Network Project Report in Packet Tracer

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Computer Networking

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Introduction

This report outlines the development and configuration of a simulated local area network (LAN) using Cisco Packet Tracer. The goal is to establish a functional connection between a web server and end devices via a LAN and a simulated internet connection. This project is part of the Computer Engineering course at Universidad Distrital Francisco José de Caldas and aims to implement various network configurations to ensure that the university's website is accessible from different devices.

Project Objective

The main objective of this project is to set up a complete network that allows users to access a local webpage through the internet. To achieve this, a network has been created in Packet Tracer, including the following components:

- Local Web Server: Configured to host the main page of Universidad Distrital Francisco José de Caldas. This server is set up to serve the homepage via HTTP, using a specific IP address and DNS and DHCP services.
- Internet Connection: Simulated using a modem and router, connecting the local server to a cloud representing global network access.
- End Devices: Two end devices—a PC and a laptop—connected to the network via wired and wireless methods to test accessibility from different points.

Project Description

The project was carried out according to the specified guidelines, including IP address configuration, DHCP and DNS services, and physical connections between network devices. A series of tests were conducted to ensure that the server's webpage is accessible from devices connected to the local network, confirming that the server and associated services are functioning correctly.

This report provides a detailed description of the network design, configurations, and test results to evaluate the effectiveness of the implementation and offer a clear view of the steps taken to achieve the project objectives.

Network Design

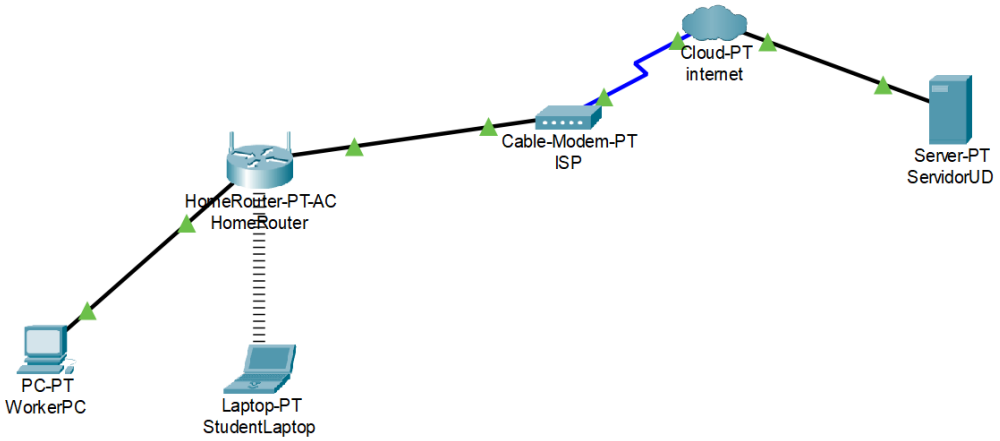
General Overview

The network design simulates an environment where the main webpage of Universidad Distrital Francisco José de Caldas can be accessed from end devices within a home network. The network setup includes a web server, a router simulating an internet connection, a modem, and end devices such as a PC and a laptop. Below is a detailed description of the configuration and connections for each component.

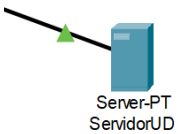
1. **Network Diagram**

The following network diagram illustrates the layout and connections between the various devices:

