

ASSIGNMENT FORMAT

COURSE	Networking Fundamentals	ASSIGNMENT NO	5
MODULE	DHCP & DNS	ASSIGNMENT DATE	23/08/2024
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Q1. Explain TCP handshake?

Ans:

Steps of the TCP Handshake

SYN (Synchronize):

The client wants to establish a connection with the server. To do this, it sends a TCP packet with the SYN (synchronize) flag set. This packet also contains an initial sequence number (ISN), which is used to identify the connection and track data transmission.

Example: The client sends a packet with $\text{SYN} = 1$ and $\text{ISN} = x$ to the server.

SYN-ACK (Synchronize-Acknowledge):

The server receives the client's SYN request and responds with a packet that has both the SYN and ACK (acknowledge) flags set. The SYN flag is used to synchronize with the client, while the ACK flag acknowledges the client's ISN by incrementing the sequence number by 1.

Example: The server responds with $\text{SYN} = 1$, $\text{ACK} = 1$ and $\text{ISN} = y$, acknowledging the client's ISN by sending $\text{ACK} = x+1$.

ACK (Acknowledge):

The client receives the server's SYN-ACK packet and sends an acknowledgment back to the server, completing the handshake. This packet has the ACK flag set and acknowledges the server's ISN by incrementing the sequence number by 1.

Example: The client sends $ACK = 1$, acknowledging the server's ISN by sending $ACK = y+1$.

At the end of this process, both the client and server have agreed on the initial sequence numbers and are ready to start transmitting data over the established TCP connection.

Visual Representation

Client → Server: SYN (ISN = x)

Server → Client: SYN-ACK (ISN = y , ACK = $x+1$)

Client → Server: ACK (ACK = $y+1$)

Purpose of the TCP Handshake

Synchronization

Reliability

Establishes Rules

Q2. Write steps to resolve a FQDN to IP Address, take example of www.purplesynapz.com

Ans:

Steps to Resolve a FQDN to IP Address (e.g., www.purplesynapz.com)

Assumption: You are accessing the website for the first time.

Initiate DNS Query:

When you enter "www.purplesynapz.com" in your browser, your computer checks its local DNS cache for the IP address.

Since this is your first time visiting the website, no cached IP will be found.

Send DNS Query to DNS Resolver:

Your computer sends a DNS query to your configured DNS resolver (usually provided by your ISP or a public DNS service like Google's 8.8.8.8).

DNS Resolver Queries Root DNS Server:

The DNS resolver checks its own cache. If the IP is not cached, it forwards the query to a root DNS server for guidance on how to find the domain.

Referral to TLD DNS Server:

The root DNS server identifies that "purplesynapz.com" belongs to the ".com" top-level domain (TLD) and sends a referral to the appropriate TLD DNS server.

Query to Authoritative DNS Server:

The DNS resolver queries the authoritative DNS server responsible for the domain "purplesynapz.com." This server holds the official IP address for the domain.

Authoritative DNS Server Responds with IP:

The authoritative DNS server responds with the IP address for "www.purplesynapz.com."

DNS Resolver Sends IP Address to Client:

The DNS resolver sends the IP address back to your computer.

Browser Establishes Connection:

