

# Advanced Network Services Lab Exercise

Dr. Mohamed Amine Ferrag  
Guelma University

27.02.2025

## Objective

- Simulate DNS name resolution services.
- Set up HTTP, FTP, and TFTP servers and clients to transfer data.
- Explore basic email traffic using SMTP.
- Monitor and manage network devices using SNMP.
- Practice remote device management using Telnet and SSH.

## Lab Topology and Devices

### Devices Required:

- 1 Cisco Router (e.g., 2901)
- 1 Switch (e.g., 2960)
- 3 PCs
- 1 Server (to host DNS, HTTP, FTP, TFTP, and SMTP services)

### Connections:

- Connect all devices to the switch.
- Connect the router to the switch.

### Network Scheme:

- **Subnet:** 192.168.2.0/24
- **Router's Interface:** 192.168.2.1 (default gateway)
- **Server IP:** 192.168.2.10

## Lab Exercise Steps

### Part 1: DNS – Simulate Name Resolution Services

#### 1. Configure the DNS Server:

- On the Server (using Packet Tracer's Server device), navigate to the DNS service tab.
- Add DNS entries mapping hostnames (e.g., `www.example.com`) to IP addresses (e.g., `192.168.2.10`).

#### 2. Configure a Client PC:

- Set the PC's DNS server to `192.168.2.10` in its IP configuration.

#### 3. Test Name Resolution: Open the command prompt on the PC and run:

```
ping www.example.com
```

Listing 1: Ping by Hostname

### Part 2: HTTP, FTP & TFTP – Set Up Servers and Clients for Data Transfer

This section covers both the configuration via the Server GUI (in Packet Tracer) and the corresponding commands on a Cisco router where applicable.

#### HTTP

##### Server Configuration (GUI):

1. On the Server device, navigate to the **Services** tab and select **HTTP**.
2. Enable the HTTP service and upload or create a simple HTML page.

**Router HTTP Server Commands (Optional):** If you wish to use the router's built-in HTTP server (for example, for remote management), enter the following commands:

```
Router> enable
Router# configure terminal
Router(config)# ip http server
Router(config)# ip http secure-server
Router(config)# exit
```

Listing 2: Enable HTTP Server on Router

##### Client Test:

1. On a PC, open a web browser.
2. Enter the Server IP (`192.168.2.10`) or the domain name (e.g., `www.example.com`) to access the web page.

## FTP

### Server Configuration (GUI):

1. On the Server device, navigate to the **Services** tab and select **FTP**.
2. Enable the FTP service and upload a sample file to the FTP directory.

**Router FTP Client Commands:** While Cisco routers do not function as FTP servers, they can be used as FTP clients. Configure FTP client credentials (if needed) and use the FTP command:

```
Router(config)# ip ftp username your_username
Router(config)# ip ftp password your_password
Router# ftp 192.168.2.10
```

Listing 3: Configure FTP Client on Router

Follow the prompts to log in and transfer files.

## TFTP

### Server Configuration (GUI):

1. On the Server device, navigate to the **Services** tab and select **TFTP**.
2. Enable the TFTP service and place a file in the TFTP directory.

**Router as TFTP Server (Optional):** A Cisco router can be configured to serve a file via TFTP. For example, to make a file available from flash memory:

```
Router(config)# tftp-server flash:myfile.txt
```

Listing 4: Configure Router as TFTP Server

**Router TFTP Client Commands:** To transfer a file using TFTP from the router, use:

```
Router# copy flash: myfile.txt tftp:
```

Listing 5: Copy File via TFTP

When prompted, enter the TFTP server IP (192.168.2.10) and confirm the filename. To copy a file from TFTP to the router, reverse the source and destination:

```
Router# copy tftp: flash:
```

Listing 6: Copy File from TFTP

## Part 3: SMTP – Explore Basic Email Traffic

### 1. Configure the SMTP Server:

- On the Server device, navigate to the **Services** tab and select **SMTP**.
- Enable the SMTP service and configure the SMTP settings (e.g., domain **example.com**).

2. **Send a Test Email:** On a PC, use the email client (or Packet Tracer's email simulation) to configure the SMTP server as 192.168.2.10 and send a test message.

## Part 4: SNMP – Monitor and Manage Network Devices

### 1. Configure SNMP on the Router:

```
Router> enable
Router# configure terminal
Router(config)# snmp-server community public RO
Router(config)# exit
```

Listing 7: Router SNMP Configuration

2. **Monitor the Device:** From a PC or SNMP manager device, use SNMP query tools to check the router's status (e.g., CPU load, interface statistics).

## Part 5: Telnet & SSH – Practice Remote Device Management

### Telnet

#### 1. Enable Telnet on the Router:

```
Router> enable
Router# configure terminal
Router(config)# line vty 0 4
Router(config-line)# password cisco
Router(config-line)# login
Router(config-line)# exit
```

Listing 8: Enable Telnet

2. **Connect via Telnet:** On a PC, open the Terminal or Telnet client and connect to the router IP (192.168.2.1).

### SSH

#### 1. Enable SSH on the Router:

```
Router> enable
Router# configure terminal
Router1(config)# hostname Router1
Router1(config)# ip domain-name example.com
Router1(config)# crypto key generate rsa modulus 1024
Router1(config)# username admin privilege 15 secret adminpass
Router1(config)# line vty 0 4
Router1(config-line)# transport input ssh
Router1(config-line)# login local
Router1(config-line)# exit
```

Listing 9: Enable SSH

2. **Connect via SSH:** On a PC, use an SSH client (e.g., PuTTY or Packet Tracer's SSH client) to connect to 192.168.2.1 using the credentials defined above.

## Conclusion

This lab exercise provides hands-on experience with several essential network services and protocols:

- **DNS** for name resolution.
- **HTTP, FTP, & TFTP** for web access and file transfers (with both GUI configuration and router commands).
- **SMTP** for email traffic.
- **SNMP** for network monitoring.
- **Telnet & SSH** for remote device management.

By completing this exercise, students will gain practical insights into configuring, testing, and troubleshooting a variety of network services in a simulated environment.