4.1 Introduction

OPNET simulation tool is used to record experiments event with different scenarios IEEE 802.11a & n According to traffic analysis, for three parameters uses in IPv4 and IPv6 environment (Throughput, delay and jitter) has considered to evaluate the network performance for IPv4 and IPv6 which are all Quality of services measurement.

After running the simulation the flowing results for different scenario (small and large network) as showing below achieved:

4.2 Throughput

4.2.1 Throughput in Small Network

The comparison between **Wi-Fi** releases **a** and **n** according to VOIP uses IPv4 and IPv6 will be based on figures shown below, The **Figure (4.1)** shows that IPv4 have the highest throughput based on release (IEEE802.11a) compared to IPv6.

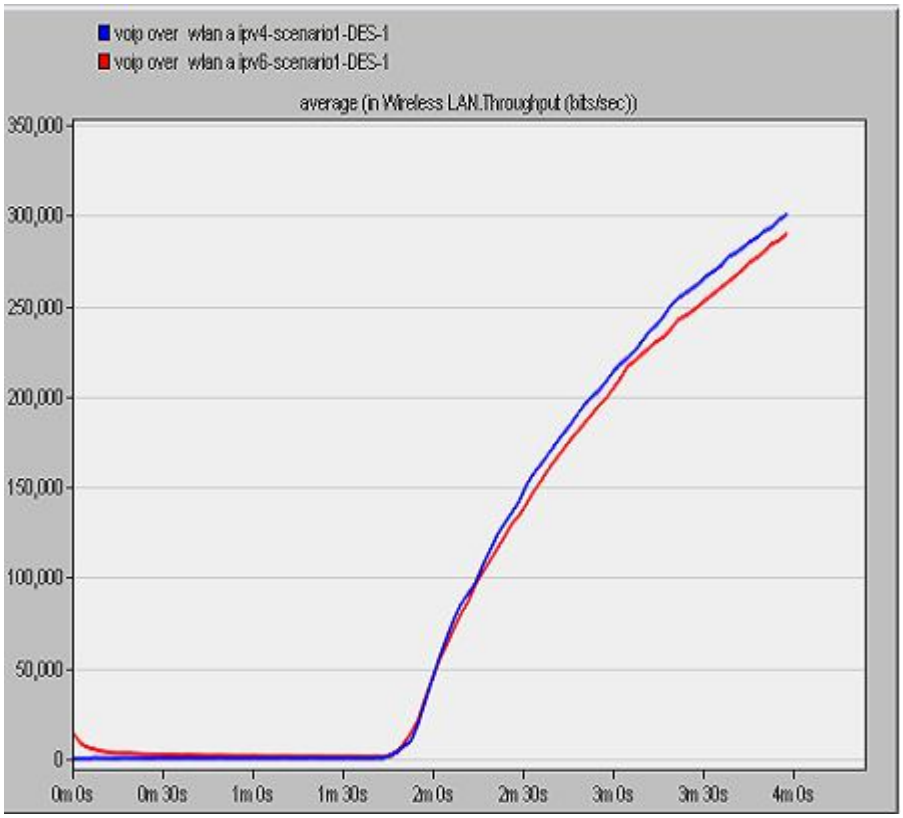


Figure (4-1) Throughput IEEE 802.11a_ipv4, 6

On the other hand, on the other **Figure (4.2)** IPv6 have the highest throughput based on release (n) compared to IPv4. So there is different between IPv4 and IPv6 VoIP traffic uses IEEE802.11a and IEEE802.11n.

