

E REDES MULTISERVIÇO – 2019/20

Practical Evaluation # 2 – QoS

OBJECTIVES

- Understand the Diffserv architecture and apply the concepts of this technology;
- Evaluate the PQ and WFQ scheduling algorithms and make critical analysis of the results obtained

INTRODUCTION

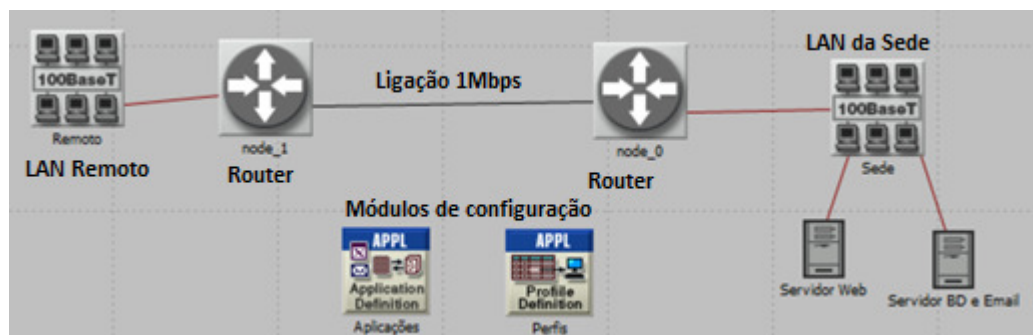
We intend to study the effect of the QoS Diffserv architecture and the PQ and WFQ scheduling algorithms in a situation of congestion of the connections and assess their ability to differentiate the treatment given to different applications.

Students should draw up a report where they display the main results and draw conclusions from them. This report should be submitted on the Moodle platform.

In this work we will use RIVERBED MODELER to simulate a two-Lan interconnection scenario with a QoS management in a multi-service environment. You can use the software on your personal computers (https://cms-api.riverbed.com/portal/community_home - about 600MB!)

EXERCISES

1. Download the available files in Moodle and export them to the board "C:\Program Files\Riverbed EDU\17.5.A\models" which was created on your PC by installing the software.
2. Through the Riverbed Modeler Academic Simulator, open the file "AulaQos201920". You will have access to a model that has already implemented the study scenarios of this practical work.
3. The network scenario consists of two LANs of 32 users (remote and Headquarters) connected by a dedicated 1Mbps symmetric circuit as shown in the following figure:



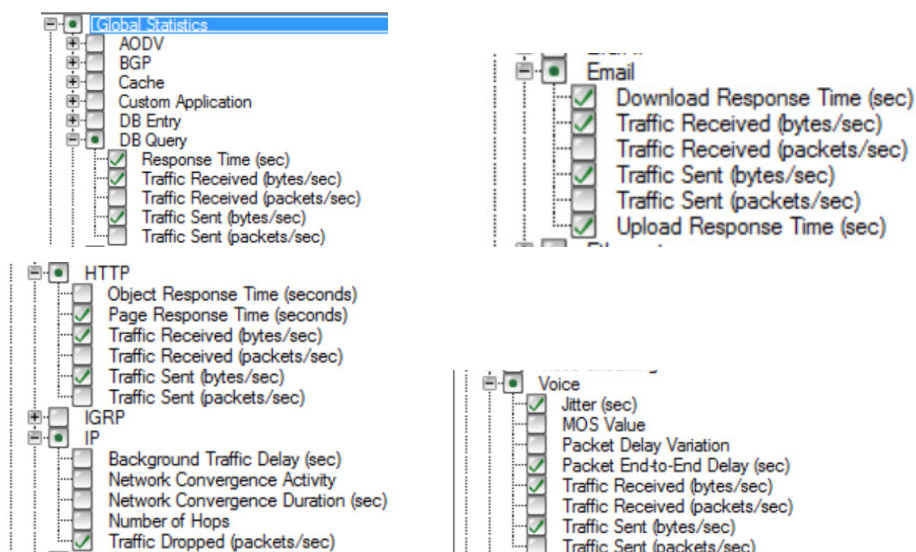
4. Users of each LAN will generate traffic from 4 applications: VoIP, Internet browsing, e-mail and database. In the simulator there are modules to create and configure the behaviour of applications. There is also a profiles module in which we define the user usage pattern in each application. In the model provided, both modules have been previously configured.

E REDES MULTISERVIÇO – 2019/20

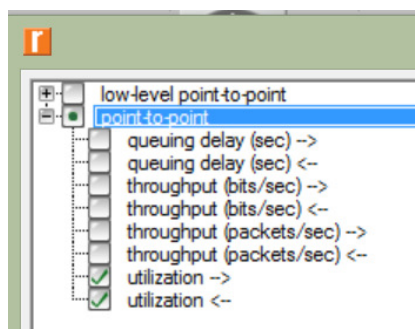
- 4 applications: VoIP, HTTP Image Browsing, High Load Email and Medium Load database;
- All users of the two LAN 's have the same usage profile following typical usage patterns of each application.

