

K. J. Somaiya College of Engineering, Mumbai-77
(A Constituent College of Somaiya Vidyavihar University)

Batch: A1 Roll No.: 16010120015

Experiment / assignment / tutorial No. _9_

Grade: AA / AB / BB / BC / CC / CD / DD

Signature of the Staff In-charge with date

Experiment No.:9

TITLE: Study and configure DHCP/DNS protocol using Cisco Packet tracer

AIM: To study and configure DHCP/DNS protocol using Cisco Packet tracer

Expected Outcome of Experiment:

CO: Demonstrate DHCP/DNS protocol concepts like flow control, error control, congestion, using Cisco Packet Tracer

Books/ Journals/ Websites referred:

1. A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition
2. B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition

Pre Lab/ Prior Concepts:

IPv4 Addressing, Subnetting, Link State Protocol, Router configuration Commands

New Concepts to be learned: DHCP/DNS Protocol and its configuration.

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THEORY:

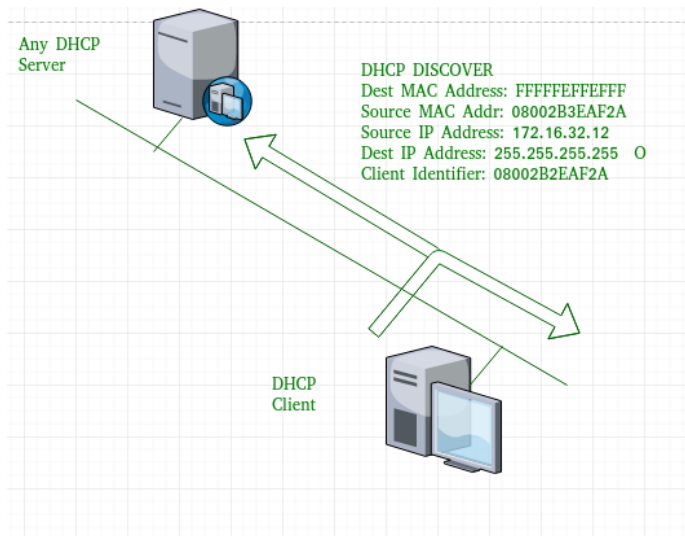
Dynamic Host Configuration Protocol(DHCP) is an application layer protocol which is used to provide:

1. Subnet Mask (Option 1 – e.g., 255.255.255.0)
2. Router Address (Option 3 – e.g., 192.168.1.1)
3. DNS Address (Option 6 – e.g., 8.8.8.8)
- 4.

DHCP is based on a client-server model and based on discovery, offer, request, and ACK.

DHCP discover message –

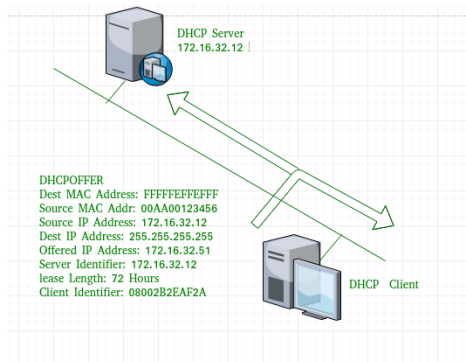
This is a first message generated in the communication process between server and client. This message is generated by Client host in order to discover if there is any DHCP server/servers are present in a network or not. This message is broadcasted to all devices present in a network to find the DHCP server. This message is 342 or 576 bytes long



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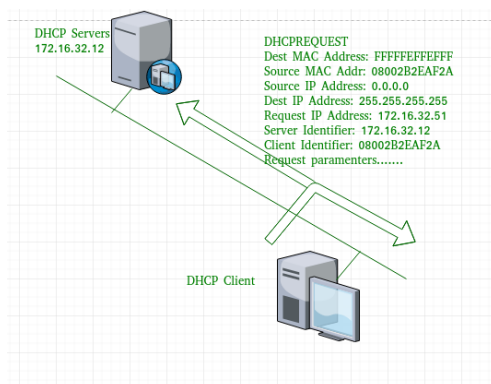
DHCP offer message –

The server will respond to host in this message specifying the unleased IP address and other TCP configuration information. This message is broadcasted by server. Size of message is 342 bytes. If there are more than one DHCP servers present in the network then client host will accept the first DHCP OFFER message it receives. Also a server ID is specified in the packet in order to identify the server.