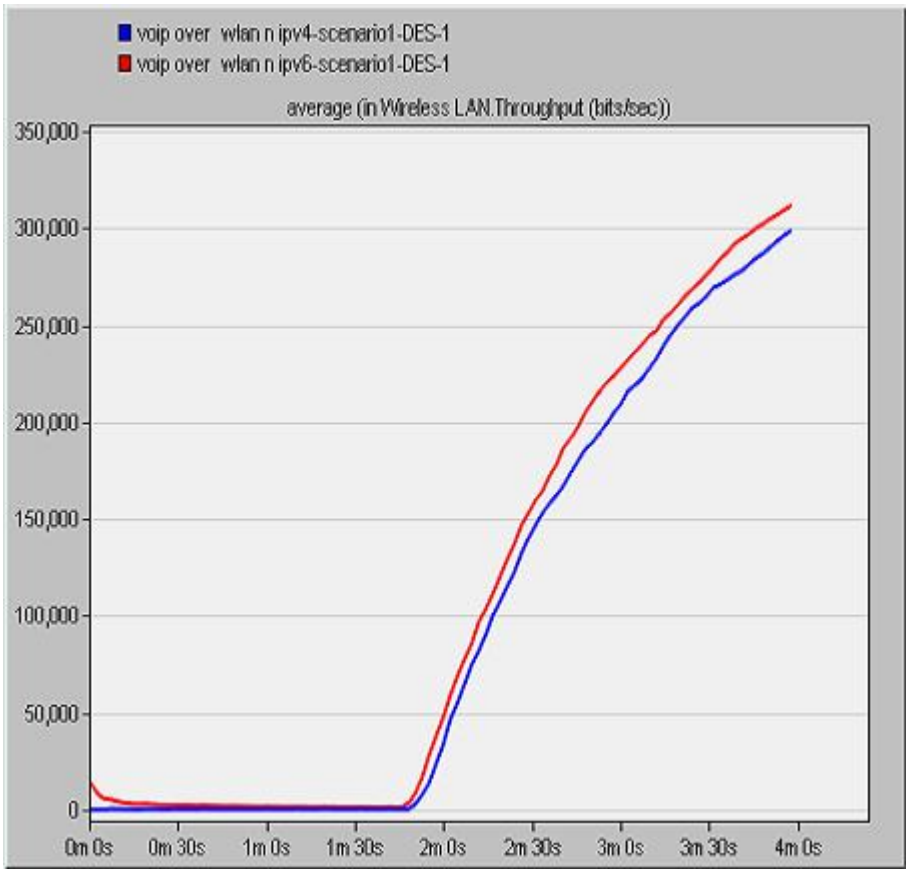


Figure (4-2) Throughput 802.11n_ipv4, 6

4.2.2 Throughput in large Network

Here the comparison between Wi-Fi releases (a) and (n) according to VoIP traffic IPv4 and IPv6 will be based on figures shown below,

The **Figure (4-3)** shows that IPv4 have the highest throughput based on release (IEEE802.11a) compared to IPv6, but the different is not far which means that IPv4 have better performance in cases of high VoIP traffic.

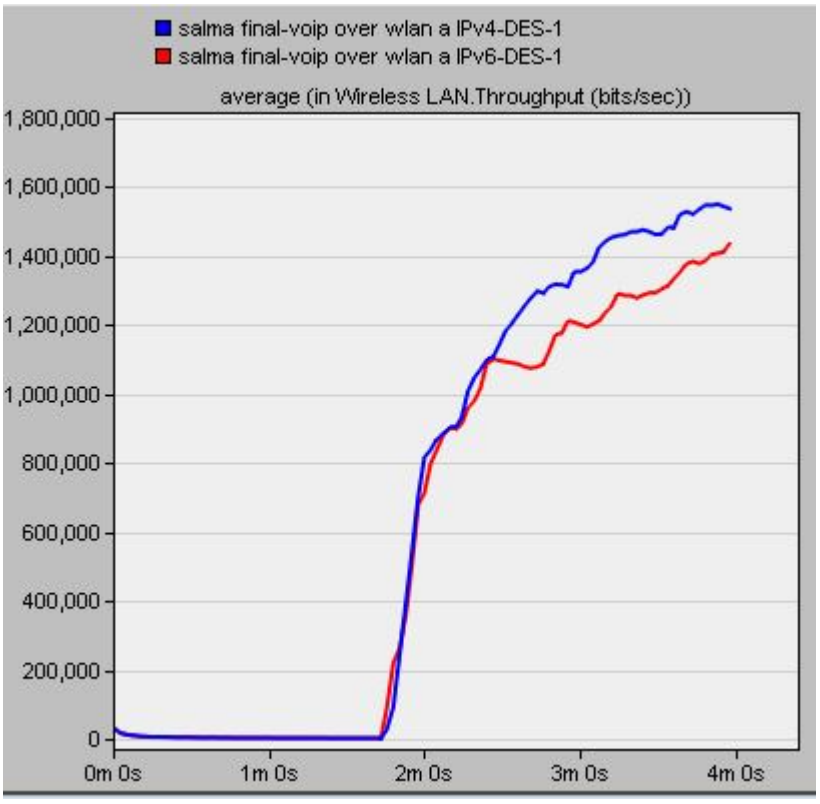


Figure (4-3) Throughput 802.11a_ipv4 , 6

on the other **Figure (4.4)** shows that IPv6 have the highest throughput based on release (n) compared to IPv4. So there is different between IPv4 and IPv6 VoIP traffic uses IEEE802.11 a and IEEE802.11 n.

