



Performance Evaluation of Various Routing Protocols in Wireless Lan Using OPNET

Amritpal Kaur, Er. Anantdeep Kaur

Department of Computer Engineering
University College of Engineering
Punjabi University Patiala, India

Abstract – Wireless networks are becoming more and more ubiquitous in recent years, ranging from Digital cellular telephony up to satellite broadcasting. With the increasing demand and Penetration of wireless services, users of wireless networks now expect Quality of Service and performance comparable to what is available from fixed networks. In this paper three routing protocols aodv, dsr, and tora are compared. Opnet is used to simulate the performance of the routing protocols. Opnet modeler is one of the most popular products for modeling and simulating of computer network.

Keyword- Introduction, AODV, DSR, TORA, OPNET, Performance Metrics

I. Introduction

A routing protocol specifies how routes communicate with each other, dissemination information that enables them to select routes between any two nodes on computer network. Routing algorithms determine route for sending packets. In ad-hoc networks, nodes doesn't know with the topology, so a new node Routing protocols can be divided into two main categories table-driven routing protocols and source initiated on-demand routing protocols. After any route is established, is maintained by a maintenance procedure until the route is no longer required. Every routing protocol has different process for route discovery and maintenance.

Firstly, this paper will provide the little information regarding the routing protocols. The performance result of AODV, DSR and TORA will be presented. The result in this paper is based on fixed network topologies of 50 nodes. Performance of these routing protocols is shown using graphs and table at the end of the paper.

II. Overview Of Protocols

A. AODV (ad-hoc on-demand distance vector routing protocol)

Ad hoc On-Demand Distance Vector (AODV) Routing is a routing protocol for mobile and other wireless ad-hoc networks. It is a reactive routing protocol, meaning that it establishes a route to a destination only on demand. AODV avoids the counting to infinity problem. It defines three types of messages for working route request, route reply and route error. ^[6]

B. DSR (Dynamic Source Routing protocol)

It is a reactive routing protocol for ad hoc wireless networks. It also has on-demand characteristics. It is based on source routing. The node wishing to send a packet specifies the route for that packet. The whole path information for the packet traversing the network from its source to the destination is set in the packet by the sender. The two mechanisms are used in DSR route discovery and route maintenance. Route discovery finds the routs and route maintenance maintains the route using route error packet and acknowledgement. ^[1]

C. TORA (Temporally Ordered Routing Algorithm)

TORA is a highly adaptive, loop-free, distributed routing algorithm. Control messages are localized to a very small set of nodes and it provides multiple routes for a destination. The protocol consist of three basic functions: creating routes, maintaining routes, and erasing routes. Creating a route from a source node to destination node requires establishing a sequence of directed links from source to destination. This is accomplished using a query/reply process that builds a directed acyclic graph (DAG) rooted at the destination.

III. Performances Metrics

A. Throughput

The average rate at which the data packet is delivered successfully from one node to another over a communication network is known as throughput. The throughput is usually measured in bits per second (bits/sec). A throughput with a higher

value is more often an absolute choice in every network. Mathematically, throughput can be defined by the following formula.

$$\text{Throughput} = (\text{number of delivered packet} * \text{packet size}) / \text{total duration of simulation}$$

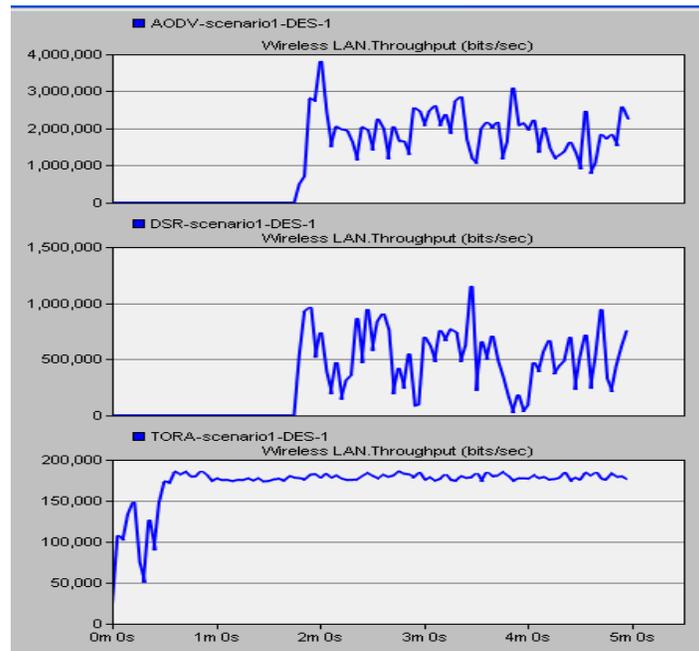


Fig. 1 Throughput

B. Delay

From the analysis it is clear that AODV has minimum delay as compared to other protocols. Minimum delay means that better output. On the other hand, DSR has more delay as compare to AODV due to large number of nodes. TORA experiences lengthy delay while waiting to determine a new route. TORA and AODV has the lowest delay as compared to DSR.

