

CS 576 Computer Networks and Distributed Systems

Course Materials

Video Tutorials for Computer Network Simulation

Installing and Using Riverbed Modeler Software

Lab Instruction of Performance Evaluation of CSMA Network Access Protocols

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Executive Summary

These course materials are designed to provide computer network simulation training for Computer Science students enrolled in “CS 576 Computer Networks and Distributed Systems” at San Diego State University. It is also open to anyone who is interested in learning computer network simulation and performance evaluation. It is composed of seven video tutorials of installing and using Riverbed Modeler software (former Opnet IT Guru), one of the most powerful and popular network simulation software programs widely used in industry and academia. Fig 1 illustrates the basic usage and a typical scenario running the simulation software.



Fig 1. The Riverbed Software Program for Computer Networks Protocol Simulation and Performance Evaluation.

Video Tutorials

All the video tutorials of this training material are publically available via URL links. Please click the links and watch tutorials accordingly.

Video Tutorial 1

Riverbed Modeler (Former Opnet It Guru) Installation

Accessible URL Link:

[http://video.sdsu.edu/nas/capture/2015/wwang/Opnet It Guru %28Riverbed Modeler%29 Installation/Opnet It Guru %28Riverbed Modeler%29 Installation - 20150226 141102 6.html](http://video.sdsu.edu/nas/capture/2015/wwang/Opnet%20It%20Guru%20Riverbed%20Modeler%29%20Installation/Opnet%20It%20Guru%20Riverbed%20Modeler%29%20Installation%2020150226%20141102%206.html)

Description:

This video tutorial provides information of where to download the Riverbed Modeler, how to register the user, getting the educational license, etc. Then you will be brought to a link to download the installation file. Start installation and follow the tutorial to finish installation. Figure 2 shows an screen shot of the installation page.

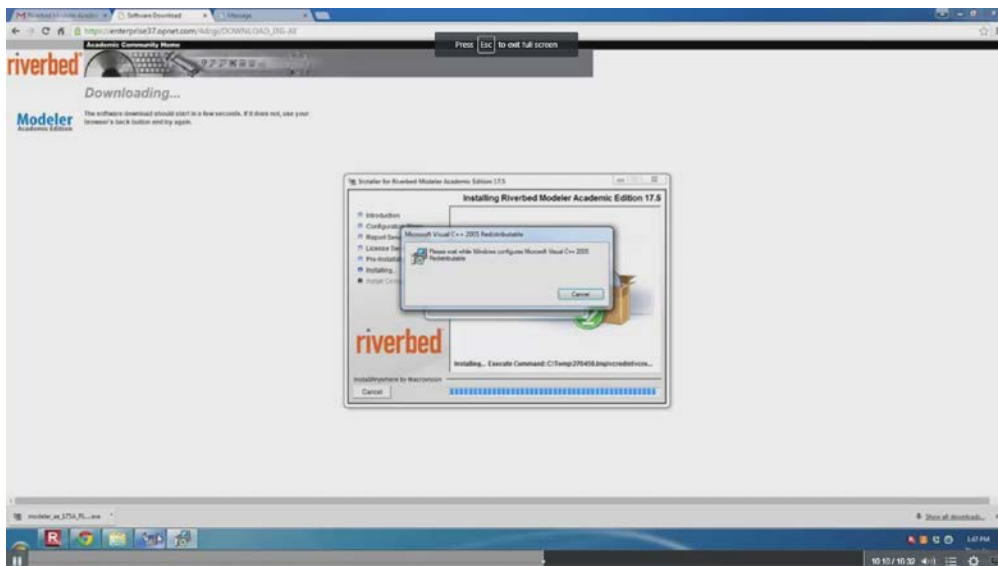


Fig 2. Installation of Riverbed Modeler in Progress.

Video Tutorial 2

Riverbed Modeler (Former Opnet IT Guru) Configuration

Accessible URL Link:

[http://video.sdsu.edu/nas/capture/2015/wwang/Riverbed Modeler %28Former Opnet IT Guru%29 Configurat/Riverbed Modeler %28Former Opnet IT Guru%29 Configurat - 20150226 145704 6.html](http://video.sdsu.edu/nas/capture/2015/wwang/Riverbed%20Modeler%20Former%20Opnet%20IT%20Guru%29%20Configurat/Riverbed%20Modeler%20Former%20Opnet%20IT%20Guru%29%20Configurat-20150226_145704_6.html)

Description:

This video tutorial tells you how to perform proper configuration of the Riverbed Modeler software. Once the software is installed, prior to the first time use, many system parameters need to be configured correctly, such as the educational license and folder directories. Figure 3 shows one of the configuration page of Riverbed Modeler.

