IT605 P: Semester Project
Submission 2

May 17, 2021

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. **Maximum group of three (3) students allowed.**

Submission 2 objective:

1. Implement Network layer functionalities.
    - **Minimum deliverables:** Your simulator should be at least capable of
        - Creating and configuring a router
        - Assigning well formatted classless IPV4 address to the devices
        - Using ARP to find the MAC address of a host within a network
        - Performing static routing
        - Implementing RIP or OSPF protocols for dynamic routing

      Note that the routing tables should be based on *longest mask matching*. Also, you can use available codes for shortest-path problem in routing, however any such source should be properly cited in your report.
    - **Test cases:** You can check your simulator's working by developing test cases on your own which show the working of each of the deliverables discussed before.
2. Implement Transport and Application layer functionalities.
    - **Minimum deliverables:** Your simulator should be at least capable of
        - Assigning port no.'s to various processes, both well known and ephemeral port no.'s and enable process-process communication

  - Implement at least *one* sliding wndow flow control protocol at the transport layer (Go Back N or Selective repeat). You can also resuse it from Layer 2 functionality (Submission 1) for the transport layer data unit (TCP datagram or UDP segment)
  - Implement at least *two* application layer services

  Note that the applications can be developed as a separate applet/program or pre-existing applications can also be used, but these need to be called from your simulator when communication is being done. Applications like Telnet, FTP, SSH clients are already available for most programming languages. You can use them, however any such source should be properly cited in your report.

- **Test cases:** Using your chosen application layer services you need to demonstrate working of entire protocol stack i.e., encapsulation of data as well as the functionalities of all layers.

Possible add ons: You can make add ons like

- **Network Layer:** enabling both classful and classless addressing, IPV6 compatible addressing, sending data as proper IPV4 datagrams, enabling address aggregation, implementing all RIP, OSPF, BGP and EIGRP protocols.
- **Transport and Application Layer:** implementing all known flow control protocols, performing congestion control, implementing more application layer services

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

Submission deadline: 17 June 2021 via Gradescope.