DHCP request message –

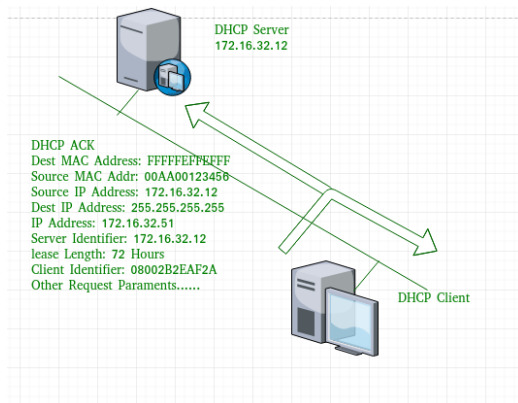
When a client receives a offer message, it responds by broadcasting a DHCP request message. The client will produce a gratuitous ARP in order to find if there is any other host present in the network with same IP address. If there is no reply by other host, then there is no host with same TCP configuration in the network and the message is broadcasted to server showing the acceptance of IP address .A Client ID is also added in this message.



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DHCP acknowledgement message –

In response to the request message received, the server will make an entry with specified client ID and bind the IP address offered with lease time. Now, the client will have the IP address provided by server.



DHCP negative acknowledgement message –

Whenever a DHCP server receives a request for IP address that is invalid according to the scopes that is configured with, it send DHCP Nak message to client. Eg-when the server has no IP address unused or the pool is empty, then this message is sent by the server to client.

- **DHCP decline –**

If DHCP client determines the offered configuration parameters are different or invalid, it sends DHCP decline message to the server. When there is a reply to the gratuitous ARP by any host to the client, the client sends DHCP decline message to the server showing the offered IP address is already in use.

- **DHCP inform –**

If a client address has obtained IP address manually then the client uses a DHCP inform to obtain other local configuration parameters, such as domain name. In reply to the dhcp inform message, DHCP server generates DHCP ack message with local configuration suitable for the client without allocating a new IP address. This DHCP ack message is unicast to the client.

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Advantages –

- centralized management of IP addresses
- ease of adding new clients to a network
- reuse of IP addresses reducing the total number of IP addresses that are required
- simple reconfiguration of the IP address space on the DHCP server without needing to reconfigure each client

DNS

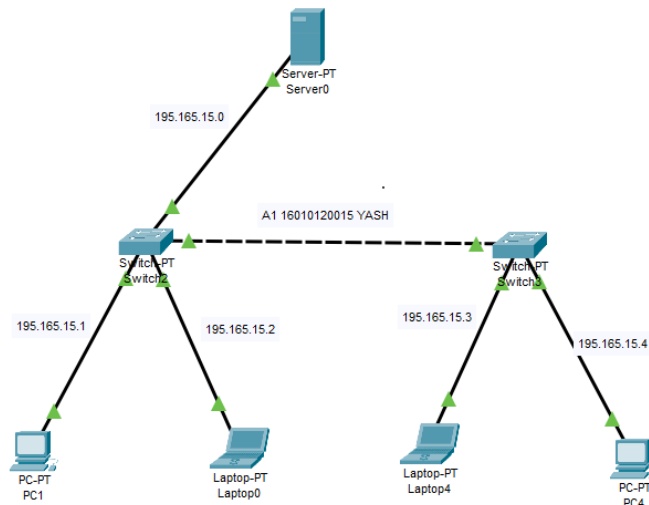
The Domain Name System (DNS) is the phonebook of the Internet. Humans access information online through domain names, like nytimes.com or espn.com. Web browsers interact through Internet Protocol (IP) addresses. DNS translates domain names to IP addresses so browsers can load Internet resources.