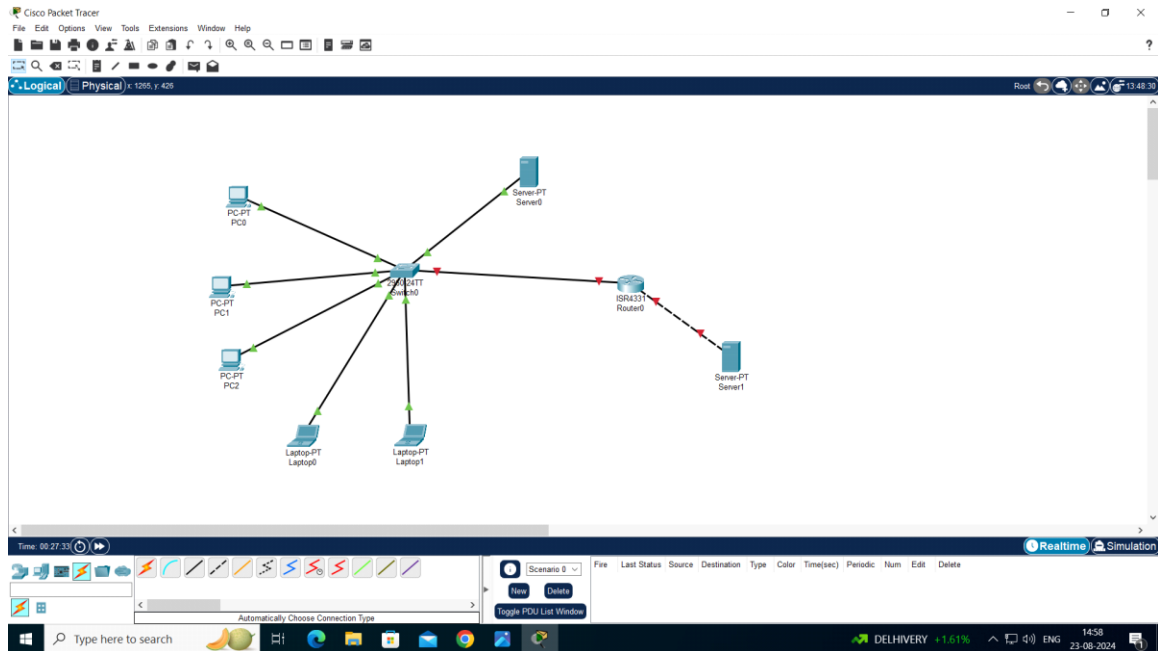
The browser uses the resolved IP address to establish a connection with the web server, enabling the webpage to load.

Q2. You joined Company ABC Private Limited as a Network Administrator, since the company had few employees the need for DHCP was not felt. Now since company has more than 50 employees, your first task is to configure a DHCP server catering 70 address IP allocation and also configure DNS server and make a presentation to show the MD proposal of DHCP and DNS. Assume devices wherever necessary.

