NETW 707: Modeling and Simulation – Spring 2019

Project Description

Due Date: April 18 2019

You are required to implement the following features in an OMNET++ simulation.

1. Construct a simulation network of N nodes and 1 central station. The number N should be dynamic (can be changed by you for each simulation).
2. Each node has messages that need to be sent to the central station. Messages arrive at each node according to a Poisson process with average inter-arrival time 4 seconds. ***The arrival time is continuous; messages can arrive at any time***.
3. Time is slotted where the slot duration is 1 second. ***The sending time is discrete; a node can only send at the beginning of the slot***.
4. Each arriving message is stored in a FIFO queue. Once the message is sent, it is removed from the queue.
5. If an arriving message found the queue not empty, it will be stored in the added to the queue.
6. At the beginning of each slot, the message at the head of the queue should be sent. (if any)
7. You should keep track of the current number of messages stored in the queue and the average number of messages stored in the queue.
8. The central station should detect collisions. If more than one message is received during one timeslot, then a collision occurs. (show by bubble or graphical effect)
9. The central station should keep track of the number of collision slots, the number of successful timeslots (only one message received), and the number of idle slots (no messages received) over time.
10. The central station should calculate the throughput as $\eta = \frac{no.\ of\ successful\ timeslots}{total\ no.of\ timeslots}$
11. Compare your observed maximum throughput (will depend on N) vs. ALOHA theoretical maximum throughput. Is it the same / better / worse? Why?

Notes:

- The actual contents of messages do not matter.
- A node will not be aware if a collision happens. Only the central station does.
- The probability of error in any message is equal to zero.
- Remember, you are just simulating the network. All not needed details can be omitted.
- When creating a new project, you can make your start with the "Source Sink Example".
- For submission modsimnetw707@gmail.com

References:

1. OMNET++ User Manual https://omnetpp.org/doc/omnetpp/manual/usman.html