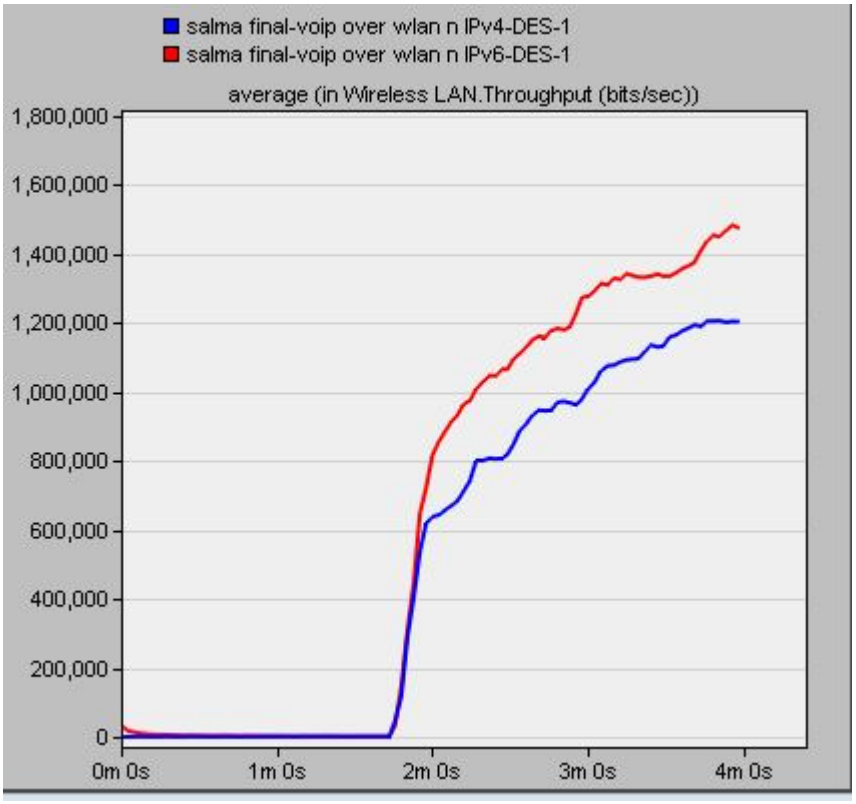


Figure (4.4) Throughput 802.11n_ipv4, 6

4.3 End to End Delay

4.3.1 End to End Delay in Small Network

Figure (4.5) shows that IPv6 have the highest delay in short period more than IPv4 according to release IEEE802.11 a ,Which indicates that IPv4 is good for real time applications more than IPv6 based on release (a) although it have delay after one minute when the run started.