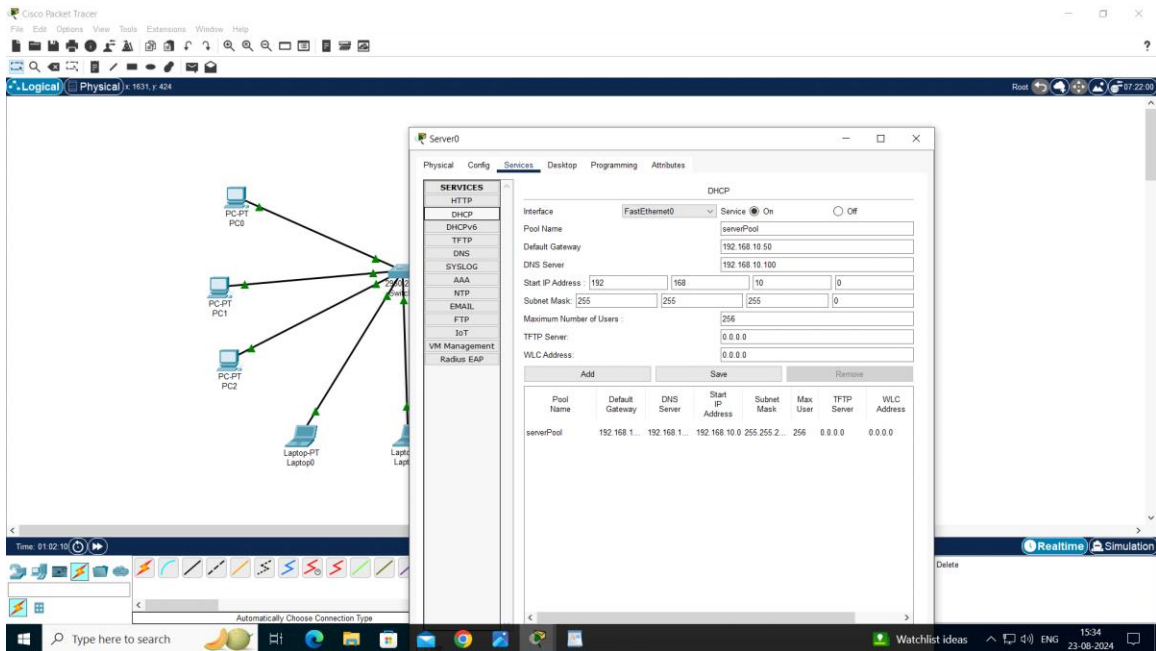
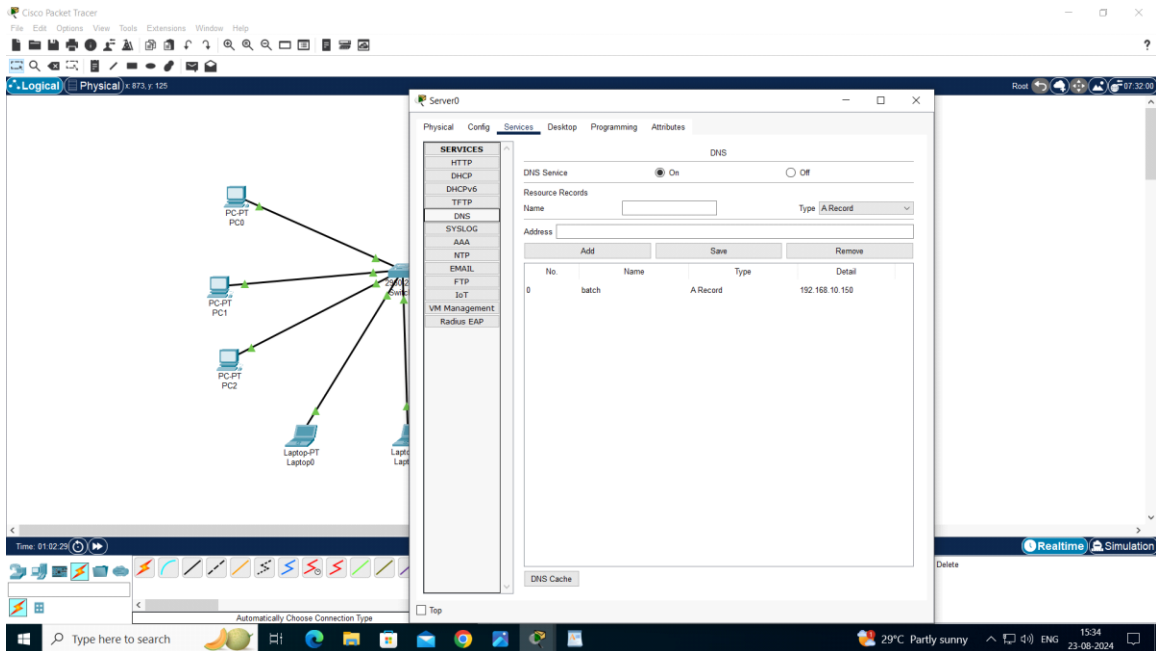
NOTE: In packet tracer, connect only 5 devices, however give provision for 70 IP's in pool

Ans:

- **Draw the Network and show the topology**



- **Allocate the IP's to necessary devices like DNS Server, DHCP Server etc**
- Network Segment: 192.168.10.0/24
- DNS Server: 192.168.10.100
- DHCP Server: 192.168.10.0
- Default Gateway (Router): 192.168.10.50
- Web Server: 192.168.10.2
- IP Pool for DHCP: 192.168.10.50



- **Configure DNS Server**

1. Steps to Configure DNS:

2. Access the DNS server's configuration window.
3. Assign the static IP address (192.168.10.150) to the DNS server.
4. Enable DNS service and create a new zone
5. Add A records (FQDN entries) such as:
6. www.batch.com ->

The screenshot shows the 'Server0' configuration window with the 'Services' tab selected. On the left, a sidebar lists various services, with 'DNS' highlighted. The main area is titled 'DNS' and contains the following configuration options:

- DNS Service:** A toggle switch set to 'On'.
- Resource Records:** A section for adding and managing DNS records.
- Name:** A text input field containing 'batch'.
- Type:** A dropdown menu set to 'A Record'.
- Address:** A text input field containing '192.168.10.150'.
- Buttons:** 'Add', 'Save', and 'Remove' buttons are located below the address field.
- Table:** A table with columns 'No.', 'Name', 'Type', and 'Detail'. It contains one entry: '0', 'batch', 'A Record', and '192.168.10.150'.
- DNS Cache:** A button located at the bottom of the configuration area.

At the bottom left of the window, there is a 'Top' button.