The process of DNS resolution involves converting a hostname (such as www.example.com) into a computer-friendly IP address (such as 192.168.1.1). An IP address is given to each device on the Internet, and that address is necessary to find the appropriate Internet device - like a street address is used to find a particular home. When a user wants to load a webpage, a translation must occur between what a user types into their web browser

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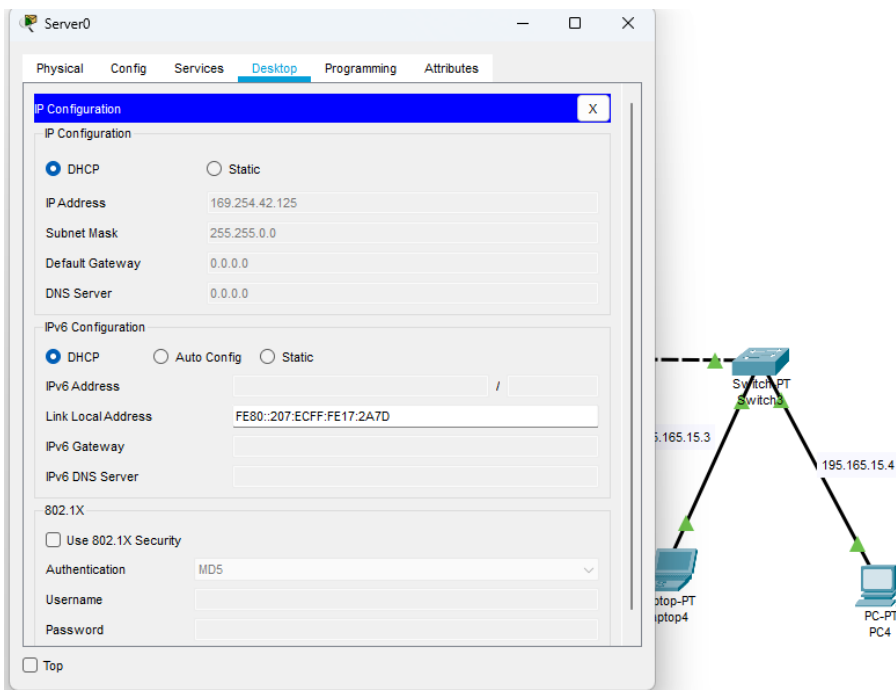
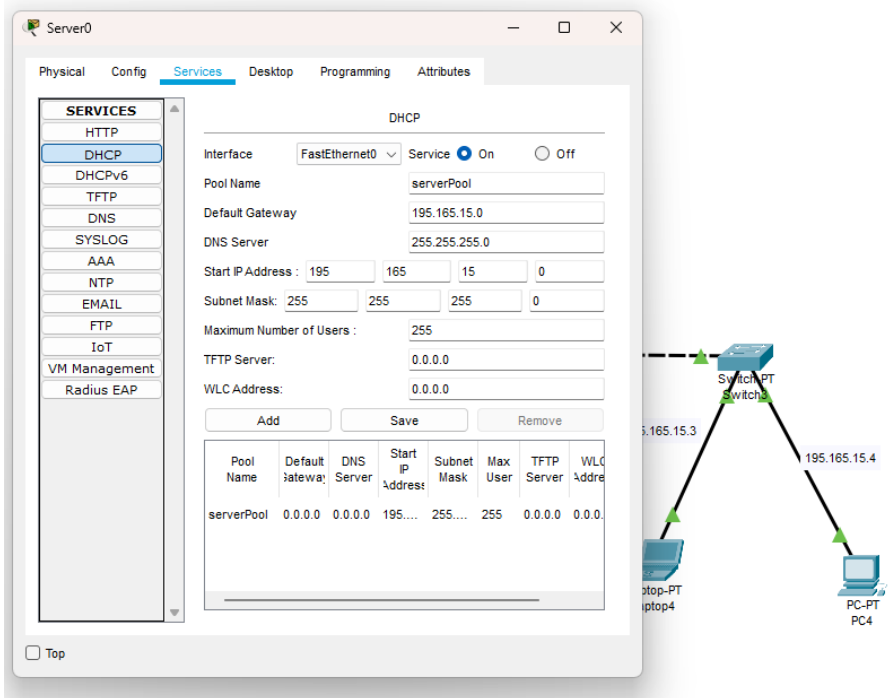
IMPLEMENTATION:

TOPOLOGY :



SERVER CONFIGURATION:

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END DEVICES CONFIDURATION :