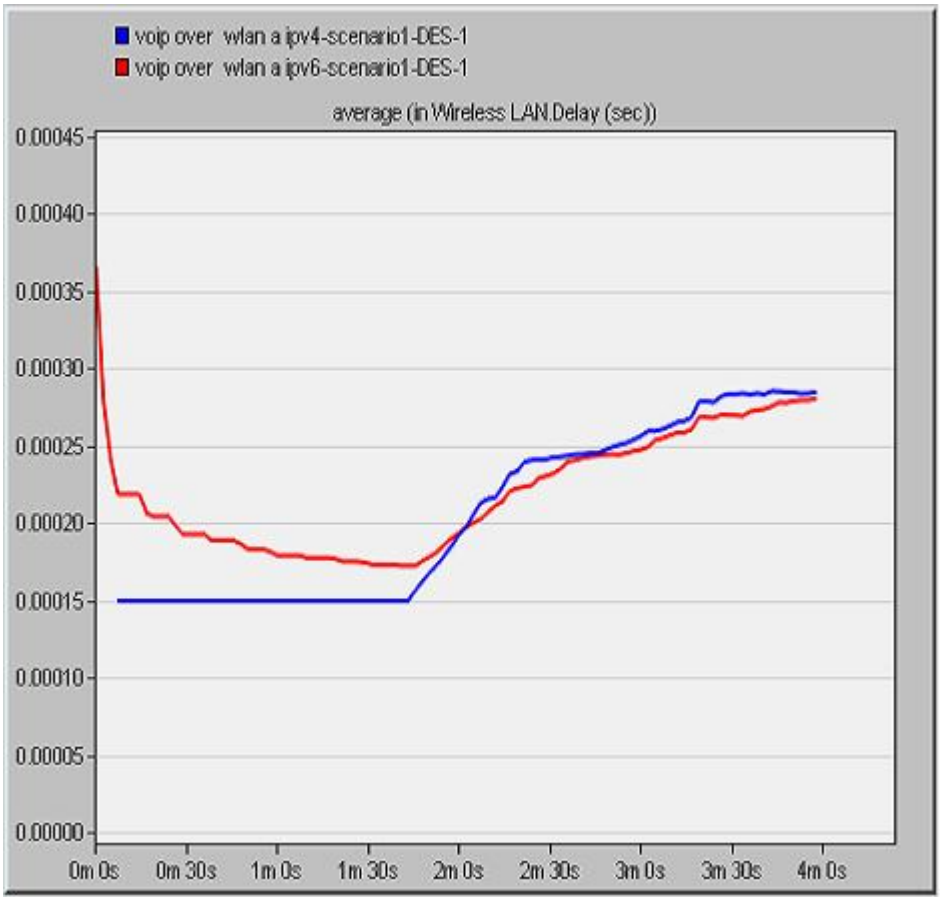


Figure (4.5) Delay 802.11 a_ipv4, 6

On the other hand, in **Figure (4.6)** shows that IPv6 have also more delay than IPv4 based on release IEEE802.11 n, but it's less than once which was shown in **Figure (4.5)** and IPv4 also have a little stable .So, from the previous delay comparison IPv4 and IPv6 based on IEEE802.11 a, n there a large different between them, IPv4 in beater for real time applications.

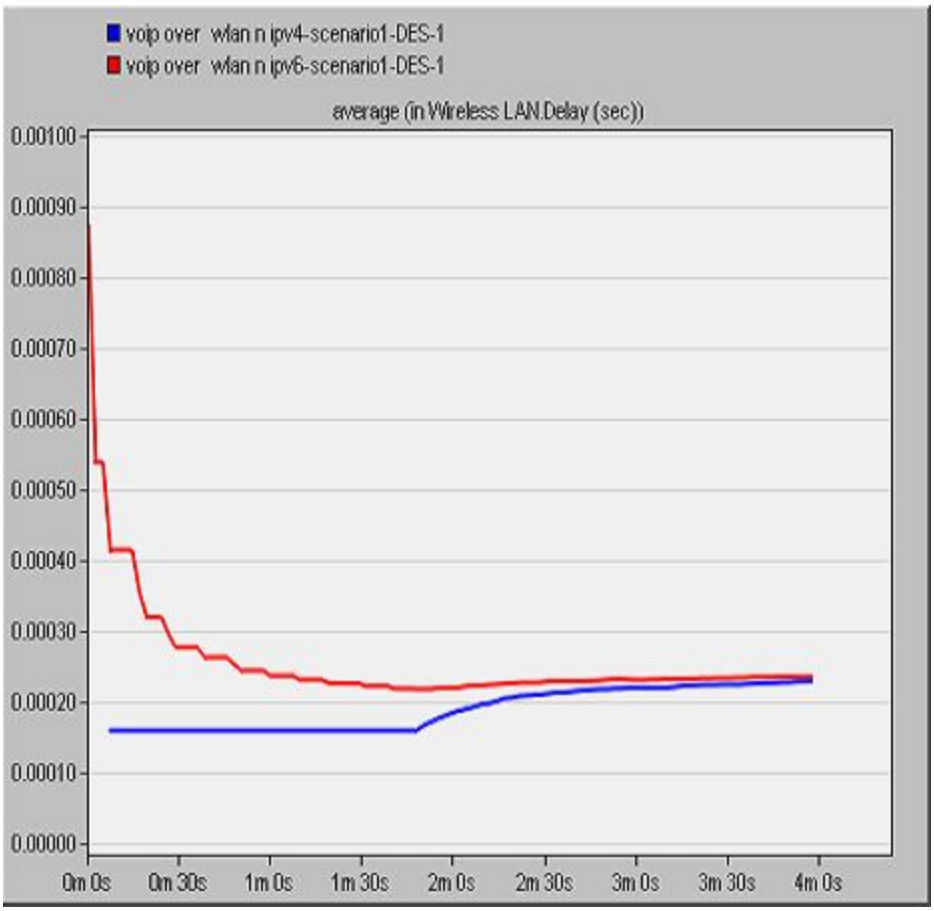


Figure (4-6) Delay 802.11 n_ipv4, 6

4.3.2 End to End Delay in Large Network

Figure (4.7) shows that IPv4 have the highest delay than IPv6 according to release IEEE802.11 a ,Which indicates that IPv6 is good for real time applications more than IPv4 based on release (a) although it have delay after two minute approximately when the run started .