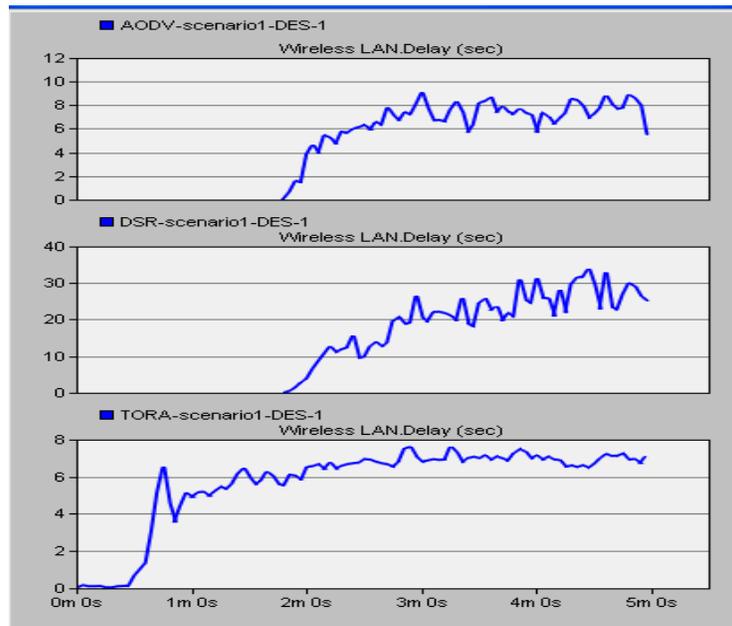


Fig. 2 Delay

C. Network Load

Network load define the total load on WLAN. Different applications have different effect on network load. Network load also depends upon the type and size of data. For example, for real time applications load will be high as compare to other type of data.

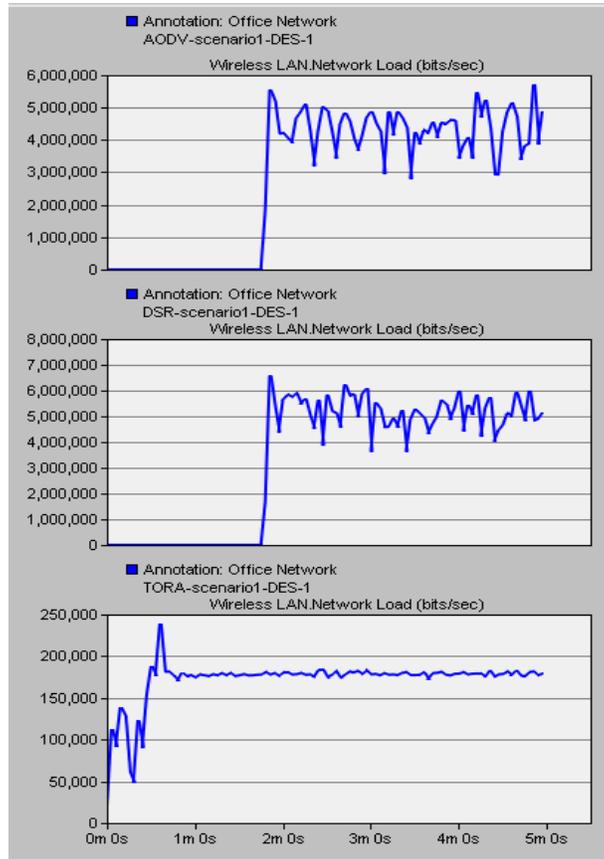


Fig 3 Network Load

IV. Conclusion

The performance of three routing protocols that are AODV, DSR and TORA routing protocols had been examined. The simulation model was developed on OPNET which allowed the simulation of fixed nodes. Several scenarios were implemented. The fixed node topology was compared against 50 nodes. AODV routing protocol showed that it has the highest throughput and lowest delay as compared to DSR and TORA.

Table 1

ATTRIBUTES	AODV	DSR	TORA
THROUGHPUT(bits/sec) (i*100000)	40	10	2
DELAY(sec)	9	35	8
NETWORK LOAD (bits/sec)(i*10000)	600	700	25

References

- [1] Parulpreet Singh, Ekta Barkhodia, Gurleen Kaur Walia, *Performance Study of Different Routing Protocols(OLSR, DSR, AODV) Under Different Traffic Loads and with Same Number of Nodes*, of Electronics & Communication, LPU, Phagwara, Vol. 3, Issue 1, Jan.- March 2012
- [2] Park, V., Corson, S., *Temporally-Ordered Routing Algorithm (TORA) Version 1 Functional Specification*, IETF MANET Working Group Internet Draft. Draft-item-manet-TORA-spec-03.txt. November 2000.
- [3] Deep Kaur and Kirandeep Kaur “*QoS in WLAN using IEEE 802.11e (Survey of QoS in MAC layer Protocols)*” of SBS College of Engineering and Technology, Ferozepur, India, 2012 IEEE DOI 10.1109/ACCT.2012.93
- [4] Perkins, C. E. Royer, E. M. and Das, S. R. "Ad hoc On-demand Distance Vector (AODV) routing," Mobile Ad Hoc Networking Working Group Internet Draft, 7. draft-ietf-manet-aodv-07.txt. Nov. 2000.
- [5] Saurabh Mittal, Pinki “*Performace Evaluation of routing protocols using Manet*” international journal of multidisciplinary research Vol.2, Issue 2, February 2012, ISSN 2231 5780.
- [6] <http://en.wikipedia.org/wiki/AODV>