

The Impact of Transition from IPv4 to IPv6 in AODV VANET and MANET Routing Protocol

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Abstract

The transition from IPv4 to IPv6 has become inevitable and fairly urgent. Thus, it is necessary to study and analyze the impact of this transition in all networks protocols, especially in a mobile ad hoc network (MANET) and in VANET as a part of it, the topology of the network may change rapidly and unexpectedly due to mobility of nodes. Routing protocols operate differently under distinct environments. Thus, it is necessary to analyze the behavior of different routing protocols under distinct environments. In this Paper study has been done on the performance observation of AODV routing protocol of MANET under IPv4 and IPv6 Environment using OPNET Modeler as simulation tool. We have analyzed the behavior of AODV routing protocol in WLAN delay, throughput, routing traffic received and total packets dropped.

Keywords: IPv4, IPv6, MANET, Routing Protocols, AODV, OPNET.

1. Introduction

MANET is a network consists of many nodes which communicate to each other without any central control authority. Bandwidth, energy, physical security and other resources are limited in mobile ad hoc network. In mobile ad hoc network every mobile node acts as a host and also as a router, Ad hoc networks are heavily used in emergency situations where no infrastructure is available, for e.g. battle fields, disaster mitigation etc. The main limitation of ad-hoc systems is the Availability of power. In addition to running the onboard electronics, power consumption is governed by the number of processes and overheads required to maintain connectivity [1]. There is always a need in

mobile ad hoc network to search a good path for the routing of data packets from source to destination. In mobile ad hoc network every mobile node acts as a host and as a router. Due to the limited transmission range of wireless networks, multi-hops are needed to exchange data packets between source to destination in network. Bandwidth, energy, physical security and other resources are limited in mobile ad hoc network. Congestion in network may arise due to the limited bandwidth of mobile ad hoc networks and to avoid this problem efficient routing in mobile nodes is essential [2], the necessity for sufficient Internet protocol (IP) addresses to meet the demand of mobile devices, as well as flexible communications without infrastructure, are especially considerable. The next-generation IP, Internet Protocol version 6 (IPv6) [3], [4], the primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Therefore, nodes are required to relay packets on behalf of other nodes in order to deliver data across the network. A significant feature of ad hoc networks is that changes in connectivity and link characteristics are introduced due to node mobility and power control practices.

Reactive routing protocol is a type of routing protocol in which route is established when it is needed by source node to send data packets to the destination node. In reactive routing protocol flooding technique is used for route discovery. Once routes are discovered the routes are stored and maintained in route cache. The main advantage of this type of routing protocols is to save precious bandwidth of ad hoc network, AODV is a type of reactive protocol in which route is created when it is needed [2].

1.1 AODV

The AODV (Ad-Hoc On-Demand Distance Vector) routing protocol is a reactive routing protocol that uses some characteristics of proactive routing protocols. Routes are established on-demand, as they are needed. However, once established a route is maintained as long as it is needed. Reactive (or on-demand) routing protocols find a path between the source and the destination only when the path is needed (i.e., if there are data to be exchanged between the source and the destination). [5].

2. Methodology

In this paper we used discrete event simulation software known as OPNET (Optimized Network Engineering Tool) Modeler version 14.5. It is one of the most widely used commercial simulators based on Microsoft Windows platform and incorporates more MANET routing parameter as compared to other commercial simulator available. It not only supports MANET routing but also provides a parallel kernel to support the increase in stability and mobility in the network. [6] The simulations focused on the impact of the transition from IPv4 to IPv6 on the performance of AODV routing protocol. For our study there are two simulation scenarios consisting of 4 nodes in the first scenario used IPv4 as addressing protocol and the second scenario used IPv6, fig.1 illustrate the 4 nodes in OPNET :

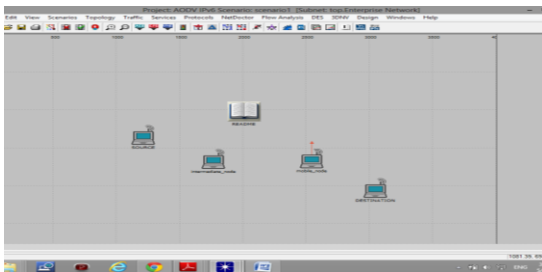


Fig.1 illustrate the 4 nodes in MANET in OPNET modeler

Simple four node scenario to show the features of AODV, SOURCE starts exponential traffic at 100 sec, and continues till end of simulation (600 sec).