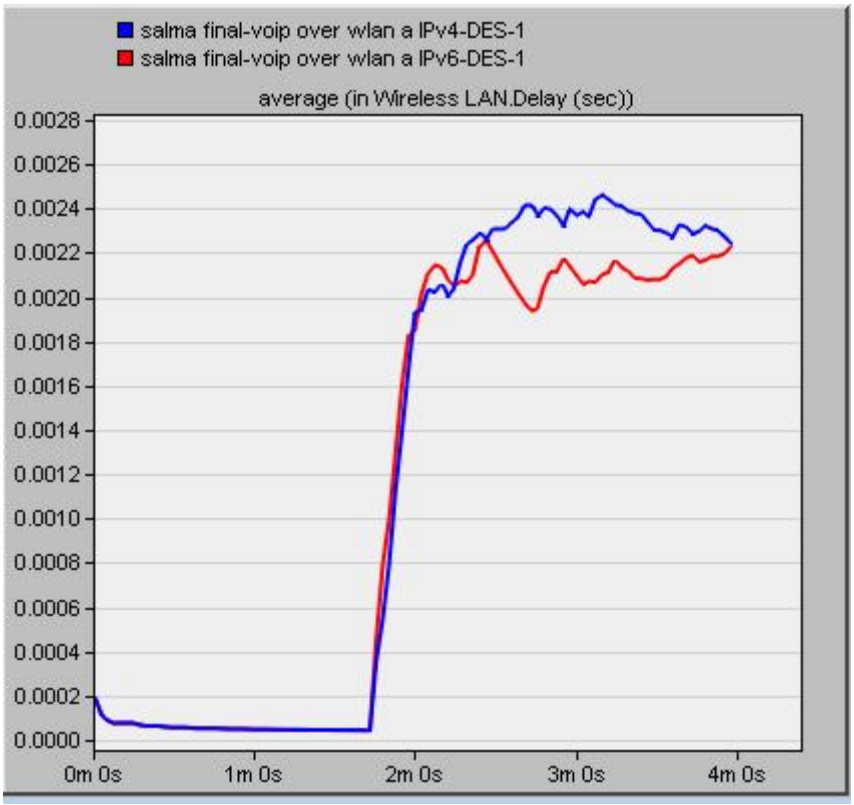


Figure (4.7) delay 802.11a_ipv4, 6

On the other hand, **In Figure (4.8)** shows that IPv6 have also more delay than IPv4 based on release IEEE802.11 n .So, from the previous delay comparison IPv4 and IPv6 based on IEEE802.11 a, n there in large different between them, IPv4 in beater for real time applications.

