Universidad Distrital Francisco José de Caldas
Faculty of Engineering
Subject: Computer Networks
Workshop 2

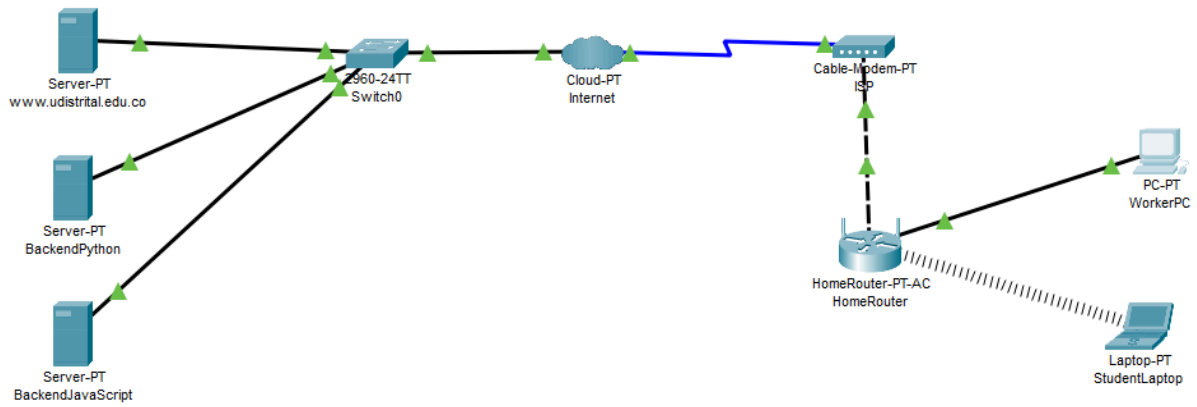
Final Report: Network Design and Simulation in Packet Tracer

1. Introduction

This report documents the design, configuration, and analysis of a network implemented in **Cisco Packet Tracer**, aiming to study the operation of the **OSI Model** through its different layers.

The network includes two backend servers (one using Python and another using JavaScript), a frontend server, and user stations. Additionally, the **simulation tool** was used to analyze network traffic and verify device communication.

2. Network Screenshot



3. Network Design Decisions

3.1. Network Infrastructure

The network was designed with the following structure:

- **BackendPython Server**: A server with the IP **193.168.100.201** providing a web service in **Python**.
- **BackendJavaScript Server**: A server with the IP **193.168.100.202** providing a web service in **JavaScript**.
- **FrontEnd Server**: A server hosting a web page with buttons to interact with the backend servers.
- **StudentLaptop and WorkerPC**: User devices to test connectivity and service accessibility.
- **Switches and Router**: Used for device connection and network segmentation.

3.2. IP Addressing Scheme

The following IP address scheme was assigned:

Device	IP Address	Subnet Mask	Gateway
BackendPython	193.168.100.201	255.255.255.0	193.168.100.1
BackendJavaScript	193.168.100.202	255.255.255.0	193.168.100.1
FrontEndServer	193.168.100.100	255.255.255.0	193.168.100.1
StudentLaptop	193.168.100.50	255.255.255.0	193.168.100.1
WorkerPC	193.168.100.51	255.255.255.0	193.168.100.1

3.3. Configured Services

- **HTTP Server** on the FrontEnd Server to host the web page.
- **Routes on BackendPython and BackendJavaScript servers** to handle HTTP requests.

4. Network Analysis Using Simulation Tool

To verify network communication, the **Simulation** option in Packet Tracer was used. The following tests were conducted:

- **Connectivity Test**: Ping commands were sent between devices to validate connectivity.
- **HTTP Packet Capture**: Client requests to the frontend server were analyzed, along with subsequent communication with the backend servers.
- **Data Flow Verification in the OSI Model**: Packets were tracked across OSI layers, from the application layer down to the physical layer.

Key Findings: ✅ Communication between backend servers and the frontend is successful. ✅ StudentLaptop and WorkerPC can access the web page correctly. ✅ A VLAN was implemented to prevent direct access to backend servers from end users.

5. Conclusions

- Configuring servers in different languages (Python and JavaScript) provides insight into **how web services operate in local networks**.
- The network simulation confirmed that the setup is functional and meets the required specifications.