

Introduction

The use of IP addressing is an integral part to any network, no network can work within IP addressing. This study was designed to pen the two versions of IP addressing (IPv4 and IPv6) against one another, this is necessary due to the limitations within IPv4. Due to a lack of address spacing a new Internet protocol is required to upgrade from the outdated IPv4 [1]. To accomplish this comparison a simulation was utilized, network designs along with traffic were implemented into a simulation to gather accurate and reliable results to determine which protocol had the best performance.

Aims and Objectives

Aim

To compare the Performance of IPv4 and IPv6.

Objectives

- Compare the performance of IPv4 and v6 using simulation software.
- Research how other aspects of IPv4 and v6 can effect performance.
- Compare the results found in this study to that of other studies to get more accurate results.

During this experiment there were some changes made to the original objectives. The change was made due to issues that were faced during the project which made the final objective (Come to final conclusion on which protocol is superior) not possible.

Experiment

Experiment Breakdown

- Used the simulation software Riverbed Modeler Academic Edition to run experiment
- Three network designs were implemented to the simulation software, the designs are a small network an enterprise network and a enterprise network connected to a secondary network via a wide area network (WAN). The small network can be seen in figure 1 as an example
- The enterprise networks simulated over 1000 devices and utilized multiple routers to simulate to an internet service provider.

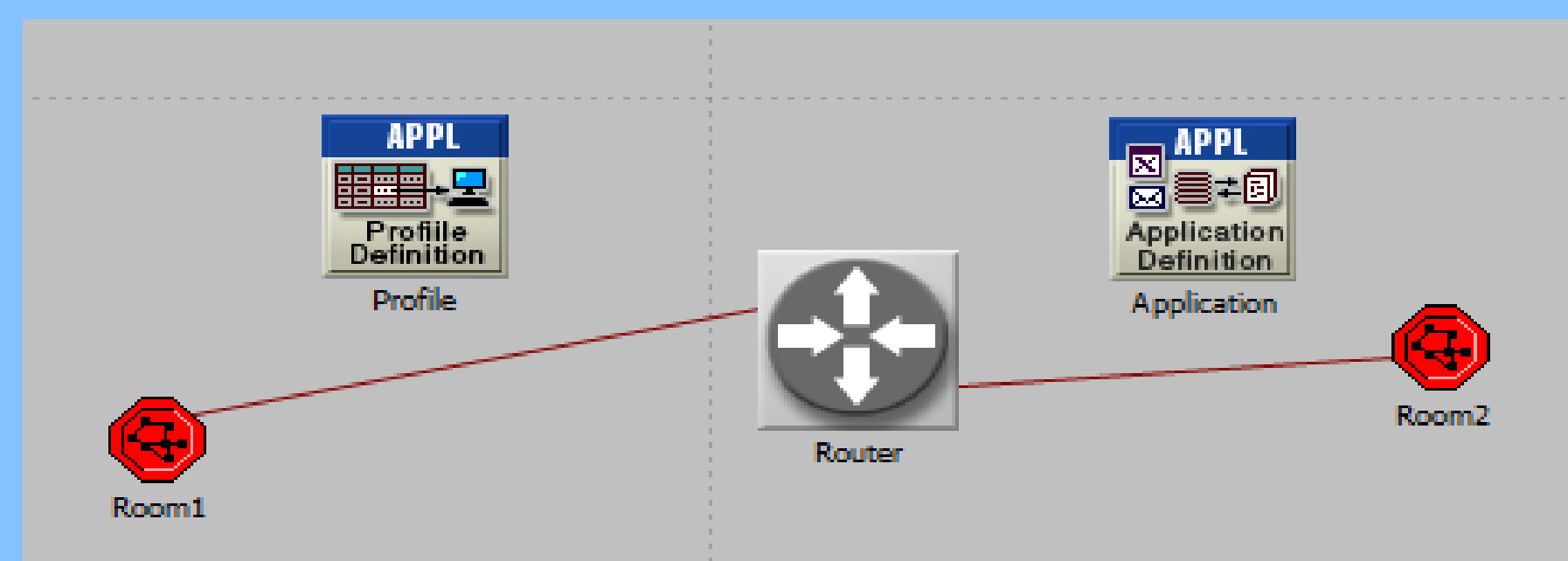


Figure 1—Example of Small Network

- The third network which connects two networks via a WAN simulates over 1000 devices, but also a smaller secondary network which simulates 10 devices.
- The connections throughout this experiment were 1GB/s links
- Four traffic types were implemented, these were TCP, HTTP, Voice and Video Traffic. These were all implemented at the same time within the network.
- The metrics used within the results were throughput, utilization and packet loss.
- Experiment was run using two different scenarios, the first with IPv4 the second with IPv6.

Findings and Conclusion

- The results from the small network showed that IPv6 performed slightly better in throughput and utilization, packet loss remained at zero due to limitations with software. Please see figure 2.

