TRAFFIC ANALYSIS OF DSR, AODV AND OLSR USING TCP AND UDP

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Abstract

Mobile Ad-hoc Network (MANET) is a collection of wireless mobile nodes dynamically forming a temporary network without the aid of any established infrastructure or centralized administration. Routing protocols in MANET helps node to send and receive packets. Ad hoc networks are useful for providing communication support where no fixed infrastructure exists or the deployment of a fixed infrastructure is not economically profitable and movement of communicating parties are allowed. Due to the dynamic topology, developing better routing protocol became a challenging task. Ad hoc networks are envisioned to have dynamic, sometimes rapidly-changing, random, Multi-hop topologies which are likely composed of relatively bandwidth-constrained wireless links. The various traffic flows are analyzed with the help of OPNET simulator.

Some studies have been reported in the literature to evaluate the performance and traffic flows of the basic manet routing algorithms like AODV, DSR and OLSR for TCP and UDP.

***Keywords*: MANET; DSR; OLSR; AODV; OPNET**

1. Introduction

MANET is the mobile Ad-hoc network in which there is no centralized control for the nodes in the network. In MANET the nodes are free to move in the network environment without any infrastructure defined for the mobility.

Also in MANET the nodes communicates via the wireless link and nodes are free to move randomly and thus the topology used is dynamic in nature. MANET nodes act as router for other mobile node. Thus routing in Manet is an important task in MANET. If traffic performance is analyzed on MANET then it can be determined that which type of application can be used in the MANET.As it is known that TCP is transmission control protocol and UDP is used datagram protocol, both of them are compared on the basis of various traffic parameters like HTTP, Email, FTP etc, in manet.

A Mobile Ad-hoc network (MANET) is a multi hop wireless network formed by a group of mobile node that have wireless capabilities [1]. Ad-hoc is a communication mode that allows computers to directly communication with each other without a router. In Latin, ad-hoc means “for this” meaning “for this special purpose” [1]. In ad hoc networks, nodes do not start out familiar with the topology of their networks; instead, they have to discover it[1]. The basic idea is that a new node may announce its presence and should listen for announcements broadcast by its neighbors [1]. Each node learns about nodes nearby and Static ad-hoc network the positions of a node may not change once it has become a part of the network. Ex- Rooftop networks [1]. Mobile ad-hoc network is sometimes called a Mobile Mesh Network, is a self configuring N/W of mobile devices connected by wireless links [1]. Each device in a MANET is free to move independently in any direction. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route the traffic [1]. In this paper the comparative study of three routing protocols i.e. DSR, AODV, and OLSR for different traffic pattern is shown for different mobile nodes using OPNET modeler 14.5.

2. Routing Protocols

2.1. *AODV*

AODV [2] is an reactive (On-demand routing protocol) with small delay. Since it is an “On-demand” routing protocol, the routes are established only when needed to reduce traffic load. AODV supports the Unicast.

Broadcast and Multicast scheme. The Count-To-Infinity and loop problem is solved with sequence numbers and the registration of the costs. In AODV every hop has the constant cost of one. The routes age very quickly in order to accommodate the movement of the mobile nodes. Link breakages can locally be repaired very efficiently. AODV is a modification of the DSDV algorithm. When a source node desires to establish communication session, it initiates a path-discovery process to locate the other node. The main advantage of AODV protocol is that routes are established on demand and destination sequence numbers are used to find the latest route to the destination. The connection setup delay is less. The HELLO messages supporting the routes maintenance are range-limited, so they do not cause unnecessary overhead in the network.

2.2. *DSR*

The Dynamic Source Routing protocol (DSR) [3] is a simple and efficient routing protocol designed specifically for use in multi-hop wireless Ad- hoc networks of mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is composed of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to arbitrary destinations in the ad hoc network. However, this protocol has a number of advantages over routing protocols such as AODV, LMR and TORA and in small to moderately size networks (perhaps up to a few hundred nodes), this protocol may perform better. An advantage of DSR is that nodes can store multiple routes in their route cache, which means that the source node can check its route cache for a valid route before initiating route discovery, and if a valid route is found there is no need for route discovery. This is very beneficial in network with low mobility. Since they routes stored in the route cache will be valid longer. Another advantage of DSR is that it does not require any periodic beaconing (or hello message exchanges), therefore nodes can enter sleep node to conserve their power. This also saves a considerable amount of bandwidth in the network.