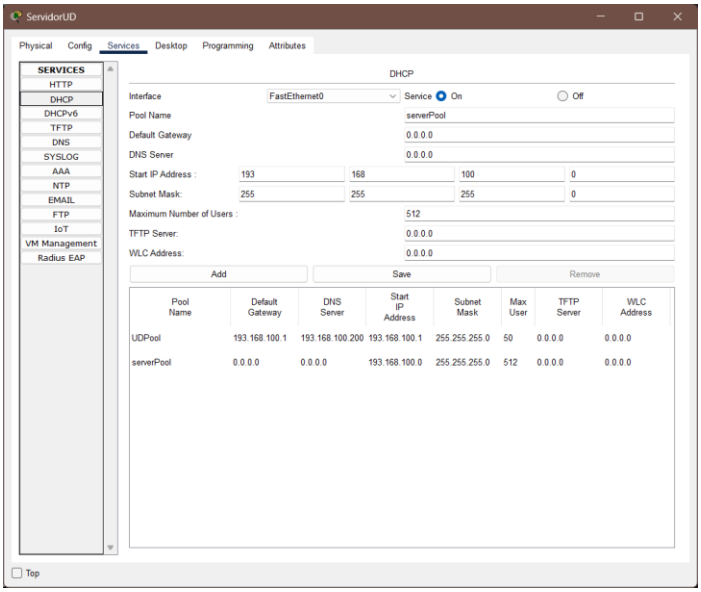
- **Web Server**: Configured with the IP address 193.168.100.200, it hosts the university's main webpage.
- **Router and Modem**: The HomeRouter connects the local network to the ISP modem, which connects to the internet cloud.
- **End Devices**: A PC connected via Ethernet cable and a laptop connected wirelessly to the UD_Invitados network.

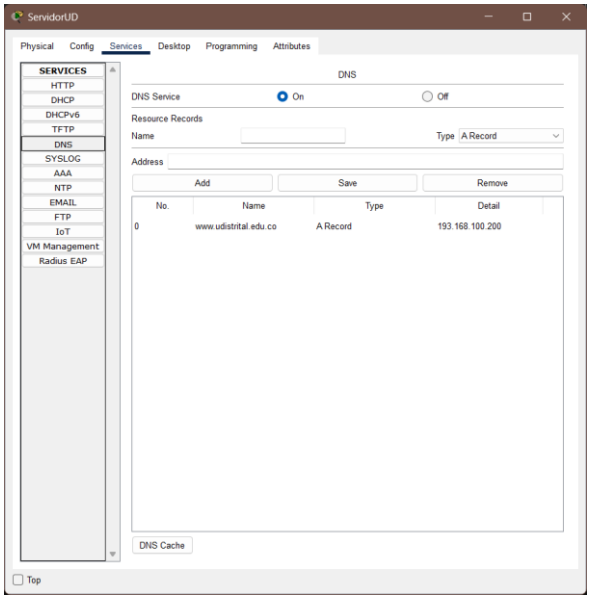


2. **Device Configuration**

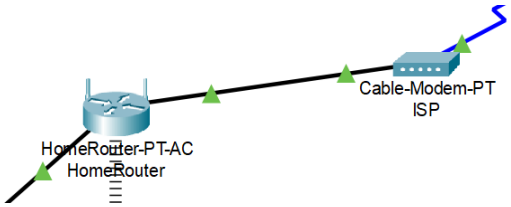


- **Web Server**:
  - IP Address: 193.168.100.200
  - Subnet Mask: 255.255.255.0
  - Default Gateway: 193.168.100.1
  - DNS Server: 193.168.100.200
  - **Configured Services**:
    - **HTTP**: The homepage (index.html) is set up to deliver the welcome content.
    - **DHCP**: Configured with an IP range for the network.
    - **DNS**: Configured to resolve www.udistrital.edu.co to the server's IP.

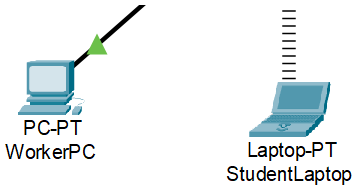




- **Router and Modem**:
  - **Router (HomeRouter)**:
    - LAN IP Address: 192.168.0.1
    - LAN Subnet Mask: 255.255.255.0
    - Wireless SSID: UD_Invitados
    - Coverage Range: 20 meters



  - **Modem (ISP)**:
    - Connected to the Coaxial7 port of the internet cloud.
- **End Devices**:
  - **PC (WorkerPC)**:
    - IP Address: Assigned by DHCP.
    - Connection: Wired to the HomeRouter.
  - **Laptop (StudentLaptop)**:
    - IP Address: Assigned by DHCP.
    - Connection: Wireless to the UD_Invitados network.