- **Configure DHCP Server**

1. Steps to Configure DHCP:
2. Assign a static IP address (192.168.10.0) to the DHCP server.
3. Enable DHCP services and create a DHCP pool:
4. Start IP: 192.168.10.0
5. Subnet Mask: 255.255.255.0
6. Default Gateway: 192.168.10.50
7. DNS Server: 192.168.10.100

Server0

Physical

Config

Services

Desktop

Programming

Attributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

DHCP

Interface

FastEthernet0

Service

On

Off

Pool Name

serverPool

Default Gateway

192.168.10.50

DNS Server

192.168.10.100

Start IP Address :

192

168

10

0

Subnet Mask:

255

255

255

0

Maximum Number of Users :

256

TFTP Server:

0.0.0.0

WLC Address:

0.0.0.0

Add

Save

Remove

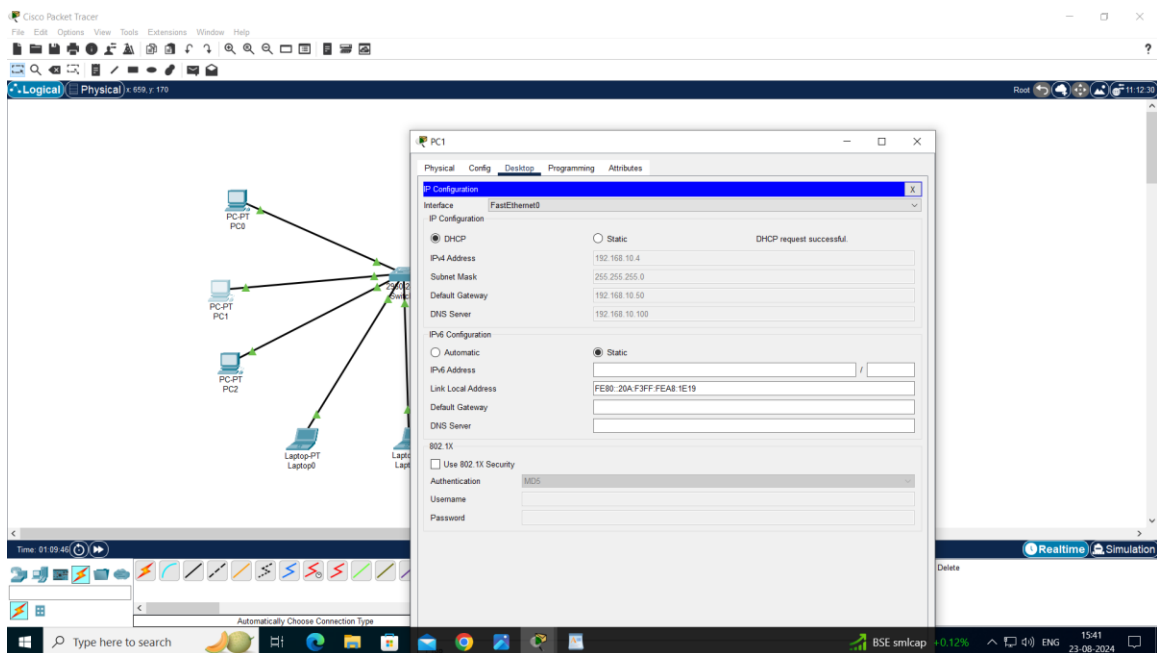
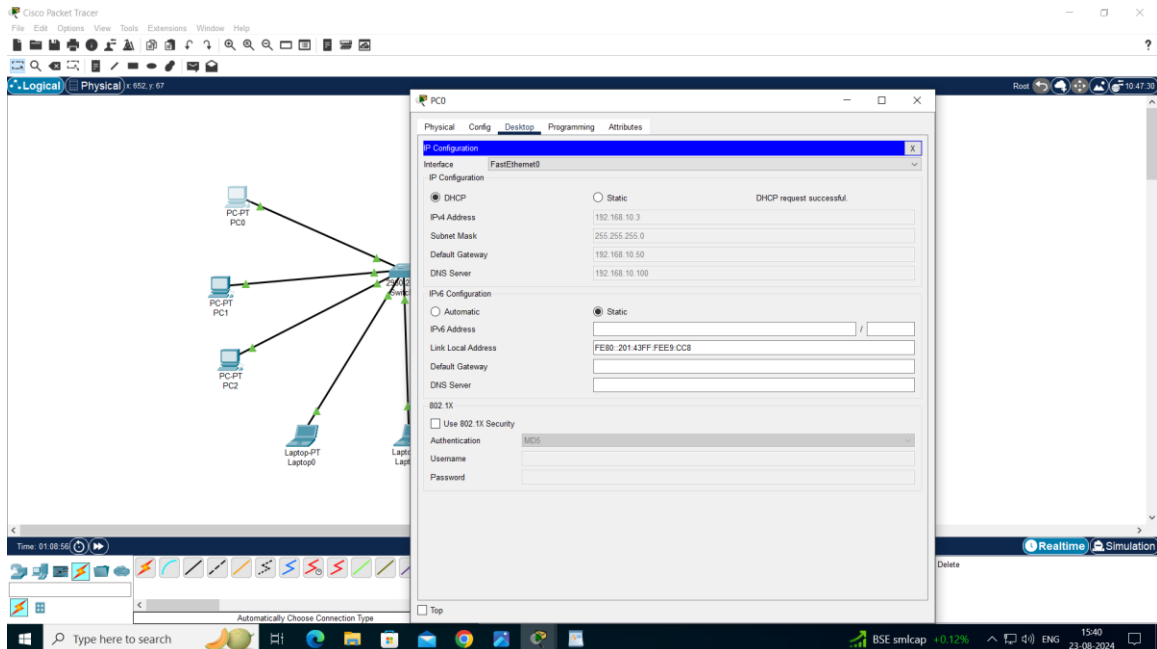
Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	192.168.1...	192.168.1...	192.168.10.0	255.255.2...	256	0.0.0.0	0.0.0.0

