

DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKING LAB

LAB4: 20/12/2022

Working with the Application Layer

DHCP,DNS, HTTP, HTTPS, Email

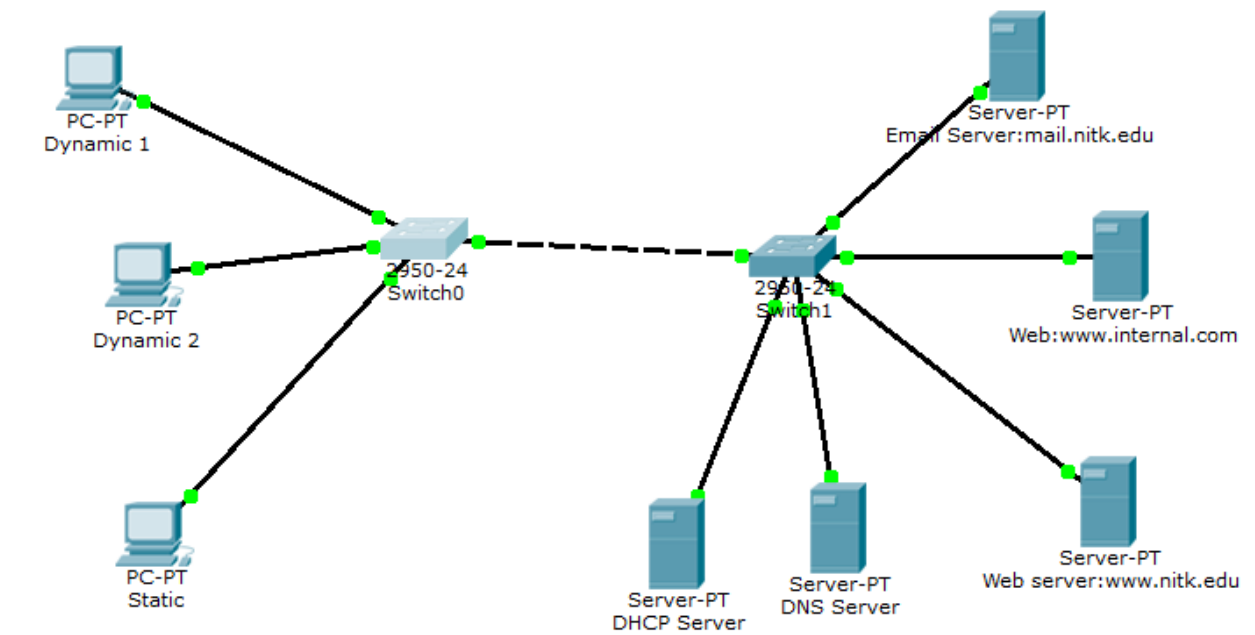
Marks : 10 Marks

Objective:

- To create a network topology with the server
- To understand DHCP, DNS, HTTP, HTTPS and Email
- To understand the working of various types of servers

Exercise 1.

a) Create following topology



b) Display the names of each device as shown in the diagram.

c) Start Packet tracer using Realtime mode

- Options -> Preferences

- o Enable "Show Link Lights"
- o Disable "Hide Device Label"

d) Configuring the DHCP Server

Add a server

Global Settings:

- o Change the display Name to "DHCP Server"
- o Set the Gateway to 172.16.0.1

FastEthernet:

- o Set the IP address to 172. 16.0.10
- o Set the Subnet Mask to 255.255.0.0

HTTP:

- Set HTTP service and HTTPS service to OFF

DHCP:

- Set Service to On
- Set the Default Gateway to 172.16.0.1
- Set the DNS Server to **172.16.0.11**
- Set the Start IP address to **172.16.0.100**
- Save the changes

DNS:

- Set the service OFF

Email:

- Set the SMTP Service and POP3 service to OFF

e) Configuring the DNS server

Add a server

Global settings:

- Change the Display Name to "**DNS Server**"
- Set the Gateway to **172.16.0.1**

FastEthernet:

- o Set the IP address to **172. 16.0.11**
- o Set the Subnet Mask to **255.255.0.0**

HTTP:

- Set HTTP service and HTTPS service to OFF

DHCP:

- Set the service OFF

DNS:

- Entering the **www.nitk.edu** domain
 - o Enter for the Domain Name www.nitk.edu
 - o Enter for the IP Address 172.16.0.20
 - o Click Add

- Entering the **www.internal.com** Domain name
 - o Enter for the Domain Name **www.internal.com**
 - o Enter for the IP Address **172.16.0.30**
 - o Click Add
- Entering the **mail.nitk.edu** Domain name
 - o Enter for the Domain Name **mail.nitk.edu**
 - o Enter for the IP Address **172.16.0.40**
 - o Click Add

Email:

- Set the SMTP Service and POP3 service to OFF

f) Configuring the **www.nitk.edu** Web Server

Add a server

Global settings:

- Change the Display Name to "**Web Server:www.nitk.edu**"
- Set the Gateway to **172.16.0.1**

FastEthernet:

- o Set the IP address to **172. 16.0.20**
- o Set the Subnet Mask to **255.255.0.0**

HTTP:

- Set both the HTTP and HTTPS Service to ON.
- Change the sentence, "<hr> Welcome to CISCO Packet Tracer. Opening doors to new opportunities. Mind Wide open. "to" <hr>Welcome to National Institute of Technology Karnataka Surathkal public web page!" . you may add other information as well

DHCP:

- Set the service OFF

DNS:

- Set the service OFF

Email:

- Set the SMTP Service and POP3 service to OFF

g) Configuring the **www.internal.com** Web Server

Add a server

Global settings:

- Change the Display Name to "**Web Server:www.internal.com**"
- Set the Gateway to **172.16.0.1**

FastEthernet:

- o Set the IP address to **172. 16.0.30**
- o Set the Subnet Mask to **255.255.0.0**

HTTP:

- Set both the HTTP and HTTPS Service to ON.
- Change the sentence, "<hr> Welcome to CISCO Packet Tracer. Opening doors to new opportunities. Mind Wide open. "to" <hr>This is internal network!" . you may add other information as well

DHCP:

- Set the service OFF

DNS:

- Set the service OFF

h) Configuring the mail.nitk.edu Email Server

Add a server

Global settings:

- Change the Display Name to "**Email Server:mail.nitk.edu**"
- Set the Gateway to **172.16.0.1**

FastEthernet:

- o Set the IP address to **172. 16.0.40**
- o Set the Subnet Mask to **255.255.0.0**

HTTP:

- Set both the HTTP and HTTPS Service to OFF.

DHCP:

- Set the service OFF

DNS:

- Set the service OFF

Email:

- Set SMTP and POP3 Service to ON.
- Set the domain name to mail.nitk.edu
- Set up three user accounts as follows:

Users	Passwords
user1	ccnlab1
user2	ccnlab2
user3	ccnlab3

i) Configure two client computers using DHCP

Add two client computers

Global settings

- Change the Display Names to "Dynamic 1" and to "Dynamic 2" respectively
- Set the Gateway /DNS to DHCP

FastEthernet

- Set the IP Configuration to DHCP

j) Configure one client computer using static IP addressing

Add two client computers

Global settings:

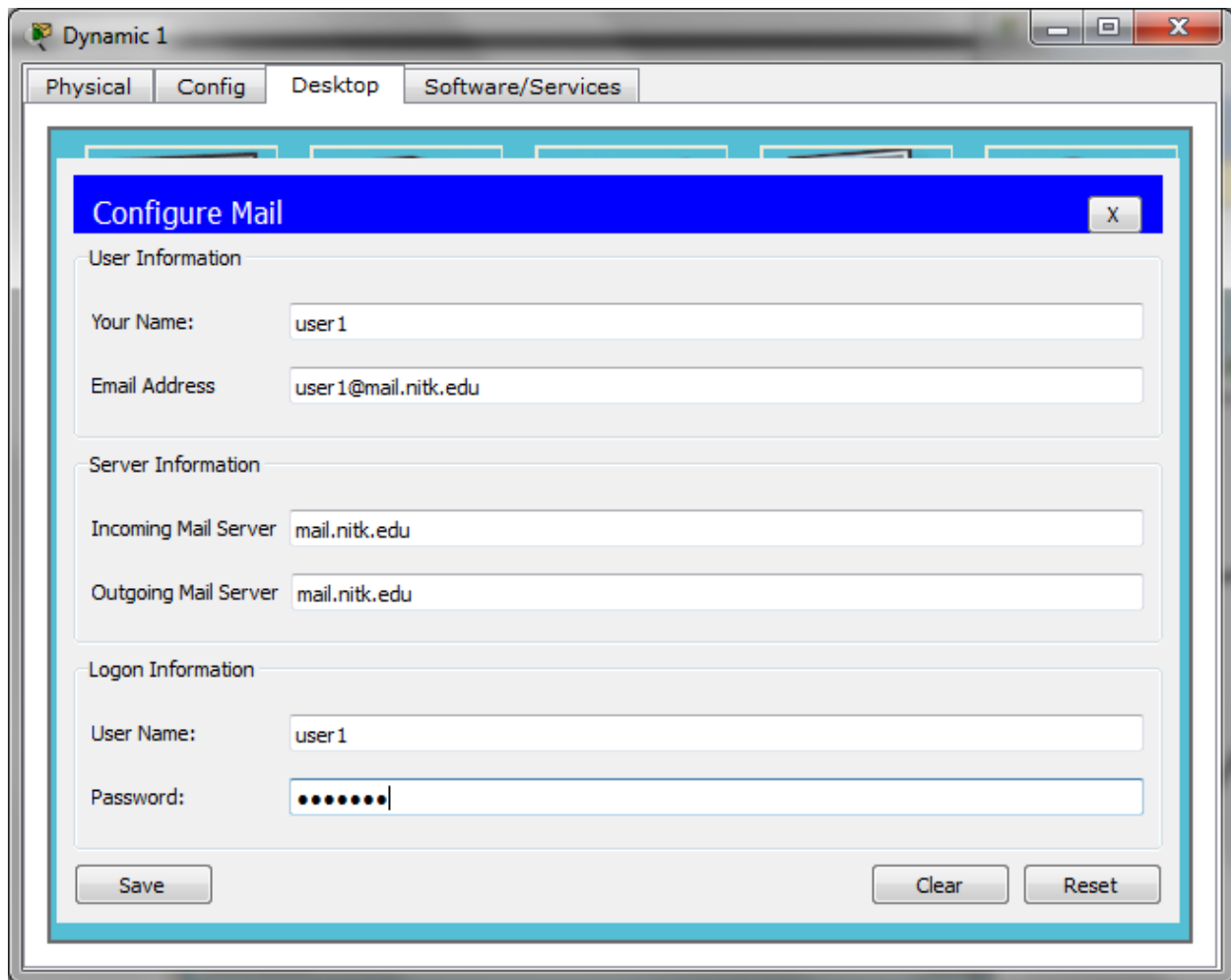
- Change the Display Name to "Static"
- Set the Gateway/DNS to Static
 - o Set Gateway to 172.16.0.1
 - o Set the DNS Server to 172.16.0.11

FastEthernet

- Be sure the configuration is set to Static
- Set the IP address to 172.16.0.90
- Set the Subnet Mask to 255.255.0.0

k) Configure Email Configuration for clients

Click on system Dynamic 1 -> Desktop -> Email



Similarly enter email configuration for Dynamic 2 and Static and SAVE.

l) Adding switches

- Add two switches
- Connect the servers to one switch using a straight-through cable
- Connect the client computers to the other switch using a straight-through cable.
- Interconnect the two switches using a crossover cable.

m) Verify the connectivity

Ping (ICMP)

- From client computer use Desktop command prompt to ping the other client computers and the servers
- Example: From Dynamic 1 client , C>ping 172.16.0.20
- The first one or two ping may fail, but you should receive a reply on the later pings. This is due to the ping timing out while the ARP process takes place.

Web Browser (HTTP)

- On the client computers use Desktop Web Browser, enter the URLs of the web Servers www.nitk.edu and www.internal.com
- You should see the web pages that you created on these servers.