3. **Network Connections**

- **Web Server**: Connected to the Router via a Copper Straight-Through cable.
- **Router**: Connected to the ISP Modem with a Copper Straight-Through cable.
- **End Devices**:
  - PC connected via Ethernet to the Router.
  - Laptop connected wirelessly to the Router's network.

Technical Configuration

This section details the configuration of each network component, including the web server, router, modem, and end devices.

1. **Web Server Configuration**
    - **IP Address and Network Settings**:
        - IPv4 Address: 193.168.100.200
        - Subnet Mask: 255.255.255.0
        - Default Gateway: 193.168.100.1
        - DNS Server: 193.168.100.200
    - **Service Configuration**:
        - **HTTP Service**:
            - **Web Files**: Only `index.html` is present in the web directory.
            - **Content of index.html**:

```
<html lang="es">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-
width, initial-scale=1.0">
    <title>Bienvenidos - Universidad
Distrital</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            margin: 0;
            padding: 0;
            background-color: #f5f5f5;
            color: #333;
        }

        header {
            background-color: #004a87;
            color: white;
            padding: 20px;
            text-align: center;
        }

        header h1 {
            margin: 0;
            font-size: 2.5rem;
        }

        header p {
            margin-top: 10px;
            font-size: 1.2rem;
        }

        main {
            display: flex;
            justify-content: center;
            align-items: center;
            height: 80vh;
            text-align: center;
        }

        main h2 {
            font-size: 2rem;
            color: #004a87;
```

```
        }

        .content {
            max-width: 600px;
            padding: 20px;
            background-color: white;
            box-shadow: 0 4px 8px rgba(0, 0, 0,
0.1);
        }

        footer {
            background-color: #004a87;
            color: white;
            text-align: center;
            padding: 10px;
            position: fixed;
            width: 100%;
            bottom: 0;
        }

        footer p {
            margin: 0;
        }

        @media (max-width: 600px) {
            header h1 {
                font-size: 2rem;
            }

            main h2 {
                font-size: 1.5rem;
            }
        }
    </style>
</head>
<body>
    <header>
        <h1>Bienvenidos a la Universidad
Distrital Francisco José de Caldas</h1>
        <p>Educación con excelencia y
compromiso</p>
    </header>

    <main>
        <div class="content">
            <h2>¡Te damos la más cordial
bienvenida!</h2>
            <p>La Universidad Distrital Francisco
José de Caldas es una institución pública
comprometida con la formación integral de los
estudiantes, la investigación, y la
responsabilidad social. Nos enorgullecemos de ser
un espacio de inclusión, innovación y
conocimiento.</p>
        </div>
    </main>
```

```
    <footer>
        <p>Universidad Distrital Francisco José
de Caldas - Todos los derechos reservados ©
2024</p>
    </footer>
</body>
</html>
```

- **DHCP Service**:
  - Pool Name: UDPool
  - Default Gateway: 193.168.100.200
  - DNS Server: 193.168.100.200
  - Initial IP Address: 193.168.100.1
  - Subnet Mask: 255.255.255.0
  - Maximum Users: 50
- **DNS Service**:
  - Name: www.udistrital.edu.co
  - Record Type: A
  - Address: 193.168.100.200

2. **Router (HomeRouter) Configuration**
   - LAN IP Address: 192.168.0.1
   - LAN Subnet Mask: 255.255.255.0
   - Wireless SSID: UD_Invitados
   - Coverage Range: 20 meters
3. **Modem (ISP) Configuration**
   - **Connection to Router**:
     - Port: Port0 of Cable-Modem-PT.
     - Physical Connection: Use a Copper Straight-Through cable to connect the FastEthernet port of the Router to the Ethernet port of the Cable-Modem-PT.
4. **End Devices Configuration**
   - **PC (WorkerPC)**:
     - Network Configuration: Obtain IP address via DHCP from the HomeRouter.
   - **Laptop (StudentLaptop)**:
     - Network Configuration: Obtain IP address via DHCP from the HomeRouter.
     - Wireless Connection: Connect to the UD_Invitados network.