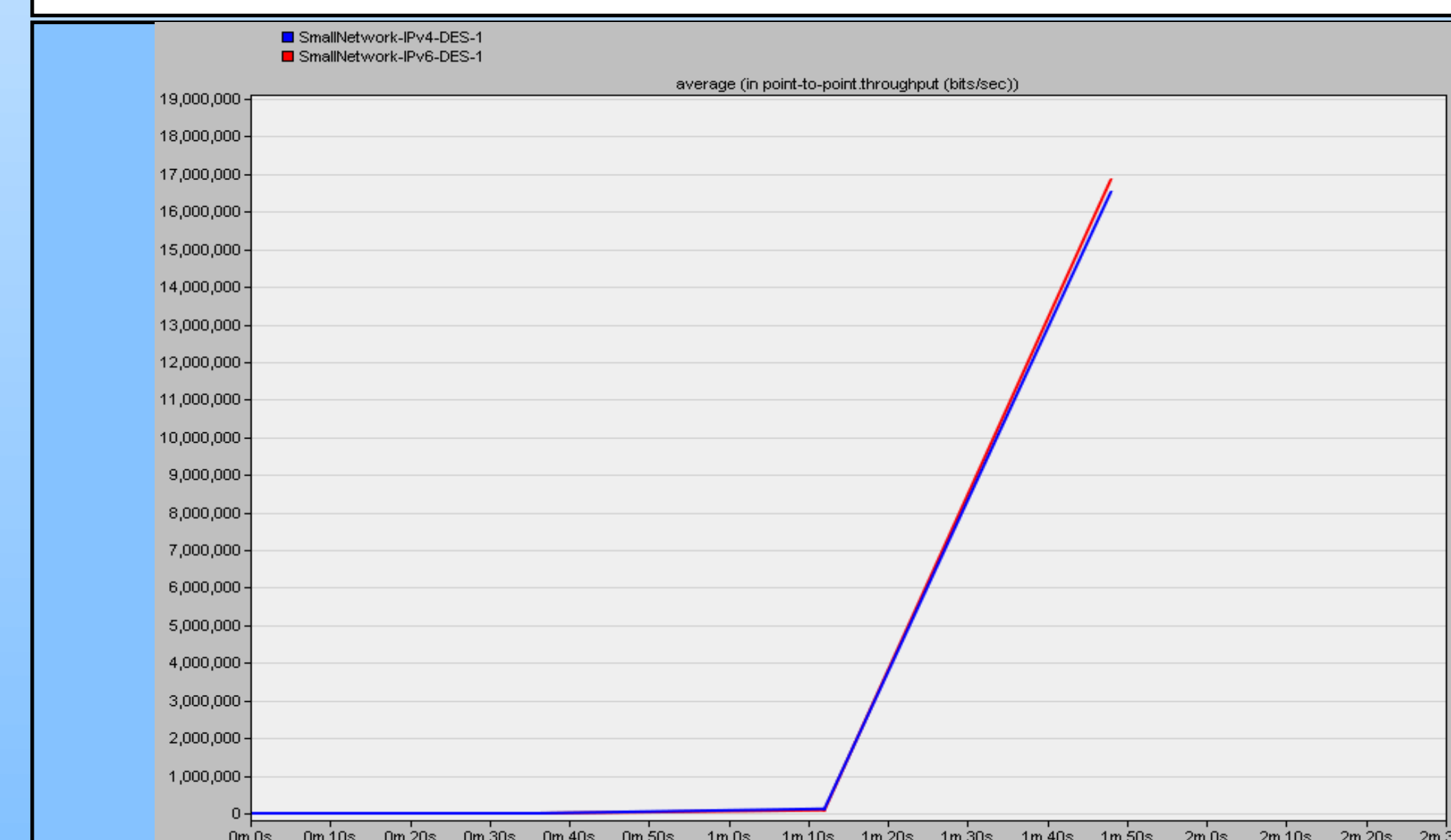


Figure 2—Example of small network results

- The enterprise network had a similar result to the smaller network, IPv6 had the better performance with increases of up to 15% with throughput and utilization. Packet loss was once again zero.
- The final simulation had drastically different results to the previous tests, there were massive bottle necks within the network when IPv6 was being deployed. The bottle necks meant that IPv4 was over 1000 time faster than IPv6.

Conclusion

To conclude from the results that were discovered during this experiment, although in some cases IPv6 seems to have the better results more testing is still required due to issues faced during the final network implementation.

References

- [1] R. Shanmugam, R. Padmini and S. Nivedita, Special Edition Using TCP/IP, Que, 2013.
- [2] Riverbed, "What are the restrictions for Riverbed Modeler Academic Edition 17.5?," Riverbed, 16 11 2015. [Online]. Available: <https://supportkb.riverbed.com/support/index?page=content&id=S24443>.