We run the simulation for ten minute and get the results for both scinareos

3. Results and Discussion

On the basis of four parameters we evaluate the performance of one of the MANET routing protocols (AODV) under IPv4 and IPv6 environments, that is, WLAN delay,throughput , routing traffic recieved and total packets drops the results shown below:

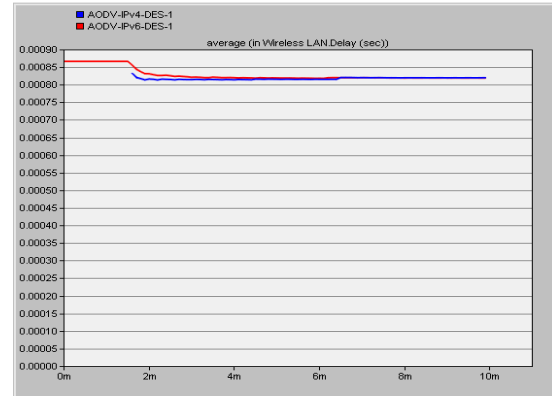


Fig.2 Illustrate the Average WLAN Delay(sec)

In fig.2 we observe that the delay in IPv4 is less than the delay when using IPv6

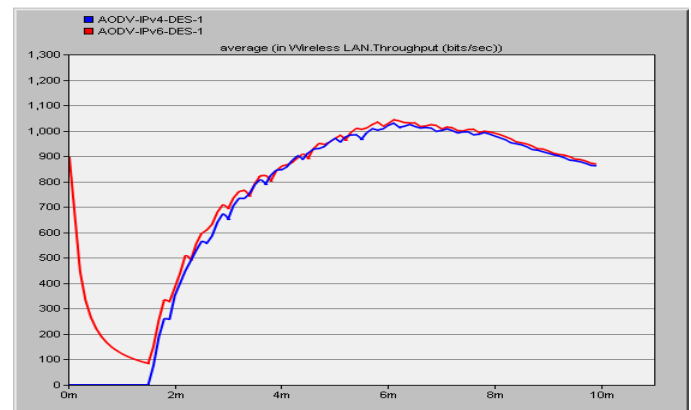


Fig.3 illustrate the average WLAN throughput (bit/sec)

in fig.3 we observe that the transition from IPv4 to IPv6 enhance the performance by increasing throughput in WLAN

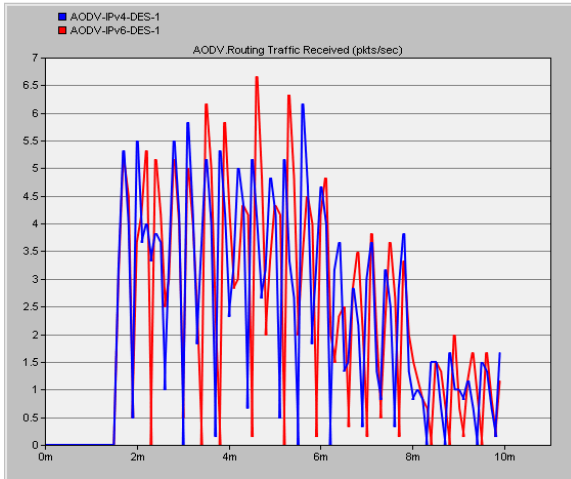


Fig.4 illustrate AODV routing traffic recieved (pkts/sec)

In fig 4 we observe that AODV in IPv4 is better than the ipv6 in term of routing traffic received

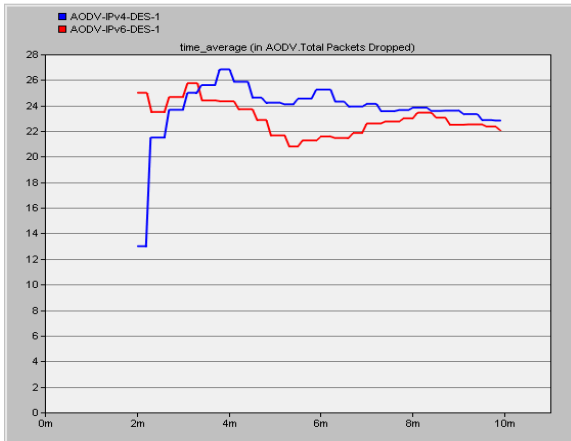


Fig.5 illustrate the total packets dropped (pkts)

In fig 5 we observe that AODV in IPv6 has less number of packet drops.

Tabel.1 AODVin IPv4 &IPv6

AODV	IPv4	IPv6
Wireless LAN delay(sec)	0.686×10^{-3}	0.828×10^{-3}
Wireless LAN throughput(bit/sec)	710	765
Routing traffic received (packet/sec)	2.58	2.56
Total packet dropped	23.72	22.95

4. Conclusions

In this study we tested the impact of transition from IPv4 to IPv6 in AODV VANET, MANET routing protocol using OPNET. On the basis of observation, we say that AODV in IPV6 performs better than IPv4 in terms of throughput and total packets dropped but in terms of delay and routng traffic received we found IPv4 is better , table.1 presents results summary.

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