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PC1

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IP Address 195.165.15.3

Subnet Mask 255.255.255.0

Default Gateway 0.0.0.0

DNS Server 255.255.255.0

IPv6 Configuration

☒ DHCP ☐ Auto Config ☐ Static

IPv6 Address /

Link Local Address FE80::201:C9FF:FE53:1E97

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

☐ Top

Laptop0

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IP Address 195.165.15.2

Subnet Mask 255.255.255.0

Default Gateway 0.0.0.0

DNS Server 255.255.255.0

IPv6 Configuration

☒ DHCP ☐ Auto Config ☐ Static

IPv6 Address /

Link Local Address FE80::202:4AFF:FE78:9319

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

☐ Top

PC4

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static DHCP request successful.

IP Address 195.165.15.5

Subnet Mask 255.255.255.0

Default Gateway 0.0.0.0

DNS Server 255.255.255.0

IPv6 Configuration

☒ DHCP ☐ Auto Config ☐ Static

IPv6 Address /

Link Local Address FE80::260:3EFF:FE43:8C83

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

☐ Top

Laptop4

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static DHCP request successful.

IP Address 195.165.15.4

Subnet Mask 255.255.255.0

Default Gateway 0.0.0.0

DNS Server 255.255.255.0

IPv6 Configuration

☒ DHCP ☐ Auto Config ☐ Static DHCPv6 request failed.

