ITL355: Computer Networks Lab
Semester Project Submission 1

February 25, 2025

Project: Develop a network simulator implementing entire protocol stack.

Note: This is an open ended assignment where you're free to choose any programming language, input/output representation, formats, etc., but all these should be specified in a proper **specification document** which should be **regularly** updated with each submission. **A maximum group of three (3) students is allowed.**

Submission 1 objective:

1. Implement Physical layer functionalities.
    - **Minimum deliverables:** Your simulator should be at least capable of
        - Creating end devices, hubs
        - Creating connections between them to form a topology
        - Sending and receiving data
    - **Test cases:** You can check your simulator's working on following cases
        - Create two end devices with a dedicated connection and enable data transmission between them. *Note that this is only a simulation as no real data can be shared.*
        - Create a star topology with five end devices connected to a hub and enable communication within end devices. *This should follow exact working principles of hub.*
2. Implement Data Link layer functionalities.
    - **Minimum deliverables:** Your simulator should be at least capable of
        - Creating layer 2 devices: bridge and switch
        - Performing address learning in case of switch
        - Implement at least one error control protocol

  - Implement at least one access control protocol
  - Implementing at least one sliding window-based flow control protocol
- **Test cases:** You can check your simulator's working on the following cases
  - Create a switch with five end devices connected to it and enable data transmission between them. Demonstrate access and each of the flow control protocols. Also, report the total number of broadcast and collision domains in the given network.
  - Create two star topologies with five end devices connected to a hub in each case and then connect two hubs using a switch. Enable communication between all 10 end devices and report the total number of broadcast and collision domains in the given network.

Possible add ons (not compulsory): You can make add ons like

- **Physical layer:** representation of data as bits, performing line coding and showing the resultant signals, showing topology of network
- **Data Link layer:** introduction of noise models, more error detection and correction techniques, other access control and flow control techniques

and many more *depending on where your creative thinking and coding capability can reach.*

Submission deadline: 25 March 2025 via Gradescope.