COMPUTER NETWORKS PROJECT
REPORT OF SUBMISSION 2

Submitted By-

NAME - **ARYAN PATEL**

ENROLL NO - **2020BITE043**

NAME - **GAURAV MEENA**

ENROLL NO - **2020BITE010**

We have implemented all the layers of OSI model

- ***Languages Used:*** *python*
- ***IDE Used:*** *VsCode and Jupyter Notebook*
- ***Libraries Used:***
  - *os*
  - *time*
  - *random*
  - *ipaddress*
  - *netaddr*
  - *itertools*
  - *copy*

ipaddress *– used for retrieving subnet Id*

netaddr *– used for checking subnet*

Physical layer

- We have created class of End Device, hubs (layer 1 device)

Data Link Layer

- Built Layer 2 devices class of Switch

- Implemented address learning when using Switch

1. We have implemented one access control protocol ***Token passing*** (ControlledAccess protocol)

Token Passing: Token passing is a network communication protocol where a "token" is passed around a network of nodes, allowing each node to take turns transmitting data. Nodes can only transmit data when they possess the token, which ensures that only one node can transmit data at a time. Once a node has finished transmitting, it passes the token to the next node in the network, allowing the cycle to continue.

Also, we have implemented 2 flow control protocols for noisy channels ***Stop-and-wait ARQ*** and ***GO-BACK-N***

Stop-and-wait ARQ: Stop-and-wait is a basic flow control protocol used in communication systems, particularly in noisy channels, to ensure reliable data transmission. The sender transmits a data packet and waits for an acknowledgment (ACK) signal from the receiver before sending the next packet. If the sender does not receive an ACK within a specified time frame, it resends the packet. This helps to prevent data loss due to errors caused by noise in the channel. The stop-and-wait protocol is simple and easy to implement but can lead to low channel utilization in high-latency or high-error environments.

Go-Back-n: Go-Back-N is a protocol used in data communication to ensure reliable transmission of data between a sender and a receiver over an unreliable network. It works by sending multiple data packets at once and waiting for an acknowledgment from the receiver. If an acknowledgment is not received within a specified time, the sender retransmits the packets from the last acknowledged packet. This process continues until all packets are successfully received by the receiver.

Network Layer

- Built a router class in which you can assigning well formatted classless IPV4 address to the devices
- Also end devices can perform ARP request to find the MAC address of a host within a network
- Also router class object can perform static routing and can also implement **RIP protocol**

RIP (Routing Information Protocol) is one of the oldest routing protocols used in computer networks. It belongs to the family of interior gateway protocols (IGPs) and is typically used in small to medium-sized networks. RIP is based on the distance-vector algorithm, where routers exchange routing information with their neighboring routers.

Application Layer

- Implemented user-built **FTP protocol**
- One end device object will send file over network to other end device object in a network
- Also used port number for this, used 80 as port number for ftp protocol

FTP (File Transfer Protocol) is a standard network protocol used for transferring files between a client and a server over a computer network. It operates on the application layer of the TCP/IP protocol suite and is built on a client-server architecture.

References:

Geeks for geeks

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ChatGPT: Used for optimizing rip protocol