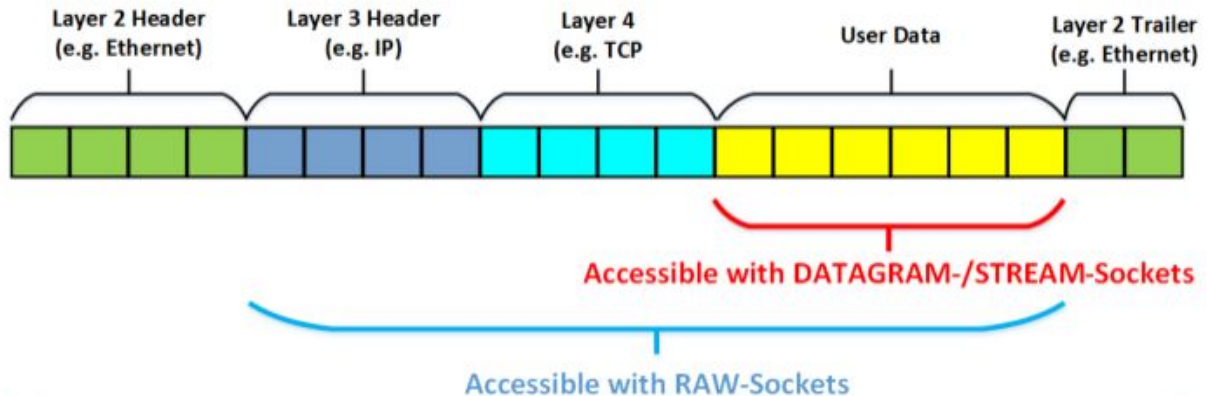


L4 Converter with Port Network Address Translation (NAPT)

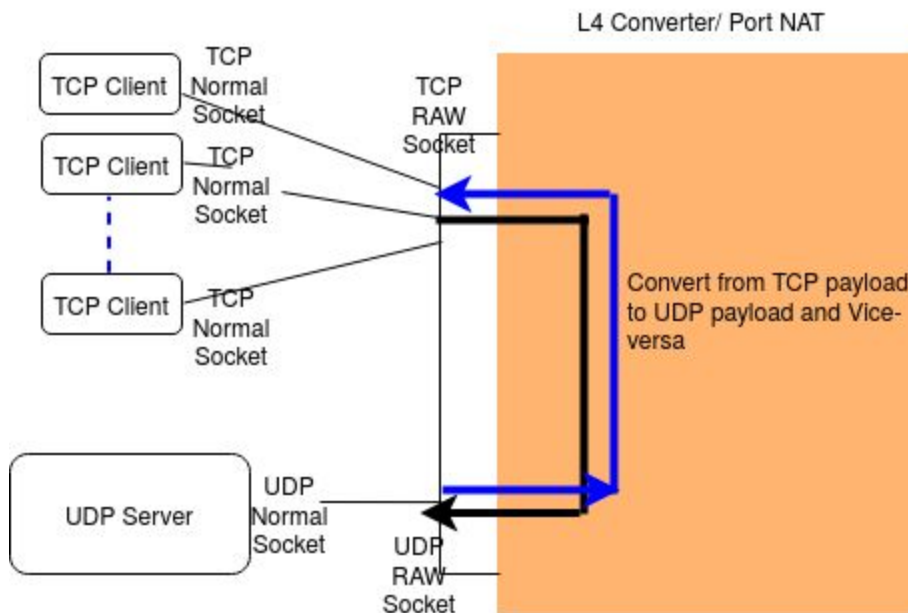
Objective of this lab is to utilize the RAW socket interface capabilities at the network layer for communication between network entities.



1. Implement a simple L4 Converter with Port NAT functionality at application level in C/C++ for forwarding chat messages between TCP clients and a single UDP server. Use RAW socket interface as an underlying means of communication between clients and server. The converter with NAT functionality is placed between TCP client(s) and UDP Server as shown in the figure below. TCP client(s) and UDP server should be able to communicate/chat with each other through this forwarder. Configure virtual IPs to represent an unique IP address at the associated interface shown in the figure below for respective network entity.
 - 1.1. L4 converter NAT shall come up with RAW socket(s) listening for respective IP packets either from client(s) or server. Add appropriate checks to drop irrelevant IP packets at respective RAW socket interfaces here (E.g For receipt of TCP packets from TCP clients, the converter should consider only TCP packets and drop any of the other IP packets at this socket interface. Similarly for the other socket interface, it should consider only UDP packets)
 - 1.2. Both TCP clients and UDP server shall open respective normal socket interfaces.
 - 1.3. Both converter and UDP server shall use the same port to handle messages from their clients (TCP and UDP respectively)
 - 1.4. At TCP client, a message to send to the server shall be taken from the user as an input and destined to Converter IP and port in TCP message.
 - 1.5. For the TCP packet received from the TCP client to send to the UDP server, the NAT forwarder shall convert the packet from TCP format to UDP format as well change the source IP to its own IP (mapped to IP towards the UDP server)

interface) and source port to an unique port generated for this client before sending the packet to the destined UDP server.

- 1.6. UDP server shall send a fixed reply message “Received <packet number> from <Source IP>:<Source Port>” back to UDP client represented by our converter.
- 1.7. For reply packet received from UDP server the NAT shall convert it to TCP packet including its own IP as the source IP, as well place the original destination IP of the TCP client and port to which the message is intended.
- 1.8. Measure the time taken /RTT at the TCP client for every packet sent and received from the server.
- 1.9. At least 2 TCP clients shall be considered for successful working of the end to end functionality. There is no need to access any details of the L2 layer.



NOTE: Please do not use any library APIs like pcap*(), libnet(). Any system calls used shall be relevant w.r.t RAW socket APIs() only.

Submission

Add appropriate comments to your code in the programs to make it readable. Prepare a single zip file with name format **<assignment6_roll no>.zip** containing the source files and respective readme of your program. Submit it to google classroom in the posted assignment section.

PLAGIARISM STATEMENT <Include it in your readme>

I certify that this assignment/report is my own work, based on my personal study and/or research and that I have acknowledged all material and sources used in its preparation, whether they be books, articles, reports, lecture notes, and any other kind of document, electronic or personal communication. I also certify that this assignment/report has not previously been submitted for assessment in any other course, except where specific permission has been granted from all course instructors involved, or at any other time in this course, and that I have not copied in part or whole or otherwise plagiarised the work of other students and/or persons. I pledge to uphold the principles of honesty and responsibility at CSE@IITH. In addition, I understand my responsibility to report honour violations by other students if I become aware of it.

Name of the student

Roll No