2.3. *OLSR*

OLSR is an optimized link state routing protocol. It is a proactive routing protocol in which the routes are permanently stored and updated in the routing table.

3. Routing Protocols

From [1] the three routing protocols i.e. AODV, DSR and TORA are compared on the FTP traffic and throughput is calculated, also [1] The study of these routing protocols shows that the TORA performs better than AODV and DSR when the numbers of nodes are increased in a network according to our simulation results but it is not necessary that TORA perform always better in all the networks, its performance may vary by varying the network.

From [4] the DSR protocol is analyzed on the basis of traffic parameters like FTP, HTTP, EMAIL and VIDEO CONFERENCING on 35 nodes.

4. Simulation

In this paper the traffic is analyzed using OPNET MODELER 14.5. Also traffic routes are analyzed on the basis of TCP and UDP .Here the OPNET SIMULATOR is used to analyzed the traffic flows for various MANET routing protocols like AODV, DSR, OLSR for 42 mobile nodes.

5. Traffic Flow Patterns

5.1. *4 For AODV*

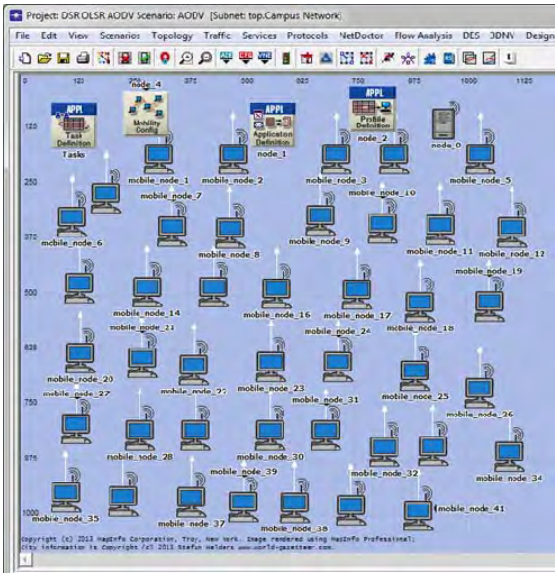

Fig.1. Network Diagram for AODV

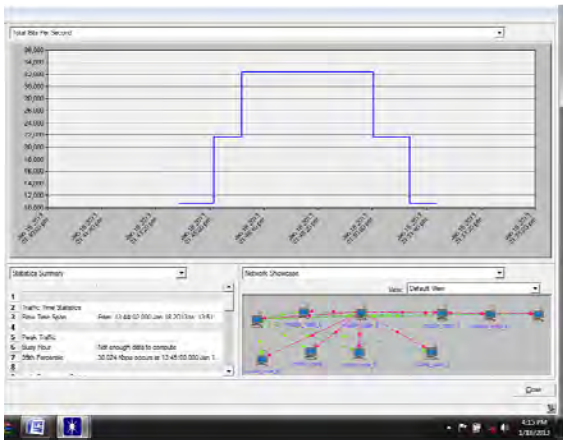

Fig.2. Traffic analysis with network showcase and graph for AODV

5.2. *For DSR*

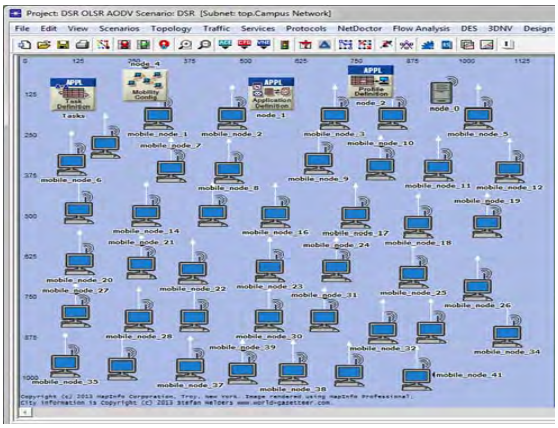