IPv6 Address /

Link Local Address FE80::230:A3FF:FE31:2CB2

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

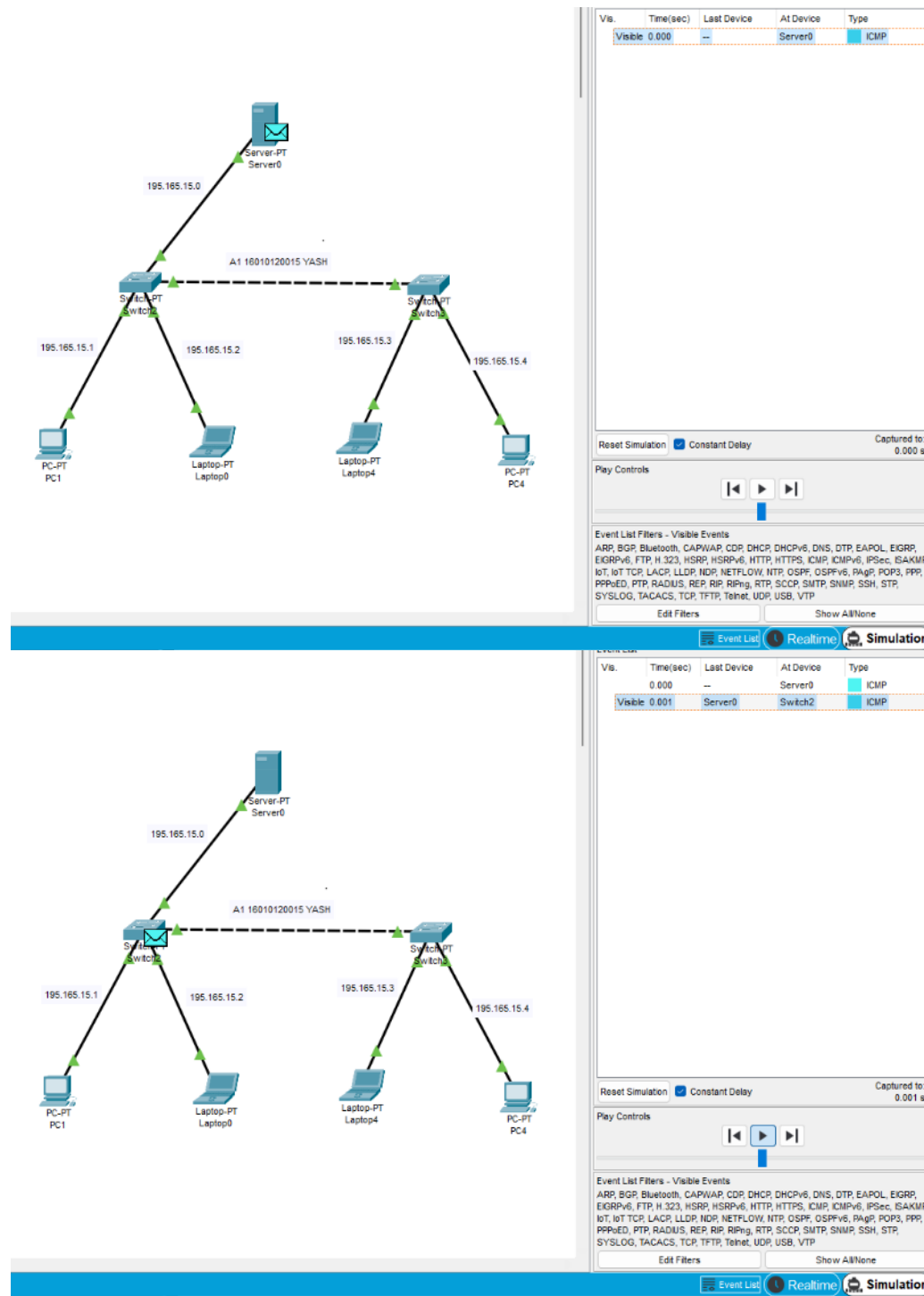
Authentication MD5

Username

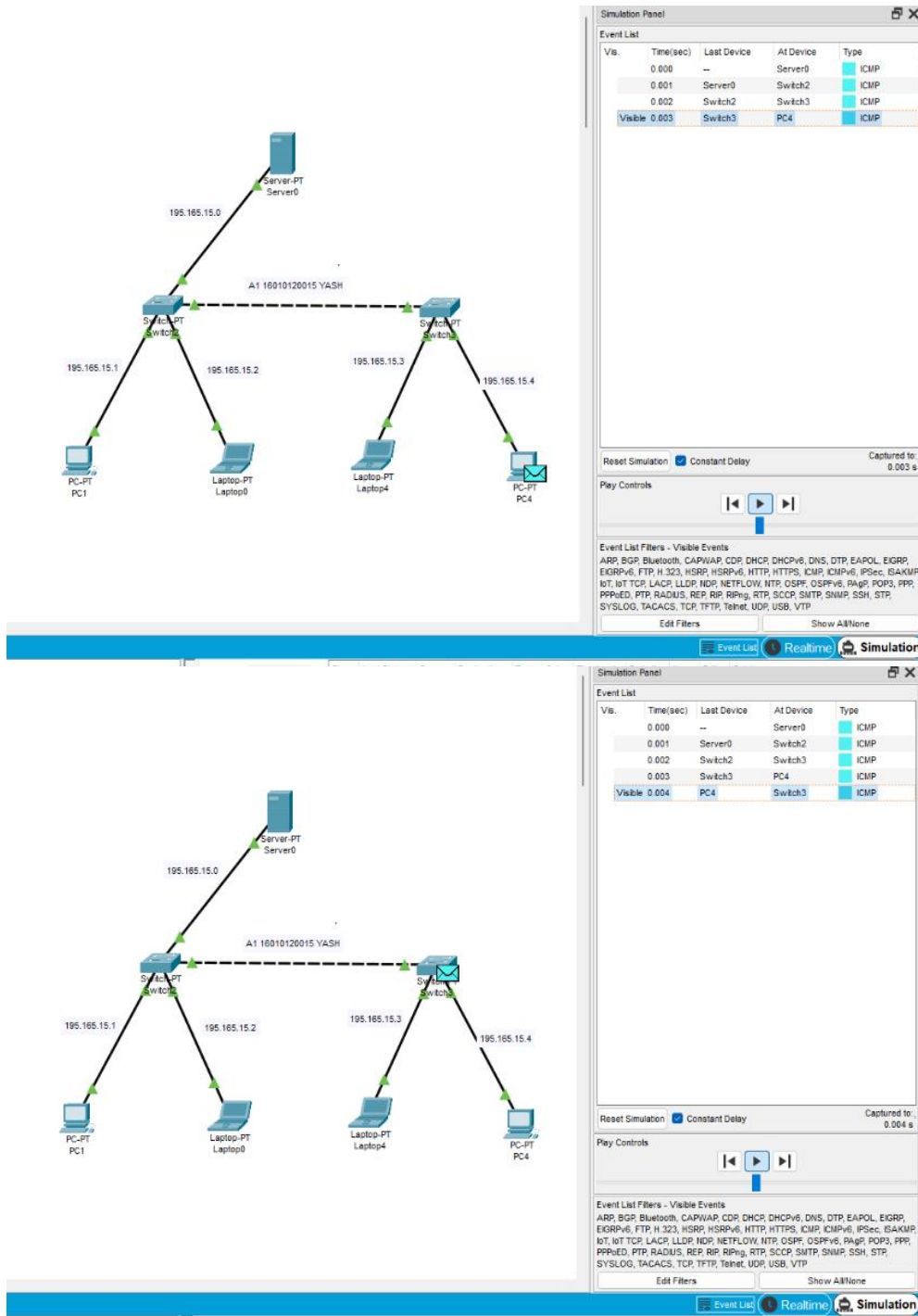
☐ Top

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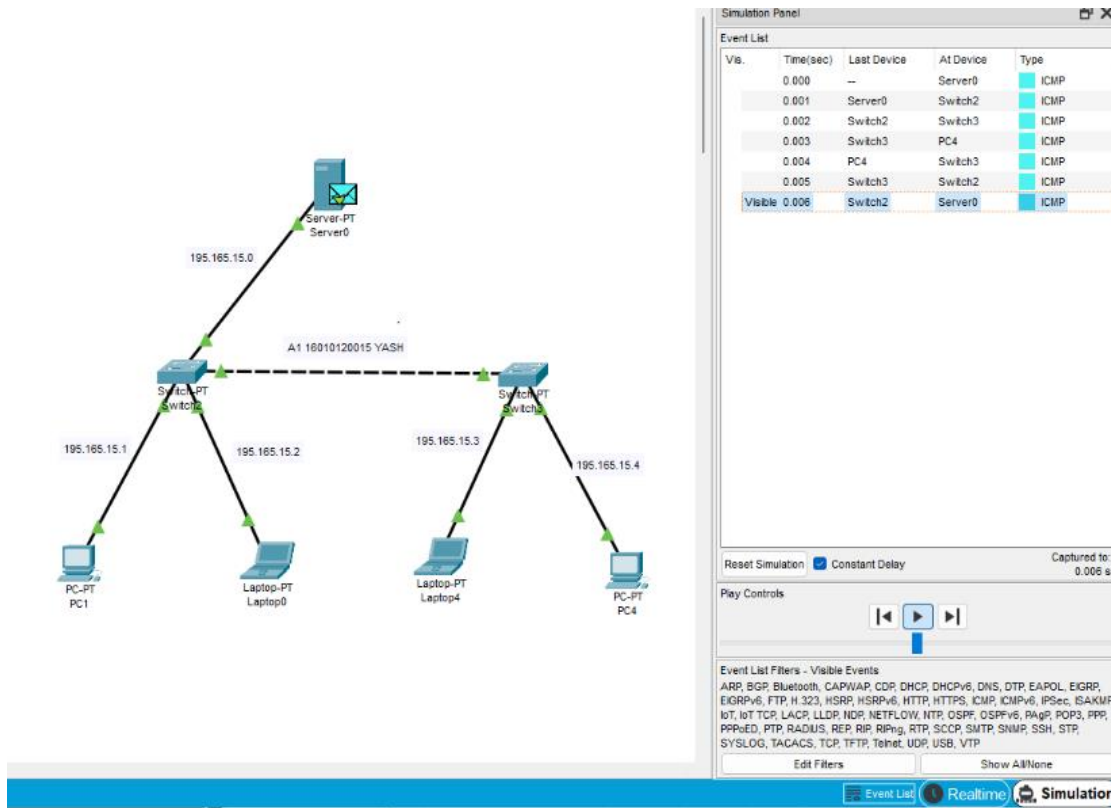
SIMULATION :



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CONCLUSION:

In this experiment we have understood the basic principles and concepts of DHCP/DNS

We have understood that :

- Dynamic Host Configuration Protocol (DHCP) is a client/server protocol that automatically provides an Internet Protocol (IP)
- Host with its IP address and other related configuration information such as the subnet mask and default gateway

and we successfully implemented using Cisco Packet Tracer.

Post Lab Questions:

Date: 16/11/2022

Signature of faculty in-charge