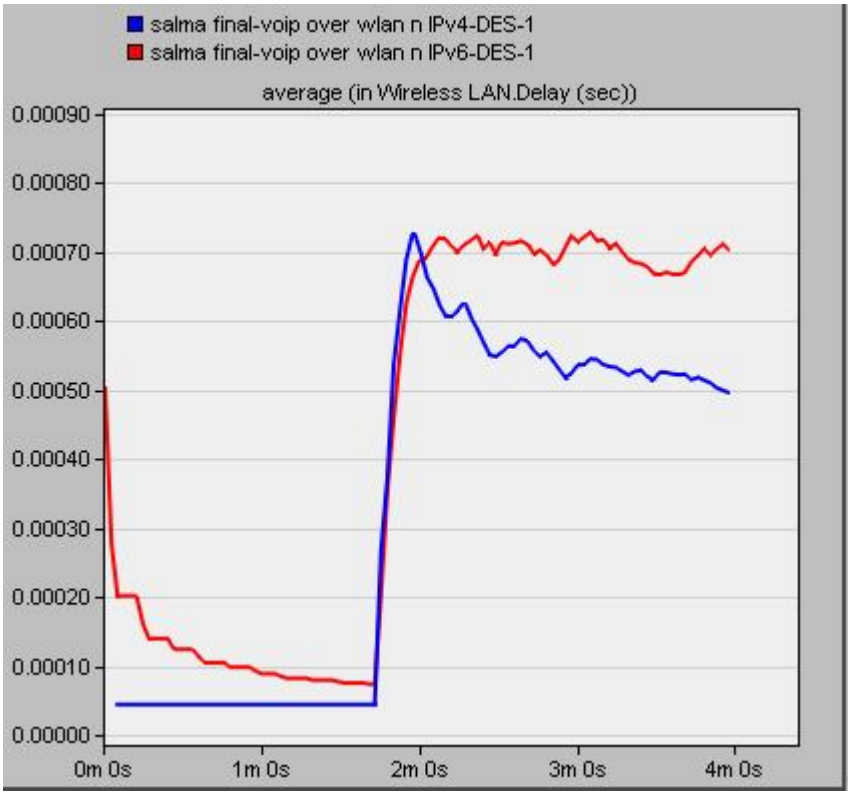
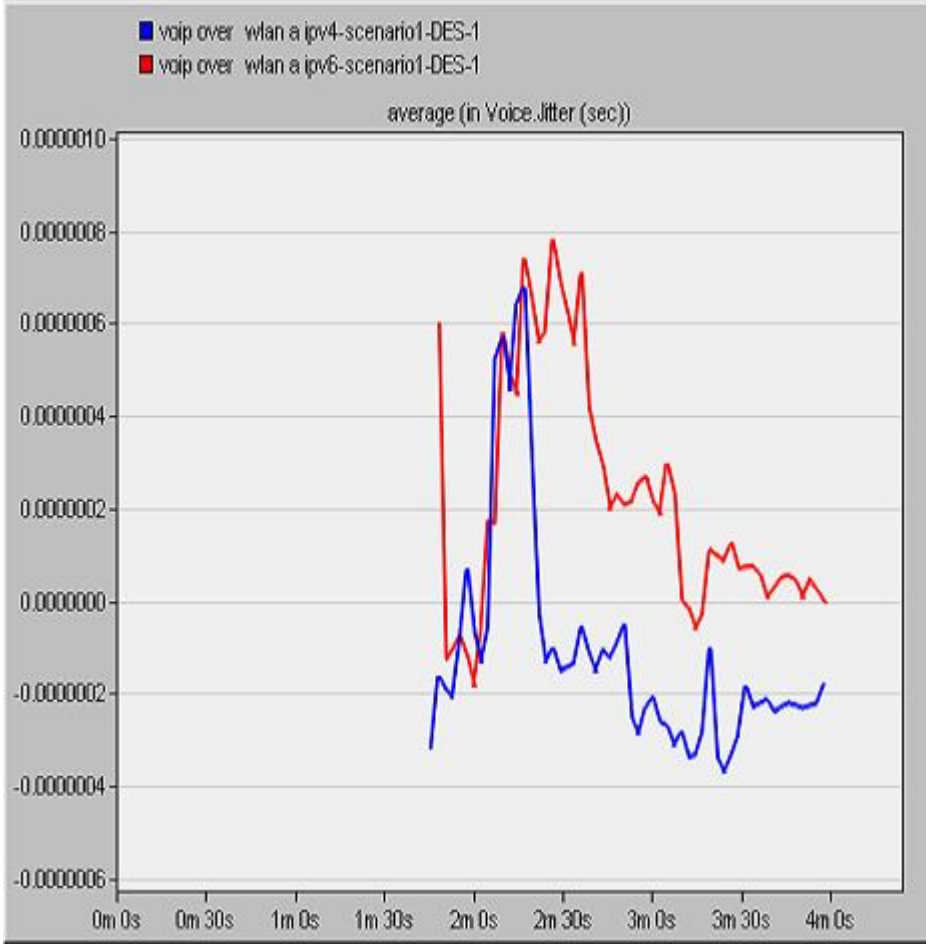


Figure (4.8) delay 802.11n_ipv4, 6

4.4 Jitter

4.4.1 Jitter in Small Network

In **Figure (4.9)** shows that IPv6 have the highest jitter compared to IPv4 according to release IEEE802.11 a. So IPv4 is beater for real time applications .



Figure(4.9) Jitter 802.11a_ipv4, 6

On the otherhand, in **Figure (4.10)** shows same results that IPv6 have the highest jitter compared to IPv4 according to release IEEE802.11 n, So IPv4 is beater for real time applications .

