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Data traffic on computer networks is growing fast with new variety of traffic, as video and voice are sent over the networks that were originally designed to carry data only. In order to keep up with the ever growing network traffic, more powerful network devices, such as routers, switches and cables with higher bandwidth are developed constantly and these are replaced with the out-dated network devices just changing the hardware is not enough to ensure that the networks are at their optimal performance. Traffic between networks is normally guided by routers, which are network devices that send network traffic between different networks. These routers must somehow know which network traffic received is destined for. The information routers use to make routing decisions can either be provided to them by network administrators or the routers can learn it themselves by using routing protocols. Among other things such as using quality of service to optimizing network performance, choosing an appropriate routing protocol is absolutely essential as this will increase speed of data delivery in the network and reduce traffic on the network at the same time.

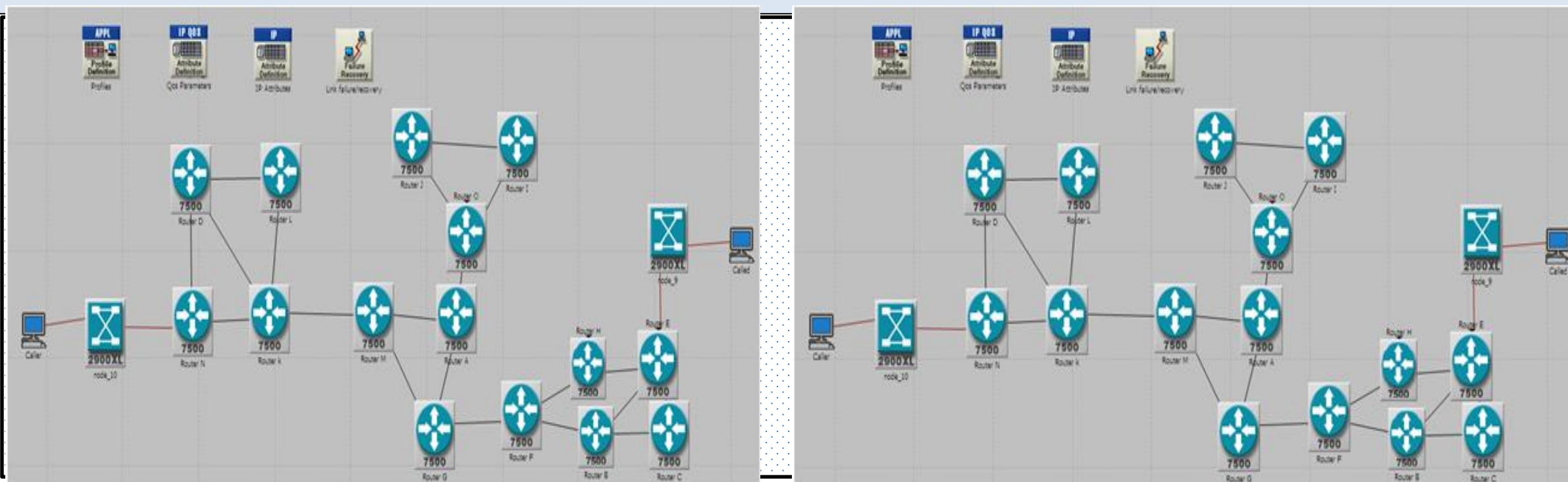


Figure 2 – Large Network

Chapter 2: Both the routing protocol is simulated using Opnet Modular. Both the routing protocols are simulated to a small and large network and check the result of different parameters including using different graph and comparison tables. Convergence and re-convergence time, Jitter, End to End delay, Throughput Traffic data. The goal of this project is to compare and analyse the performance of two IP routing protocols through simulation. These protocols are Enhanced Interior Gateway Routing Protocol (EIGRP), and Open Shortest Path First (OSPF). Using [OPNET](#) Modeler, each routing protocol will be simulated in both large and small IP networks. Two similar small networks and two large networks will be simulated in OpnetModeler. Then one small and one large network will be setup with EIGRP and vice versa will be done with OSPF. The type of traffic that will be used during the simulation will be voice.