Test Results

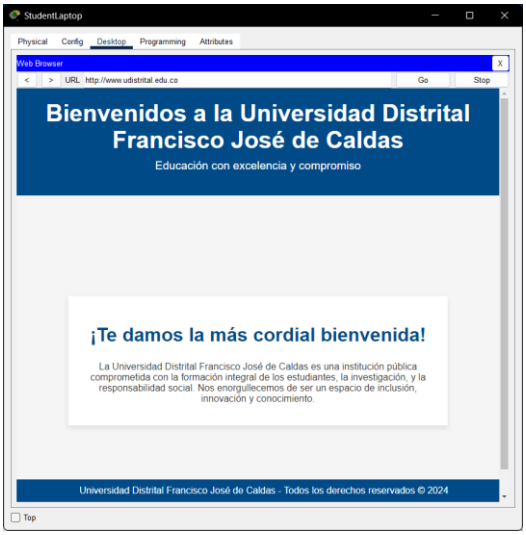
Test Objective

The goal of the tests is to verify that the end devices connected to the network can correctly access the webpage hosted on the local server. This includes ensuring that both the PC and the laptop can load the webpage using the configured domain name, www.udistrital.edu.co.

1. **Test from the PC (WorkerPC)**
   - **Device Configuration**: The PC is set up to obtain an IP address via DHCP from the HomeRouter.
   - **Test Performed**:

        - Opened a web browser.
        - Entered the URL www.udistrital.edu.co in the address bar.
    - **Result**:
        - **Web Page**: The main page of Universidad Distrital Francisco José de Caldas loaded successfully.
    - **Screenshot**:

2. **Test from the Laptop (StudentLaptop)**
    - **Device Configuration**: The laptop is configured to obtain an IP address via DHCP from the HomeRouter and is connected to the wireless network UD_Invitados.
    - **Test Performed**:
        - Connected to the UD_Invitados wireless network.
        - Opened a web browser.
        - Entered the URL www.udistrital.edu.co in the address bar.
    - **Result**:
        - **Web Page**: The main page of Universidad Distrital Francisco José de Caldas loaded successfully.
    - **Screenshot**:



3. **Configuration and Connectivity Verification**
    - **IP Addresses**:
        - **PC**: Confirmed that the IP address obtained via DHCP is within the range configured on the HomeRouter.
        - **Laptop**: Confirmed that the IP address obtained via DHCP is within the range configured on the HomeRouter.
    - **Connectivity**:
        - **Ping to Server**: Performed a ping to the server at 193.168.100.200 from both devices to check network connectivity.
        - **Ping Results**:
            - **PC**: Successful response.
            - **Laptop**: Successful response.

Conclusions

- The web server was successfully configured, making the main page of Universidad Distrital Francisco José de Caldas available through the domain name www.udistrital.edu.co. The removal of unnecessary pages and correct HTTP service setup ensure that only the `index.html` page is accessible, meeting the project's requirements.
- Tests from both the PC and the laptop confirmed that the devices can access the webpage hosted on the server. Network connectivity was validated through ping tests, and IP addresses were correctly assigned via DHCP.
- The configuration of the HomeRouter and ISP modem allowed effective connection between the local network and the simulated Internet cloud. Integration of devices such as the PC and laptop into the network was successful, and it was verified that the UD_Invitados wireless network provided access to the webpage from the laptop.
- All specified project requirements were met. The network was configured to allow proper connectivity between the server and end devices, and necessary tests were conducted to ensure the configuration was correct and functioning as expected.
- For future network implementations or expansions, it is recommended to maintain detailed documentation of each component's configuration and perform periodic tests to ensure continuous functionality. Additionally, consider scalability and security, especially when integrating new devices or services.