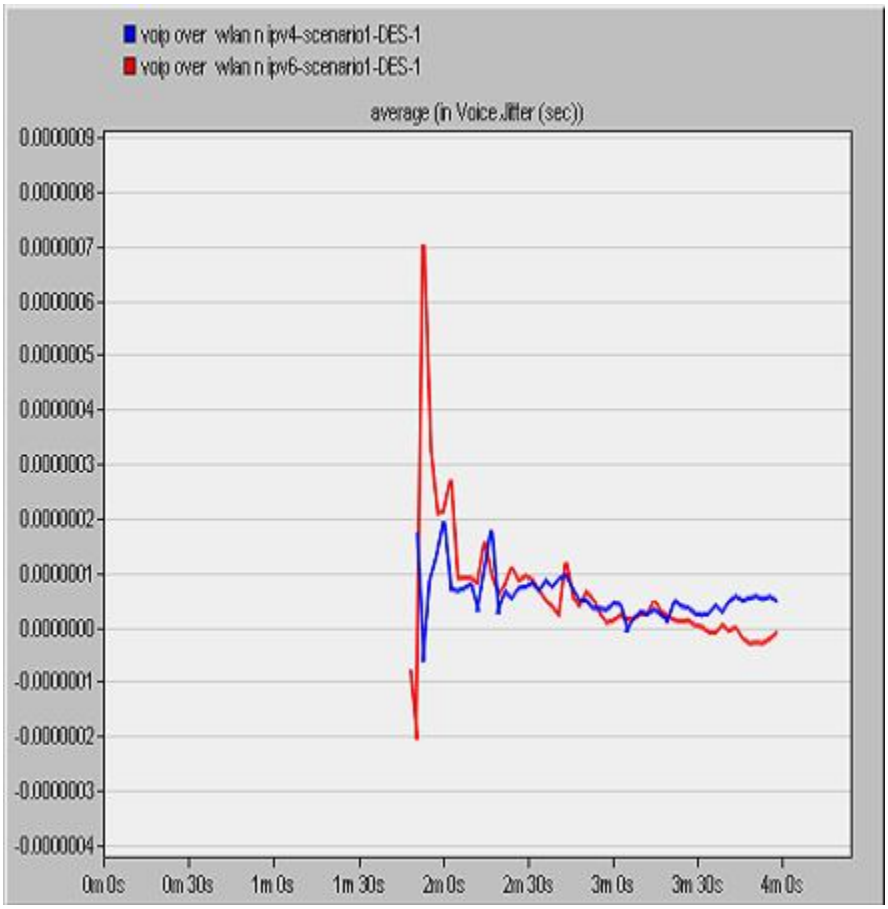


Figure (4.10) Jitter 802.11 n_ipv4, 6

4.4.2 Jitter In Large Network

in **Figure (4.11)** shows that IPv6 have the highest jitter compared to IPv4 according to release IEEE802.11 a. So IPv4 is beater for real time applications and IPv4 also have a little stable than IPv6.

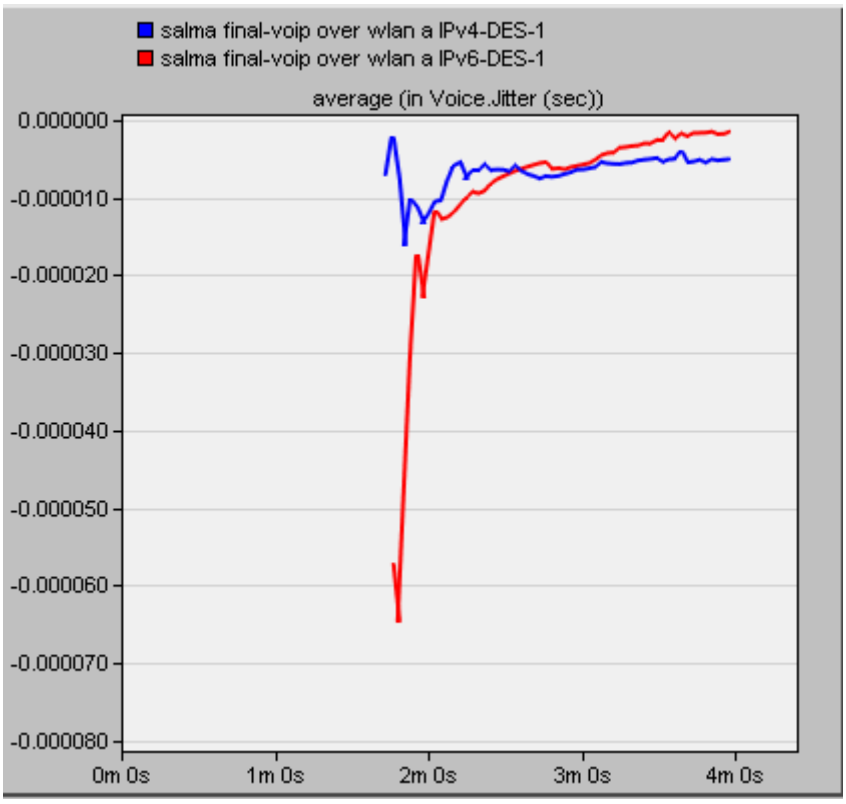


Figure (4.11) Jitter a_ipv4, 6

On the other hand, in **Figure (4.12)** shows that IPv4 have the highest jitter compared to IPv6 according to release IEEE802.11 n, So IPv6 is beater for real time applications.