Top

- **Assign IP's to PC/laptops/other devices using DHCP Server**

1. Steps to Assign IPs:
2. Configure the client devices (PCs) to receive IP addresses automatically (via DHCP).

3. Verify the IP address assignment by using the ipconfig command on each PC.
4. Ensure each device is assigned an IP within the specified range.



Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical 604 / 230

PC2

Physical Config Desktop Programming Attributes

Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static DHCP request successful

IPv4 Address 192.168.10.5

Subnet Mask 255.255.255.0

Default Gateway 192.168.10.50

DNS Server 192.168.10.100

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address

Link Local Address FE80:2D6:BAFF:FE05:B66

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

Time: 01:10:15

Realtime Simulation

Type here to search

BSE smlcap +0.12%

15:42 23-08-2024

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical 605 / 487

Laptop0

Physical Config Desktop Programming Attributes

Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static DHCP request successful

IPv4 Address 192.168.10.6

Subnet Mask 255.255.255.0

Default Gateway 192.168.10.50

DNS Server 192.168.10.100

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address

Link Local Address FE80:2E8:A3FF:FE09:40E8

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

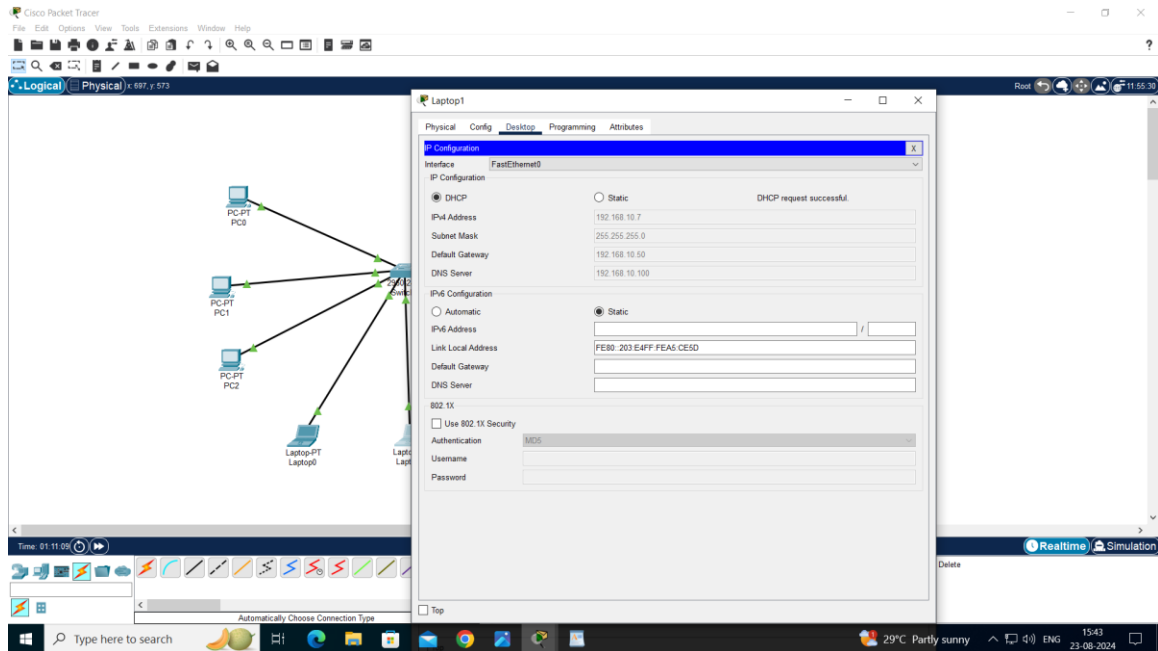
Time: 01:10:44

Realtime Simulation

Type here to search

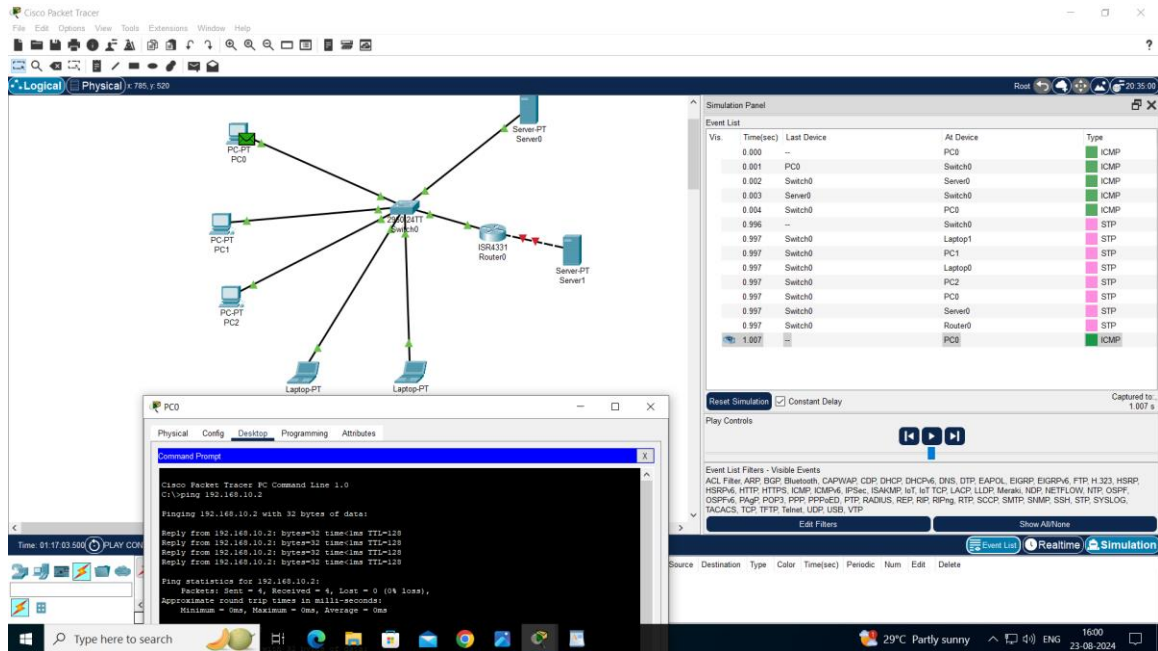
BSE smlcap +0.12%

15:42 23-08-2024



- **Send traffic from any PC to a Web Server using Simulation Mode**

1. Steps:
2. In Packet Tracer, set up the simulation mode.
3. From a PC, open the browser and navigate (WebServer IP).
4. Observe the packet exchange between the client and web server, focusing on DHCP, DNS, and HTTP traffic.



- **Access the same server using FQDN using Simulation Mode**

Steps:

1. On a PC, open the browser and enter www.batch.com.
2. The PC sends a DNS request to the DNS server to resolve www.batch.com to its IP address (192.168.10.100).

After receiving the IP address, the PC establishes an HTTP connection with the web server.

PDU Formats