Fig.3. Network Diagram for DSR

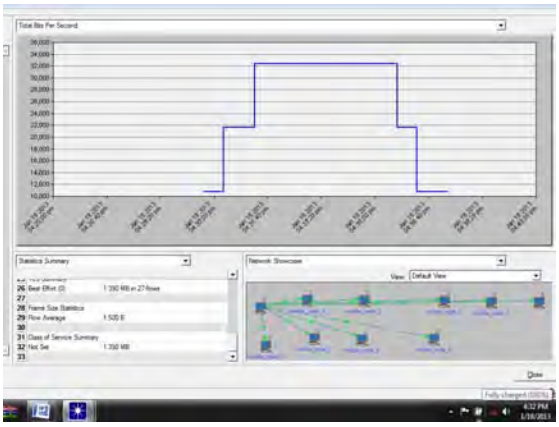

Fig.4. Traffic analysis with network showcase and graph

5.3. *For OLSR*

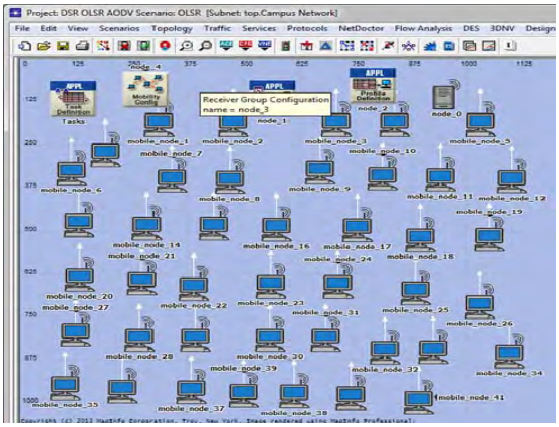

Fig. 5.Network Diagram for OLSR

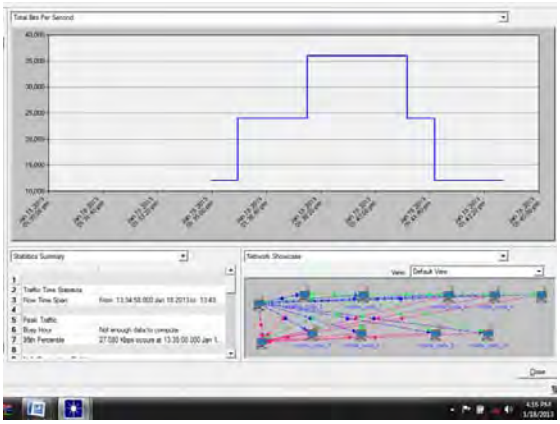

Fig. 6.Traffic analysis with network showcase and graph for OLSR

6. Statistics Summary

Table 1.Statistics summary for DSR, OLSR and AODV protocols

PROTOCOL	Link/Connection Statistics	Traffic Volume Statistics			Protocol Class Summary	Frame Size Statistics
	Number of Flows	Total Volume on Flows	Average Volume per Flow	Total Volume	TCP/UDP	Flow Average
DSR	27	1.390 MB	52.734 KB	1.390 MB	474.609 KB in 9 flows	1.500 B
OLSR	30	1.545 MB	52.734 KB	1.545 MB	527.344 KB in 10 flows	1.500 B
AODV	27	1.390 MB	52.734 KB	1.390 MB	474.609 KB in 9 flows	1.500 B

7. Conclusion

From the discussion the traffic flows are analyzed for 42 mobile nodes for each different MANET routing protocols i.e. are AODV, DSR and OLSR.

From above traffic analysis summary it is concluded that the DSR protocol has 27 flows and OLSR has 30 flows, also AODV has 27 flows. Average Volume per Flow for DSR is less than Average Volume per Flow in OLSR. Thus TCP and UDP traffic is analyzed for three different protocols like AODV, DSR and OLSR.

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