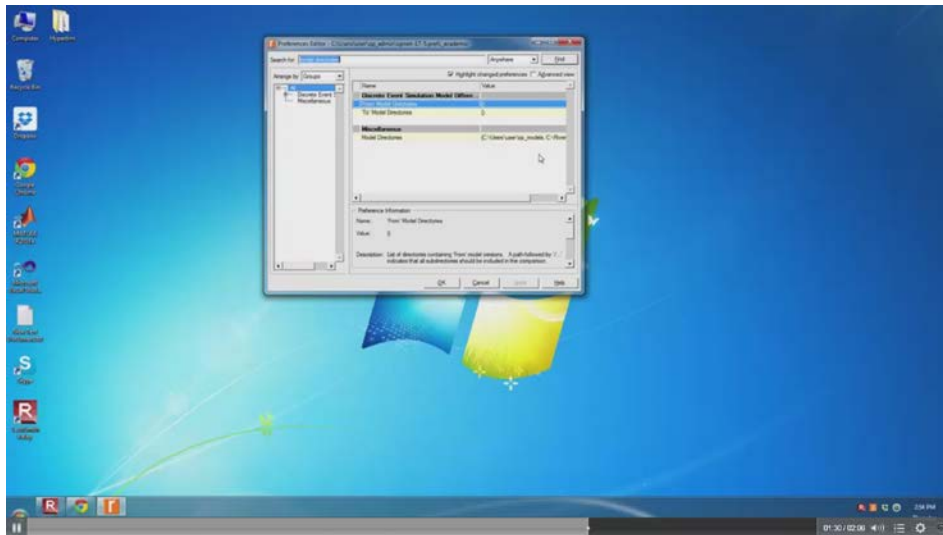


Fig 3. Configuration of Riverbed Modeler Software.

Video Tutorials 3 and 4

Ethernet Simulation

Video Tutorial 3. Lab1 Simulation Ethernet using Riverbed (Opnet) - Part 1:

Accessible URL Link:

http://video.sdsu.edu/nas/capture/2015/wwang/Lab1_Simulation_Ethernet_using_Riverbed_%28Opnet%29/Lab1_Simulation_Ethernet_using_Riverbed_%28Opnet%29_-_20150226_162644_6.html

Video Tutorial 4. Lab1 Simulation Ethernet using Riverbed (Opnet) - Part 2:

Accessible URL Link:

http://video.sdsu.edu/nas/capture/2015/wwang/Lab1_Simulation_Ethernet_using_Riverbed_%28Opnet%29_-_20150226_164347_6.html

Description:

In these two tutorials we create a simulation scenario of a simple Carrier Sense Multiple Access (CSMA) network with Collision Detection (CD) technology. This is equivalent to an IEEE 802.3 Ethernet. Figure 4 shows the scenario setup. In this simulation scenario we will perform configuration of the network topology and setup the traffic pattern of each individual node (i.e. station, or computer). Then we will run simulation, collect results and analyze the throughput results. Figure 5 shows the page of displaying simulation results.

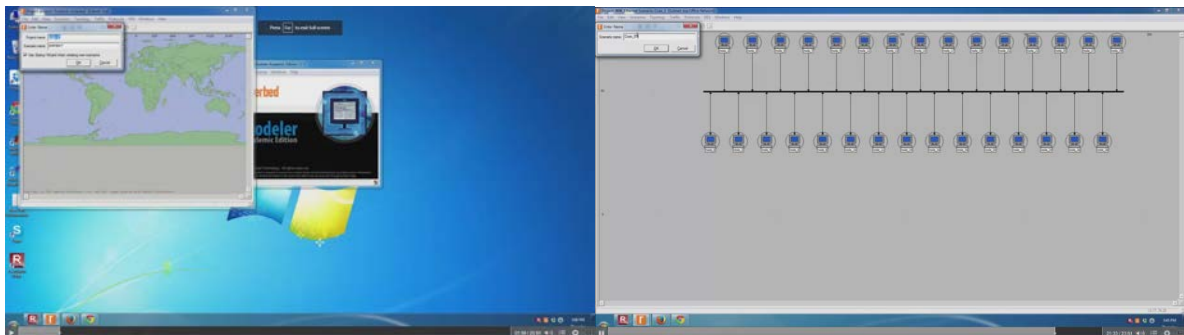


Fig 4. Create A New Simulation Scenario in Riverbed Modeler: A Simple Interconnected Network with Multiple Stations.

