**Demonstrate working of DHCP server using a client-server architecture**

Requirements:

1. Create a C-based client-server architecture using a UDP socket

2. The dhcp server should be able to receive message from multiple clients

3. The server should run on server machine and the client can run on client machine

4. Demonstrate client requesting IP address and DHCP server offering at least three available IP addresses

5. The client should randomly pick an IP address and send a DHCP request to the server

6. The DHCP server should register the client selected IP address is taken and should acknowledge the client

7. The client should randomly generate the transaction ID. The lifetime should be set to 3600 seconds.

**Procedure:**

1. Create a C-based server that can accept data from multiple clients using UDP sockets

2. Make sure the server runs on server machine and the format to start the server is as follows

dhcp<port\_number>

gateway:

subnet\_mask:

where dhcp is the UDP server executable and port\_number is the port number on which the UDP server can accept data. The gateway is the IP address from which the DHCP server starts offering the IP addresses to the clients.

3. Create a C-based client that can communicate with the server using UDP sockets

4. The client can run on client machine and sends and receives messages to the server as follows

client<port\_number>

where client is the client executable, port\_number is the port number on which the client sends messages to the DHCP server

5. The client tries to request an IP address from the DHCP server by contacting the server and sending a packet with yiaddr: 0.0.0.0 and a randomly generated transaction ID

6. The DHCP server responds with three IP address offers, transaction ID, and a lifetime (generally 3600 seconds). The offer IP addresses starts from the next available IP address. For example, if the gateway is 192.168.1.1 and the subnet mask is 255.255.255.0 then the available IP address is between the range 192.168.1.2 – 192.168.1.255

7. The client responds with a DHCP request by randomly choosing an IP address from the given offer and a new transaction ID (old transaction ID + 1)

8. The DHCP server responds with an ack confirming the chosen IP address. The DHCP server registers that the IP address is taken

9. Print all the communication between the DHCP server and the client on the terminal console

10. A structure can be used to store the IP addresses, transaction ID, and the lifetime. The structure can be used for all the communications

11. An example DHCP transaction is shown below in Figure 1

12. Test the DHCP server and client to make sure the demonstrations are working.

Deliverables:

1. Commented DHCP server and client C code

2. A readme file that describes how to compile, execute, and test the C codes.