Email (SMTP)

- From the client computer (Dynamic 1), compose an email (from Desktop tab) to another client computer (static) To: user3@mail.nitk.edu
- Upon sending the email, check if the email was received by Static PC by clicking the email icon (Desktop Tab), and clicking the receive button after.

n) Using Simulation Mode

Click on simulation

Note: To reset a simulation, click on “Reset Simulation”

Click on Edit Filters

- Choose Show All/None so that all boxes (protocols) are unchecked.
- Select (check) the following protocols: DHCP, ICMP, HTTP, DNS, HTTPS, SMTP

Web Browser (HTTP)

- On the client computers use the Desktop Web Browser, enter the URLs of the Web Servers <http://www.nitk.edu> or <http://www.internal.com>
- Click on Auto Capture/Play (automatically forwards the packets)or Capture Forward (must keep clicking to advance the packets)

DHCP

- Reset the simulation by clicking on “Reset Simulation”
- To view DHCP, on one of the “Dynamic” client computers using DHCP go to the Desktop Command prompt.
- To have the client computer ask for new IP address and other information from DHCP server, enter the command: **PC>ipconfig /renew**

Email

- Reset the simulation by clicking on “Reset Simulation”
- To view email, click on one of the client computer sending email to another client computer.
- Click on Auto capture/Play (automatically forwards the packets) or Capture Forward (must keep clicking to advance the packets)

Exercise 2

1. With the activity conducted, briefly describe the functions of the following application layer protocols:
 - HTTP:
 - HTTPS:
 - DHCP:
 - DNS:
 - SMTP:
2. Under Simulation mode, click Dynamic 1, then Command Prompt (on Desktop tab), then execute **ipconfig/release**, then **ipconfig/renew**. Click Auto Capture/play (automatically forwards the packets) or Capture Forward (must keep clicking to advance the packets) until Packet Tracer finishes simulation (or reach Buffer Full Status). On the simulation panel, look for the frame DHCP 172.16.0.10/16 (Last Device column) and Switch1 (At Device column). Click the Info square-colored area on the Info column. Click Outbound PDU details at PDU information.

	Answer
Preamble	
Source MAC address	
Destination MAC address	
Type field value	
Source IP address	
Destination IP address	

- a. A connection-oriented communication is where the sender and receiver must prearrange for communications to occur, otherwise communications fails. Connectionless services do not prearrange for communications to occur. Connection-oriented services use TCP as its transport layer protocol whereas connectionless service or a connectionless service? Is DHCP running TCP or UDP services? What is the source port used by DHCP servers?

- b. From the five application protocols under study, identify the three protocols using TCP services.

3. Under Simulation mode, click Dynamic 2, then command Prompt(on Desktop tab), then type the URL <http://www.internal.com> on the web browser. Similarly, do the same for Static PC, typing in https://www.internal.com. Click Auto Capture/play (automatically forwards the packets) or Capture Forward (must keep clicking to advance the packets) until packet tracer finishes simulations(or reach bufferful status).
 - a. Before the interaction of the client using HTTP and HTTPS, what protocol was used first?
 - b. What is the source port used by the HTTP servers? HTTPS servers.?
 - c. Look at any PDU information containing an HTTP frame and another PDU information containing HTTPS frame. Look at the difference between the data stored via HTTP with that of HTTPS.
4. Under simulation mode, click Dynamic 1, then send email on one of the other client computers , run the simulations.
 - a. Before the interaction of the clients using SMTP, what protocol was used first.?
 - b. What is the source port used by servers running SMTP?
5. By identifying the protocols serviced by TCP and UDP , identify 3 fields present in TCP that are not found in UDP.
6. Perform a ping from Dynamic 1 to Dynamic 2 under simulations mode.
 Note: Before doing a ping, type in **arp -d** a the command prompt of Dynamic1 and execute **arp -a** after internet address and physical address must be empty after typing **arp -a**
 - Before the interaction of the clients with ping, what protocol was used first?
 - Execute **apr -a** after the successful ping. Write down the internet address and physical address on dynamic1.
 - Analyze the first ICMP frame and complete the table below.

	Answer
Source IP address	
Destination IP address	
ICMP Type value	
ICMP code value	
Source Ethernet Address	
Destination Ethernet Address	
Internet Protocol version	
Time to live (TTL) value	