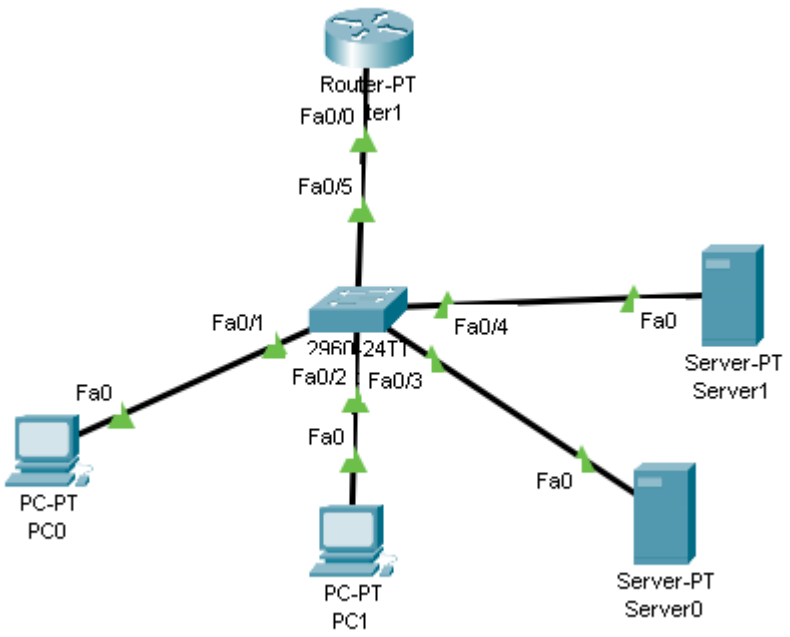
Experiment-9: Configuration of Various Application Layer Protocols (HTTP, DNS, DHCP, FTP, and Email)

Objective

To understand and configure Application Layer Protocols (Layer 7 of OSI Model) — HTTP, DNS, DHCP, FTP, and Email — using Cisco Packet Tracer.

Basic Network Topology



IP Scheme

Device	Interface	IP Address	Role
Router0	G0/0	192.168.1.1	Default Gateway
Server0	NIC	192.168.1.2	Web + DNS Server
Server1	NIC	192.168.1.3	DHCP + FTP + Email
PC0	NIC	DHCP (Dynamic)	Client
PC1	NIC	DHCP (Dynamic)	Client

Router Configuration

```
Router> enable
Router# configure terminal
Router(config)# interface gig0/0
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# ip dhcp excluded-address 192.168.1.1 192.168.1.10
Router(config)# ip dhcp pool LAN
Router(dhcp-config)# network 192.168.1.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.1.1
Router(dhcp-config)# dns-server 192.168.1.2
Router(dhcp-config)# exit
Router(config)# end
Router# write
```

The router is now configured with DHCP for the LAN.
(We'll compare this with Server-based DHCP later.)

HTTP (Web Server)

Concept

HTTP is the Hypertext Transfer Protocol used for web communication (port 80).

On Server0

1. Click Server0 → Services → HTTP.
2. Turn HTTP = ON, HTTPS = ON if needed.
3. Edit or upload an index.html file to customize the webpage.

On PCs

1. Assign IP via DHCP (or manually if DHCP not configured).
2. Open Web Browser → enter the server IP or domain (after DNS config).
   Example:
3. http://192.168.1.2

The webpage loads successfully.

DNS (Domain Name System)

Concept

DNS translates domain names to IP addresses.

On Server0

1. Go to Services → DNS.
2. Switch DNS = ON.
3. Under Resource Records, add:
4. Name: web.local
5. Address: 192.168.1.2

   You can add more entries if needed (e.g., mail.local, ftp.local).

On PCs

- Under Config → DNS, set DNS Server: 192.168.1.2.
- Or, if using DHCP, ensure the DHCP pool specifies this DNS.
- Test:
- PC> ping web.local
- PC> web browser → http://web.local

DNS resolves successfully.

DHCP (Dynamic Host Configuration Protocol)

Concept

DHCP automatically assigns IP, subnet mask, gateway, and DNS to clients.

Option A: Router as DHCP Server

(Already shown above.)

Option B: Server-based DHCP (Common in Enterprises)

On Server1:

1. Go to Services → DHCP.
2. Turn DHCP = ON.
3. Configure pool:
4. Default Gateway: 192.168.1.1
5. DNS Server: 192.168.1.2
6. Start IP: 192.168.1.11
7. Subnet Mask: 255.255.255.0
8. Maximum Users: 50
9. On PCs → Config → FastEthernet → DHCP.
   PCs receive IPs dynamically.

FTP (File Transfer Protocol)

Concept

FTP transfers files between client and server (ports 20/21).

On Server1

1. Go to Services → FTP.
2. Turn FTP = ON.
3. Create a user:
4. Username: ftpuser
5. Password: 123
6. Add files to the FTP directory.

On PC

1. Open Command Prompt:
2. PC> ftp 192.168.1.3
3. Enter username/password.
4. Use commands:
5. get filename.txt
6. put file.txt

File transfer successful.

Email (SMTP & POP3)

Concept

Email uses:

- SMTP for sending (port 25)
- POP3 for receiving (port 110)

On Server1

1. Go to Services → Email.
2. Turn SMTP = ON, POP3 = ON.
3. Add users:
4. User: alice@local.com Password: 123
5. User: bob@local.com Password: 123

On PCs

1. Go to Desktop → Email → Configure Mail
   Example for PC0 (Alice):
2. Display Name: Alice
3. Email: alice@local.com
4. Incoming Mail Server: 192.168.1.3
5. Outgoing Mail Server: 192.168.1.3
6. Username: alice
7. Password: 123

   For PC1 (Bob):

   Email: bob@local.com
   Username: bob

8. Compose mail from Alice → Bob.

   Bob receives it in his inbox.

Verification Commands (CLI)

Command	Description
ipconfig	View assigned IP via DHCP
ping <ip or domain>	Test connectivity or DNS
ftp <server>	Test FTP connection
telnet <server> 25	Test SMTP reachability
show ip dhcp binding (on router)	View DHCP leases
show ip dhcp pool	View DHCP pool details

Final Testing Summary

Function	Client Action	Expected Result
HTTP	Browser → http://192.168.1.2	Webpage opens
DNS	ping web.local	Resolves to 192.168.1.2
DHCP	Automatic IP	Gets IP from 192.168.1.11+
FTP	ftp 192.168.1.3	Login + file transfer
Email	Send Alice→Bob	Delivered successfully

Key Notes

- All servers must have static IPs.

- Clients use DHCP to get IP, gateway, and DNS.
- Ensure services are ON in each server's Services tab.
- Use DNS names instead of IPs for realism (e.g., web.local, mail.local).
- You can combine all services in one server or distribute across multiple servers.

Home Task