5. Selection of elements for collecting statistics (already done in the model):

The following QoS parameters have been selected for the simulation results collection:



- The occupation of the circuit is also being analysed:



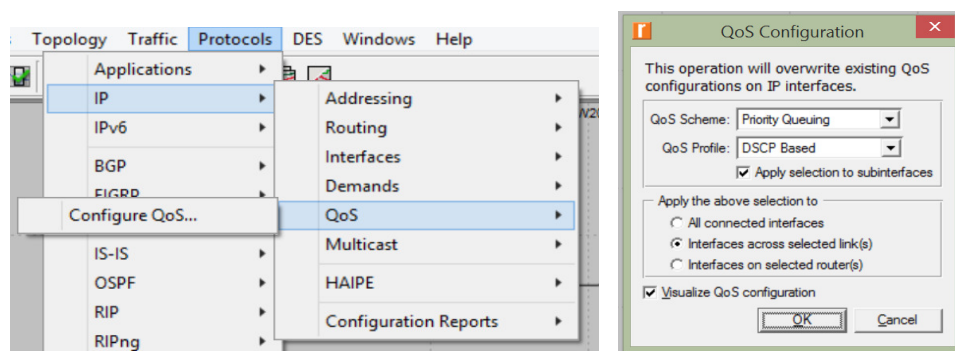
6. Simulation of network behavior without QoS (Best Effort)

- Select the "SemQoS" scenario where there is no QoS on the network. Run a simulation by putting in the time parameter 10 minutes (this will not be reached because the free version has a limit of events that will be reached before);
- (Question for report) Register and analyze the results obtained. For each application, indicate whether it would behave acceptable in view of the QoS requirements.

E REDES MULTISERVIÇO – 2019/20

7. Diffserv QoS with PQ Simulation

- a. To use the Diffserv architecture, go to the "DiffServ PQ" scenario. Note that in this scenario there is a new "QoS" module where the quality of service parameters are configured. The teacher has already made this configuration as below will be described.
- b. For the application of the Diffserv architecture in the network, the packages were previously classified with a Diffserv Code Point (DSCP):
 - i. For the voice was chosen the DSCP EF – Expedited Forwarding
 - ii. For HTTP, the DSCP AF11
 - iii. For E-mail, the AF21
 - iv. For database traffic , the AF41
- c. The prioritization order that is configured, from the most priority to the least priority, is: EF-> AF41-> AF21-> AF11.
- d. For Routers to apply a scheduling algorithm according to the Diffserv markup, we will click on the connection circuit and, in the top menu bar, access to Protocols-> IP-> QoS-> Configure QoS
- e. Select the "Priority Queueing" and "DSCP Based" options :



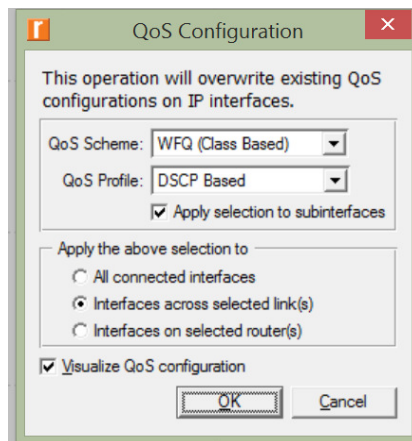
- f. Notice that the circuit has changed color; If it has not changed it is because you did not have the selected circuit when enabling QoS;
- g. Make new simulation and analyze results.
- h. (Question for report) Register and analyze the results obtained. For each application, indicate whether it would behave acceptable in view of the QoS requirements.

8. QoS Diffserv with WFQ Simulation

- a. For this simulation, the DSCP used in the PQ scenario were maintained.
- b. Weights that are set up in WFQ are:
 - i. AF11 – Weight of 5
 - ii. AF21 – Weight of 10
 - iii. AF41 – Weight of 25
 - iv. EF – Weight 55

E REDES MULTISERVIÇO – 2019/20

- c. Change to the "DiffServ WFQ" scenario and configure QoS for DSCP-based WFQ:



- d. Do the simulation and analyze the results obtained.
- e. (Question for report) Register and analyze the results obtained. For each application, indicate whether it would behave acceptable in view of the QoS requirements.

9. Global analysis (Questions for report)

- What would be the most favorable scenario for each of the four applications? In the answer indicate if you consider the results consistent with the ordering of applications in the escalation method used.
- Present an evidence of the existence of admission Control (policing and/or traffic shapping) in each of the three scenarios. You can use the results of packages sent and received for each application, the IP-> Traffic Dropped and the occupation of the circuit.
- Justify the result of the BD application in the PQ scenario with the operation of this escalation algorithm.
- Justify the result of the voice with WFQ. Implement a solution to improve this behavior and analyze the results obtained.
 - You can change QoS parameters in DiffServ, in the QoS module attributes-> WFQ Profiles-> DSCP Based-> Queues Configuration.