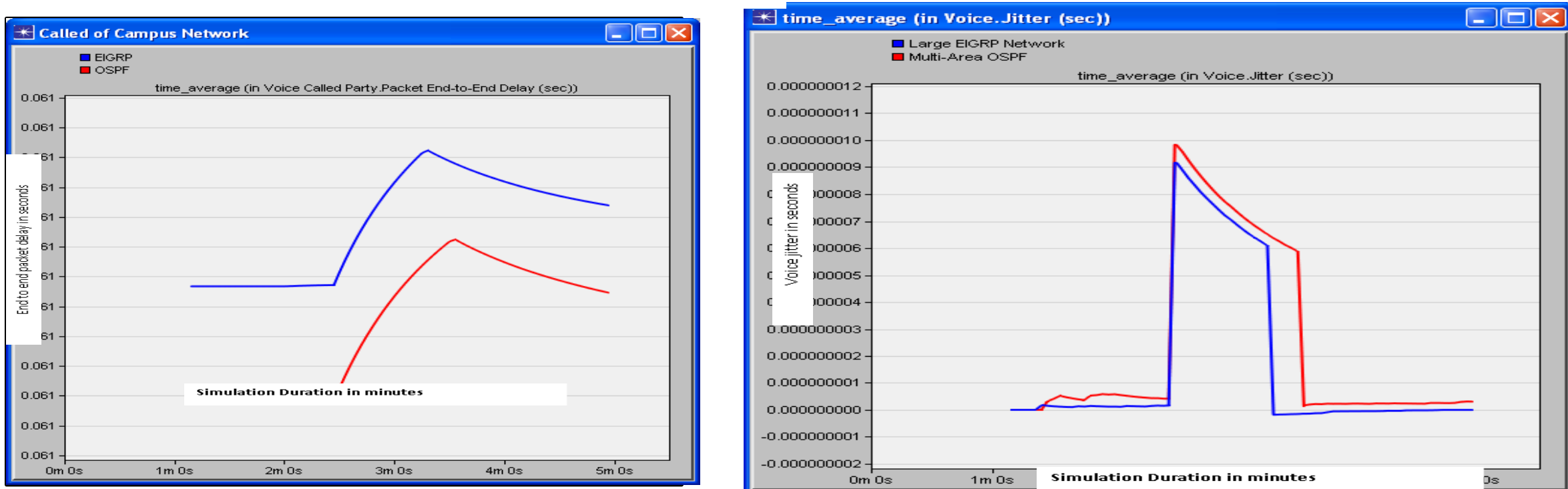
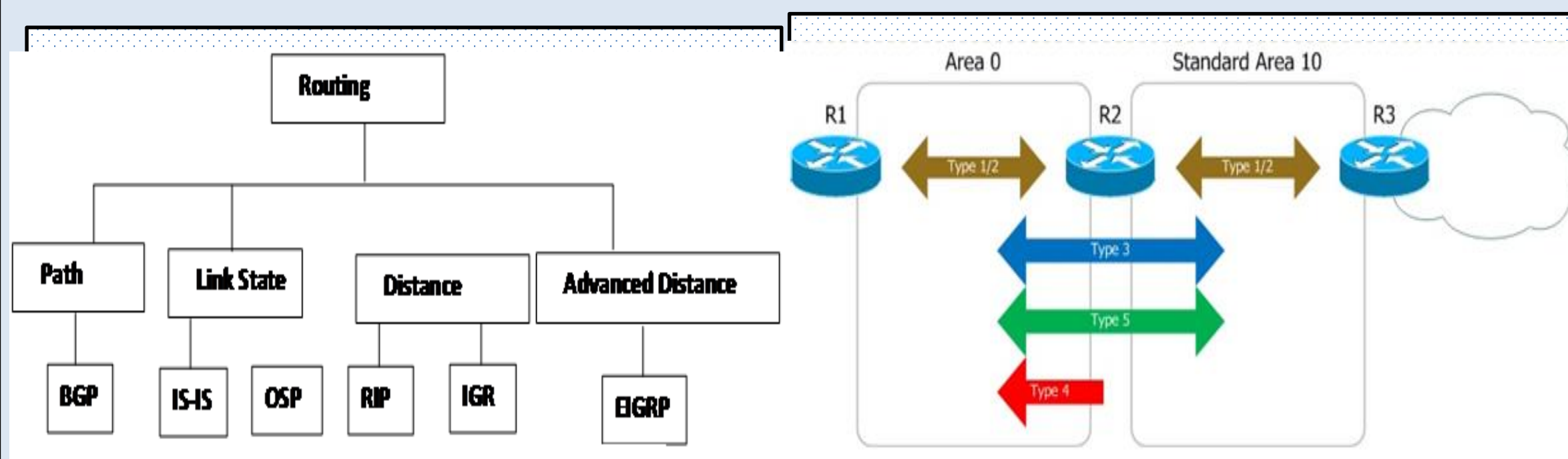


