The LNM Institute of Information Technology, Jaipur
Computer Networks Lab
Lab Assignment 4

Objective: Learn the communication among the devices in the layered environment.

Task 1: Network Design

1. Create a network named "layerNetwork" with two nodes. Each of the nodes have two layers: network layer and data link layer. Both the nodes are connected with a channel having 100ms of delay (refer simulation manual of OMNeT++ or tic-toc tutorial 3.1).

   Hint: Design the layers as simple module and nodes as compound module.
2. Each layer communicates though the Protocol Data Unit (PDU). The network layer PDU is named as N_PDU and the data link layer PDU is named as DL_PDU. Create a packet for each PDU. Both the layer communicate through addresses (both source and destination).
   Hint: Design all PDUs as "packet type" message definition.
3. The communication starts from the network layer of the source node to next bottom layer, after which this node transfers the DL_PDU to the destination node.

Task 2: Protocol Design and Simulation

1. Define source address, destination address, and the number of packets as the parameters in omnetpp.ini file.
2. Enable event logging in omnetpp.ini file and visualize the packet tracing.
3. **Network layer communication:** Source node (SN) sends 10 packets with IDs 1 to 10 to the destination node (DN) with a delay of Round Trip Time (RTT). DN receives each packet and deletes it.
4. **Data link layer communication:** In SN, for each received PDU from upper layer, it is encapsulated in a new data link layer PDU (type as "Data") and ID is assigned in the form of modulo-2 (i.e. 0 or 1). It means that the ID of the first PDU will be 0, second PDU will be 1, then again 0, and so on. In DN, data link layer sends an acknowledgment (ACK) to SN and also forwards the decapsulated PDU to upper layer.

Goal:

1. The students must know about creation of packets, moving the nodes in design mode, difference between design mode and source code mode, significance of .h and .cc files, concepts of "omnetpp.h" and "_m.h" headers, utilization of namespace, code writing in "protected" environment, importance of "Define_Module()".
2. Working with keywords: par(), gate(), cMessage, scheduleAt(), isSelfMessage(), send(), setPID(), getPID(), setPType(), getPType(), setSrc(), setDest().

Submission Instructions:

1. Submit the code as a zip file named "rollno.zip" on Moodle for evaluation. No other form of submission will be accepted for the evaluation.

2. Submit it by the deadline, failing which 2 marks will be deducted. Refrain from copying the answers strictly. It is to be noted that the originality of the submitted files will be checked. 1 mark will be deducted for all those answers which are same, does not matter whether it is original or copied ones.