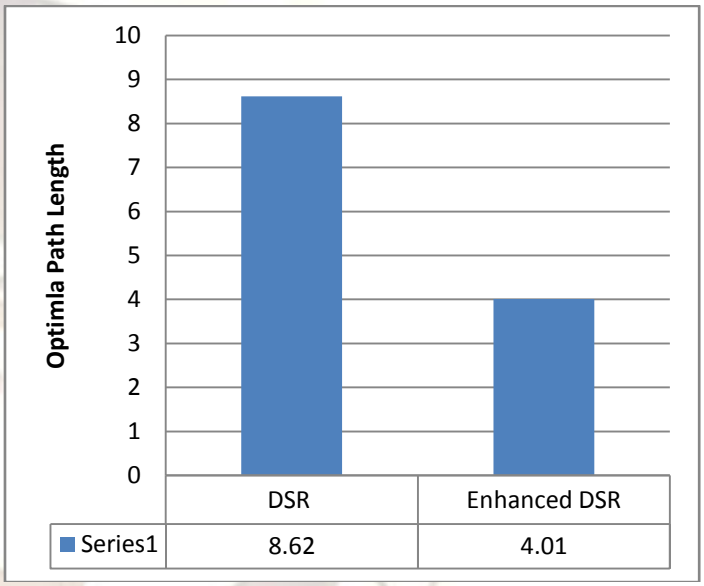


Figure 4: Optimal path length for DSR and Enhanced DSR for 50 nodes

As shown in the above figure that existing DSR has higher Path Optimality than Enhanced DSR which is almost 2 times the Enhanced DSR protocol

## V. CONCLUSION AND FUTURE WORK

Network simulator NS-2.34 is used to evaluate and compare the performance of DSR protocol under VBR traffic. The performance is compared in terms of PDR, Average end to end delay and optimal path length when number of nodes is constant 50 but creating different scenario by increasing the terrain size, connection rate and data send rate. Simulation results show that in case of Average end to end delay, existing DSR outperforms Enhanced DSR. This shows that existing DSR has suitable for delay sensitive applications. High packet delivery ratio and low optimal path length of Enhanced DSR is an advantage to the protocol. This makes the

Enhanced DSR more reliable than existing DSR. Thus from above investigations we conclude that Enhanced DSR is a better option for VBR multimedia traffic when the network size, connection rate and data rates are large.

In our future work, we will intend to do more simulations to evaluate DSR for more media centric metrics.

## REFERENCES

[1] Vasudha Arora and C. Rama Krishna, *"Performance Evaluation of Routing protocols for MANETs under Different Traffic Conditions"*, 2nd IEEE International Conference on Computer Engineering and Information Technology, 2010.

[2] Vikas Singla and Parveen Kakkar, *"Traffic Pattern based performance comparison of Reactive and Proactive Protocols of Mobile Ad-hoc Networks"*, International Journal of Computer Applications, Volume 5-No. 10, August 2010.

[3] Mobile Ad Hoc Networking: *"An Essential Technology for Pervasive Computing"*, Jun-Zhao Sun Media Team, Machine Vision and Media Processing Unit.

[4] Krishna Moorthy Sivalingam, *"Tutorial on Mobile Ad Hoc Networks"*, 2003.

[5] George Adam, Vaggelis Kapoulas, Chhristos Bouras, Georgios Kioumourtzis, Apostolos Gkamas and Nikos Tavoularis, *"Performance Evaluation of Routing Protocols for multimedia transmission over mobile Ad hoc networks"*,IFIP WMNC'2011.

[6] Mehran Abolhasan, Tadeusz Wysocki, and Eryk Dutkiewicz, *"A review of routing protocols for mobile ad hoc networks"*, Technical report, Telecommunication and Information Research Institute, University of Wollongong, Wollongong, NSW 2522; Motorola Australia Research Centre, 12 Lord St., Botany, NSW 2525, Australia,2003.

[7] Georgios Kiou Mourtzis, *"Simulation and Evaluation of Routing Protocols for Mobile Ad hoc Networks"*, Master thesis in Computer Science and Engineering, Naval Postgraduate School, Monterey California, September, 2005.

[8] D.B Johnson, D.A Maltz, and Yih-Chun Hu., *"The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks (DSR)"*, Internet draft (draft-ietf-manet-dsr- 10.txt), 19 July 2004.

[9] C. Perkins E. Belding-Royer, and S.Das, *"Ad hoc On- Demand Distance Vector (AODV) Routing"*, RFC 3561, July2003.

[10] *"The Network Simulator version 2"*, the source code of ns-allinone-2.34 can be downloaded from http://www.isi.edu/nsnam/ns/ns-build.html

[11] Kevin Fall, Kannan Varadhan, and the VINT project (May, 2010), available at http://www.isi.edu/nsnam/ns/ns-documentation.html

[12] Marc Gresis, *"Tutorial for the network simulator (ns- 2)"*, available at http://www.isi.edu/nsnam/ns/tutorial/index.html

[13] NS by example available at http://nile.wpi.edu/NS

[14] G.Rajkumar, R.Kasiram and D.Parthiban,*" Optimizing Throughput with Reduction in Power Consumption and Performance Comparison of DSR and AODV Routing Protocols"*, [ICCEET], 2012.

15] Satveer Kaur, *"Performance Comparison of DSR and AODV Routing Protocols with Efficient Mobility Model in Mobile Ad-Hoc Network"*, IJCST Vol. 2, Issue 2, June 2011.