Figure 4 – Simulation duration in minutes

Conclusion / Future Work: To conclude, it has been proven that EIGRP has better performance than OSPF overall in this experiment, in terms of the factors used, which were convergence, re-convergence, throughput, Jitter and End to end delay. Nevertheless it is important to note that OSPF has a design that is more suited to large networks, because of its hierarchical design using Areas. EIGRP does use autonomous systems and summarisation, but it still does not make one think about the hierarchical design of the network, which OSPF has by default. EIGRP in the other hand is easier than OSPF to configure, as normally, all it takes is to add the router on the network and configure EIGRP on it. For a small to medium network EIGRP would be fine, however for large networks, it

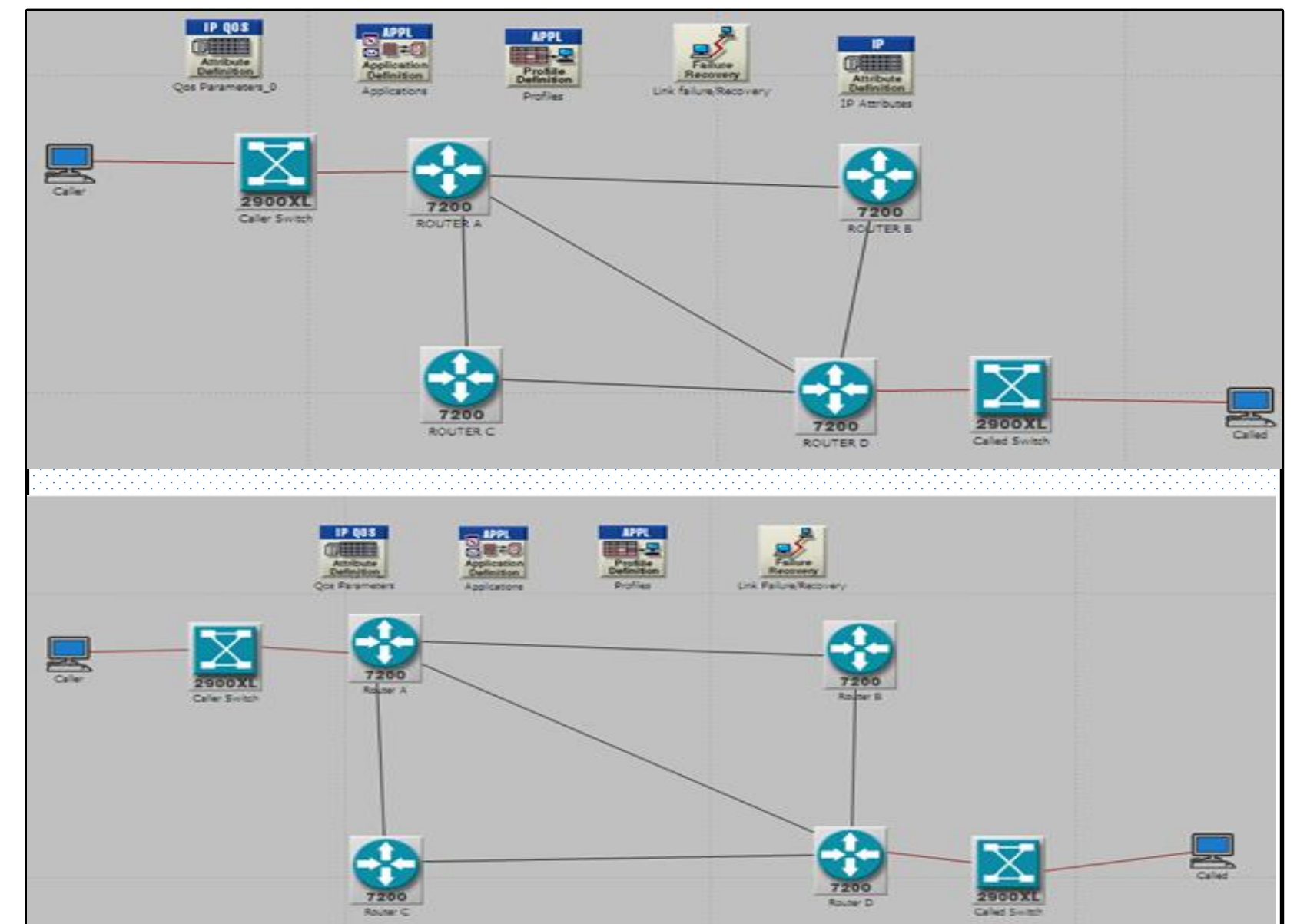
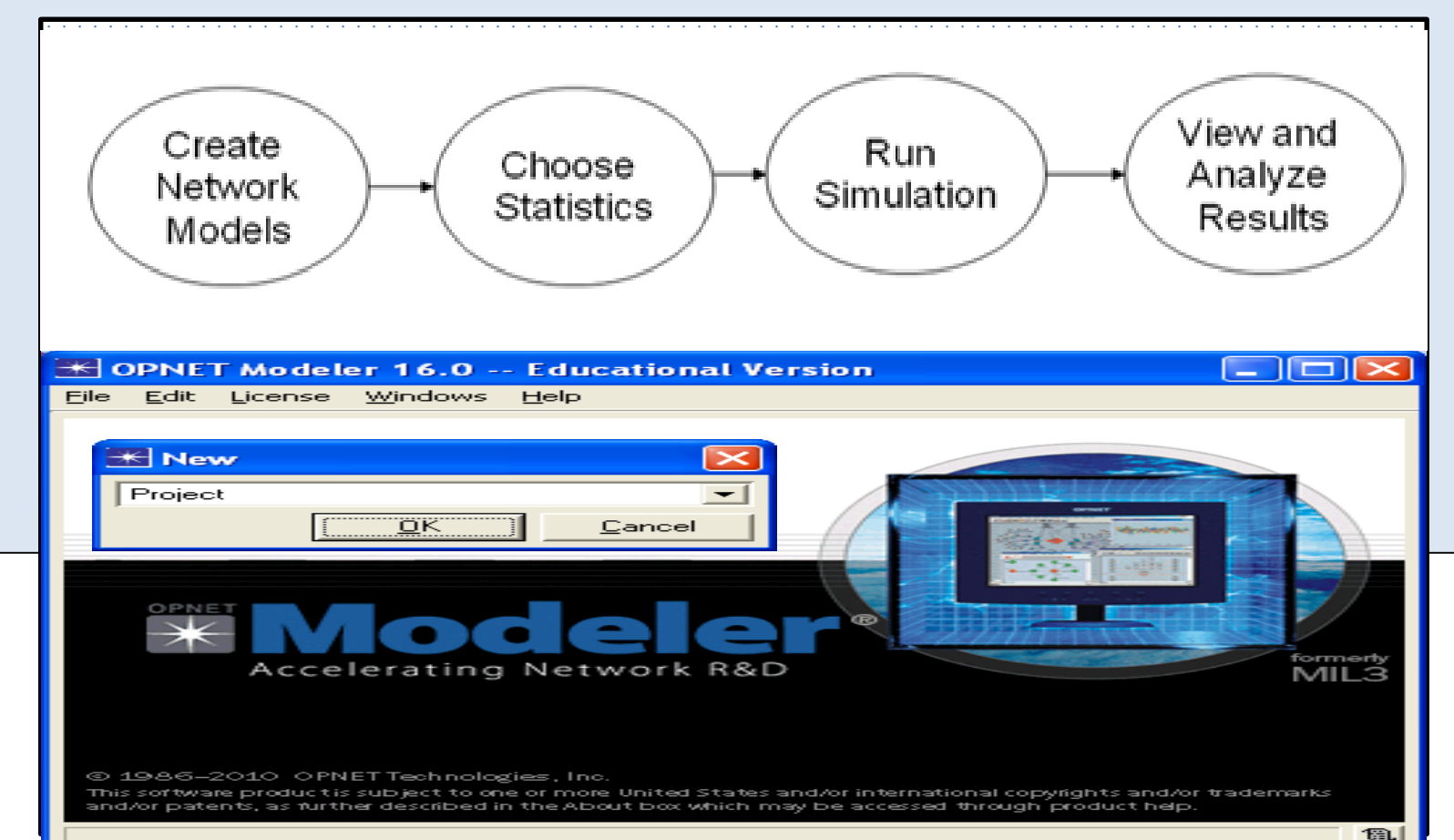


Figure 1 – Small Network

Chapter 1: This project investigates which of the two most popular interior routing protocols, OSPF and EIGRP performs better in both small and large networks. The routing protocols are simulated using OPNET Modular and voice has been used in order to model traffic in the networks. Using [OPNET](#) Modeler, each routing protocol will be simulated in both large and small IP networks. Two similar small networks and two large networks will be simulated in Opnet Modeler. Then one small and one large network will be setup with EIGRP and vice versa will be done with OSPF. The type of traffic that will be used during the simulation will be voice.



Chapter 3: Opnet modeler is highly optimized simulation software developed and maintained by a company called Opnet. It is based on C and C++ and the simulation in Opnet is done at the packet level. It also has a huge library of models of networks and protocols used in real life networks. It provides graphical user interface and it is discrete based simulation. There are different editions of Opnet software and the one that will be used for this project is OpnetModeler version 16. This was chosen because it offers the most comprehensive libraries required for the routing protocols simulated for this project. Opnet was chosen as the simulation software for this project, because NS3 was eliminated as it is still under development and it could not be relied on as this project has a deadline and it was important to find suitable simulation software that was well tested.

