

**Objectives:**

1. Further understand EDCF (enhanced distributed coordination function) protocol and service differentiation
2. Further understand using simulation to perform network protocol study.

**Due:** 5:30 pm, 04-20-2017

**Project Specification:**

This is an individual project.

In River OPNET Modeler, set up a wireless LAN network using the wireless LAN\_station\_adv node (without any IP or above layers). This way we can isolate our simulation to be solely for wireless LAN MAC protocol. Refer Lab #1 for reference.

Make sure the data rate is set to be 24 Mbps in WLAN parameters before you perform the simulations. Make sure that HCF is supported. We will only use the Traffic Categories part for service differentiation though.

Following scenarios shall be simulated. For each scenario, the traffic will start at time 1 second. And the whole simulation should last 50 seconds.

1. Station 1 will be serving as receiving station, without sending out its own traffic. 5 other stations will be sending traffic destined to Station 1.  
Pay attention to the WLAN parameter configuration. There are traffic access categories (EDCF traffic classes) and observe their AIFS and  $CW_{MIN}/CW_{MAX}$  configurations and notice how they are different.

For the 5 sending stations, enable streaming video traffic in traffic generation configuration for 1 station; enable background traffic in traffic generation configuration for 4 other stations. Set the packet size for both categories to be constant 500 bytes for all stations. Set RTS threshold to be 800 bytes in the WLAN parameters. For background traffic, set the packet inter-arrival time to be small enough (e. g. 0.0001s) so that the station is always backlogged.

Results to be collected:

- a. Throughput and access delay of an individual station with background traffic
- b. Throughput and access delay of an individual station with streaming video traffic

Scenarios to be executed:

- a. First set the video packet inter-arrival time to be 0.1s. Run the simulation and collect results.
- b. Second set the video packet inter-arrival time to be 0.001s. Run the simulation and collect results

For each of the scenario, answer the following questions:

- a. Does the video traffic have higher priority over background traffic? How can you tell from the results?
  - b. Is background traffic utilizing the bandwidth that is left by the video traffic in the network? How much bandwidth does a station with background traffic get on average?
2. Repeat the above simulation, collect simulation results and answer the same questions, but with the following changes to the setup: increase the total sending stations to 10, make 3 of them video stations

**Submission Guidelines:**

OPNET is capable of collecting the required statistics for you. You can export the results to pictures or use screen print and submit. Be sure that the units of the axis can be seen and the picture is clear enough so that the TA can judge your results. Clearly label each picture so that the TA can tell the result is for which scenario and for which traffic category.

For each result, take screen print of the traffic generation parameters and the WLAN parameter setup and put them before the simulation result. This way the TA can check your setup.

Save your results in PDF/DOC format for submission to blackboard, with a file named yourstudentid\_2.doc or yourstudentid\_2.pdf (replace yourstudentid with your true 1000\* student id number), where \_2 representing Lab 2.

Make sure your name and your student ID are listed in your write up. Late submissions will be accepted at a penalty as announced

**References:**

There are various resources online for Opnet tutorial. Some are:

[http://www.sce.carleton.ca/faculty/lambadaris/courses/5001/opnet\\_tutorial.pdf](http://www.sce.carleton.ca/faculty/lambadaris/courses/5001/opnet_tutorial.pdf)

<https://www.youtube.com/watch?v=XAzXKnAwKxo>

**Writeup:**

Answer the questions as described above. Be sure you look at the results of different scenarios and know how they compare to each other. Submit your results and screen shots, and answers to the questions

**Grading:** Total 100 Points

64: 32 for each simulation scenario (throughput, access delay for video/ftp for 0.1/0.001s traffic inter-arrival time, 4 points each)

32: 16 for each scenario (4 points for each question/scenario)

4: Correctly find the code for back off counter decrementing

Deductions for failing to follow directions:

- 10 No parameter screen shot.
- 5 No student ID and name.
- 5 Submitting write up in other than pdf/doc format.
- 5 Submitted file has a name other than yourstudnetid\_2.pdf/doc

**Important Note:**

You may discuss the problem definition and tools with other students. You may discuss the lab requirements. You may discuss or share project designs. All coding work must be your own. You may use any book, WWW reference or other people's programs (but not those of other students in the class or other sections) as a reference as long as you cite that reference in the comments. If you use parts of other programs or code from web sites or books YOU MUST CITE THOSE REFERENCES

If we detect that portions of your program match portions of any other student's program it will be presumed that you have collaborated unless you both cite some other source for the code. You must not violate UTA, state of Texas or US laws or professional ethics. Any

---

violations, however small, will not be tolerated. Students who do not submit anything get a grade of 0. Therefore students who break the rules may receive a negative grade – most likely a -50 on this lab assignment.