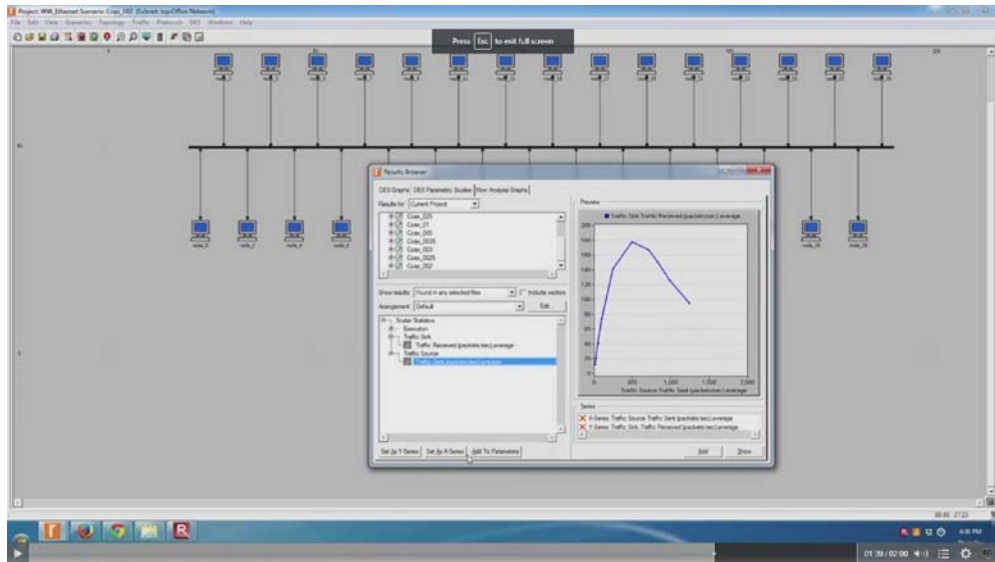


Fig 5. Performance Evaluation of The Simulation Scenario in Riverbed Modeler: A Simple Interconnected Network with Multiple Stations.

Video Tutorials 5, 6 and 7

Answers to Exercise Questions

Performance Evaluation of Various Traffic Rates, Diverse Numbers of Stations, and Different Packet Sizes (Instructor and Teaching Assistant Only)

Video Tutorial 5. Various Traffic Rates – Answers for Questions for Q2:

Accessible URL Link:

http://video.sdsu.edu/nas/capture/2015/wwang/Lab1_Q2_Simulation_Answer/Lab1_Q2_Simulation_Answer_-_20150227_103818_6.html

Video Tutorial 6. Various Numbers of Stations – Answers for Questions for Q3:

Accessible URL Link:

http://video.sdsu.edu/nas/capture/2015/wwang/Lab1_Q3_Simulation_Answer/Lab1_Q3_Simulation_Answer_-_20150227_104603_6.html

Video Tutorial 7. Various Packet Sizes – Answers for Questions for Q4:

Accessible URL Link:

http://video.sdsu.edu/nas/capture/2015/wwang/Lab1_Q4_Simulation_Answer/Lab1_Q4_Simulation_Answer_-_20150227_142323_6.html

Description:

These three video tutorials are exclusive Instructor and Teaching Assistant materials. Students are required to finish the required simulation and answer the exercise questions (Q2, Q3 and Q4) independently. These tutorials illustrate how to duplicate simulation scenarios and change or modify the configurations, instead of creating new scenarios from scratch. You will see how to change data traffic rate, modify the number of stations or adjust the packet size in these scenarios. Figure 6 shows an example of modifying the number of stations. You will also see how to select different display methods to visualize the simulation results, such as using time-average to smooth the performance curves.

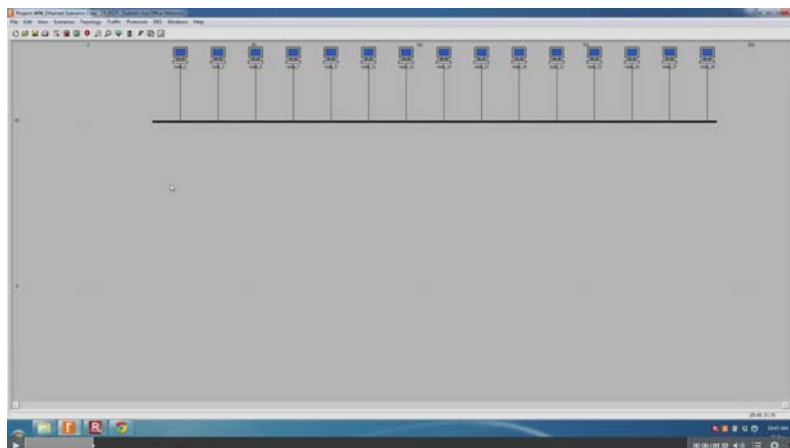


Fig 6. Duplicate and Modify the Simulation Scenario with Various Numbers of Stations.