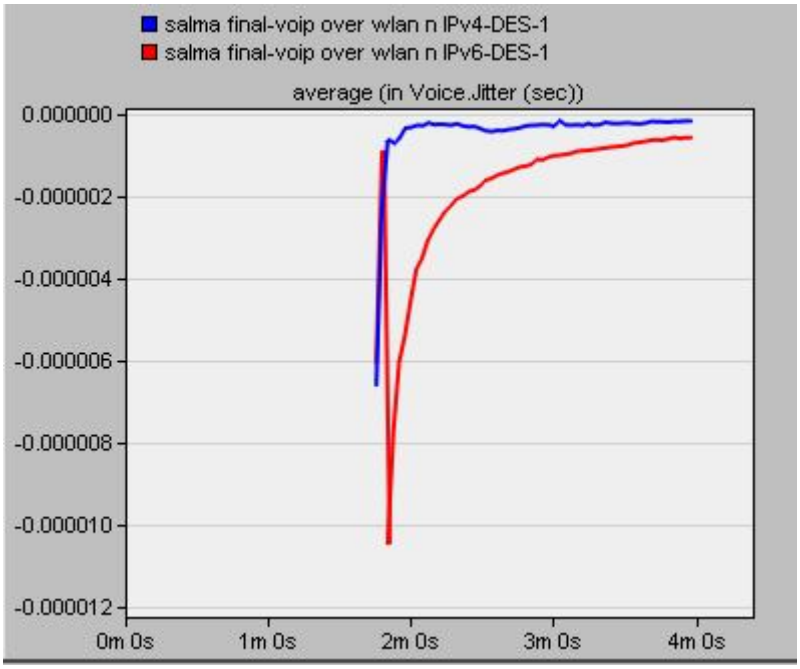


Figure (4.12) Jitter 802.11n_ipv4, 6

- **Summary**
- In small network :
  - **Table (4.1): Summarization 802.11 a IPv4, 6**

Qos Parameters	802.11 a IPv4	802.11a IPv6
Jitter	Lowest	Highest
Delay	Lowest	Highest
Throughput	Highest	Lowest

- In large network:
  - **Table (4.2): Summarization 802.11 a IPv4, 6**

Qos Parameters	802.11 a IPv4	802.11a IPv6
Jitter	Lowest	Highest
Delay	Highest	Lowest
Throughput	Highest	Lowest

- From **table(4.1)**and **table(4.2)** noticed that if the number of nodes increases in large network the delay increases in 802.11a because more amounts of data is transmitting in the same time , and the Throughput increase on both ipv4,6 and jitter is also increase in ipv4,6 network. In 802.11a ipv6 the delay is fair more than in ipv4 802.11a.
- So it has been noticed that the ipv4 is better for real time applications when our concern in throughput more than ipv6 in 802.11a. and ipv6 better in delay than ipv4 more acceptable and jitter in ipv4.

- In small network :
  - **Table (4.3): Summarization 802.11 n IPv4, 6**

Qos Parameters	802.11n IPv4	802.11n IPv6
Jitter	Lowest	Highest
Delay	Lowest	Highest
Throughput	Lowest	Highest

- In large network:
  - **Table (4.4): Summarization 802.11 n IPv4, 6**

Qos Parameters	802.11n IPv4	802.11n IPv6
Jitter	Highest	Lowest
Delay	Lowest	Highest
Throughput	Lowest	Highest

- From **table (4.3)** and **table (4.4)** noticed that if the number of nodes increases in large network the jitter increases in 802.11n ipv4 because more data is transmitting in the same time. , and the Throughput increase and delay increase in ipv4 network and so in 802.11 n ipv6 with smaller jitter on it.
- So it has been noticed that the ipv6 is better for real time applications 802.11

n ipv6 more throughput and the delay more stable, smaller jitter.