Project: Wireless Network Modeling and Simulation

Instructors: Cyril Nguyen Van Phu & Omar Sami Oubbati
Université Gustave Eiffel - M2 SIA

Project Overview

This project focuses on wireless network modeling and simulation using the INET framework in OMNeT++. The project is based on the wireless tutorial available at: `https://inet.omnetpp.org/docs/tutorials/wireless/doc/index.html`

Each student must individually complete the project tasks outlined below and provide a detailed report (maximum 15 pages) answering all the questions. The report must include screenshots, source code references, and clear explanations for all tasks.

Project Submission Guidelines

- Each student must submit their **own report** on the E-learning platform (Moodle).
- The report must not exceed 15 pages, excluding appendices and cover page.
- The deadline for submission is **January 28, 2025, at 23:59**. Late submissions will not be accepted.
- Reports sent via email will not be graded.
- Any plagiarism will result in a grade of **0** for the corresponding section.

Project Tasks

Follow the steps in the wireless tutorial and complete the following configurations and questions:

Configuration Step 1

1. Simulate and measure the transmission rate.
2. Is the inter-arrival time for the packets memoryless? Explain your answer.
3. Compute the total number of packets transmitted during the simulation time. Explain why the transmission rate was around 660 kbps.
4. Reproduce the simulation and confirm that the results remain consistent.
5. Modify the random number generator seed in 'omnetpp.ini'. How does changing the seed impact the simulation results?
6. List all parameters of the MAC protocol used in 'AckingWirelessInterface' with references to the source code.
7. Explain the 'throughput:vector' statistic in the analysis file by citing its definition and implementation in the source code.

Configuration Step 2

1. Visualize the radio transmission range.
2. Change the communication range so that host B is no longer reachable from host A. Visualize the new range.
3. Provide simulation results for the transmission rate and explain them.

Configuration Step 3

1. Identify the type of wireless interfaces for the new hosts. Explain your answer with references to the source code.

Configuration Step 4

1. Use the runtime GUI to capture a screenshot showing the IP addresses of all hosts in the network.

Configuration Step 5

1. Enable event log recording in the runtime GUI.
2. Open the '.elog' file with a text editor and explain its contents.
3. Analyze the event log using the sequence chart and event log table tools. Filter events for 'hostA+udp', 'hostB+udp', and 'hostR1+ip'.
4. Take screenshots and comment on both a complete and an incomplete transmission sequence chart.

Configuration Step 6

1. Compare the number of packets received by host B in this configuration with the results from Configuration Step 5. Explain the difference.

Configuration Step 7

1. Measure the 'numRetry' statistic for Configuration Steps 6 and 7.
2. Cite the source code where the logic for 'numRetry' is defined.
3. Explain the differences in this metric between the two configurations.

Configuration Step 8

1. Plot the throughput vector at host B and identify the time when the transmission stops.

Report Requirements

Each report must include:

- A **title page** with the project title, student name, and program (M2 SIA).
- A clear structure with an introduction, answers to all questions, and a conclusion.
- Screenshots and source code references wherever applicable.
- A bibliography citing any external references or documentation used.

Good luck with your project, and I look forward to reviewing your work!