Computer Networks LAB-1: Introduction to Packet Tracer, Peer-to-Peer Communication, Study of Cables and its Colour Codes

Objective:

- To familiarize students with Cisco Packet Tracer.
- To set up a peer-to-peer (P2P) communication network.
- To study different types of network cables and their color codes.
- To document the observations and save the configuration file in a GitHub repository.

Requirements:

- Cisco Packet Tracer software.
- A GitHub account and a repository for lab assignments.
- Access to Google Classroom for submission.

Instructions:

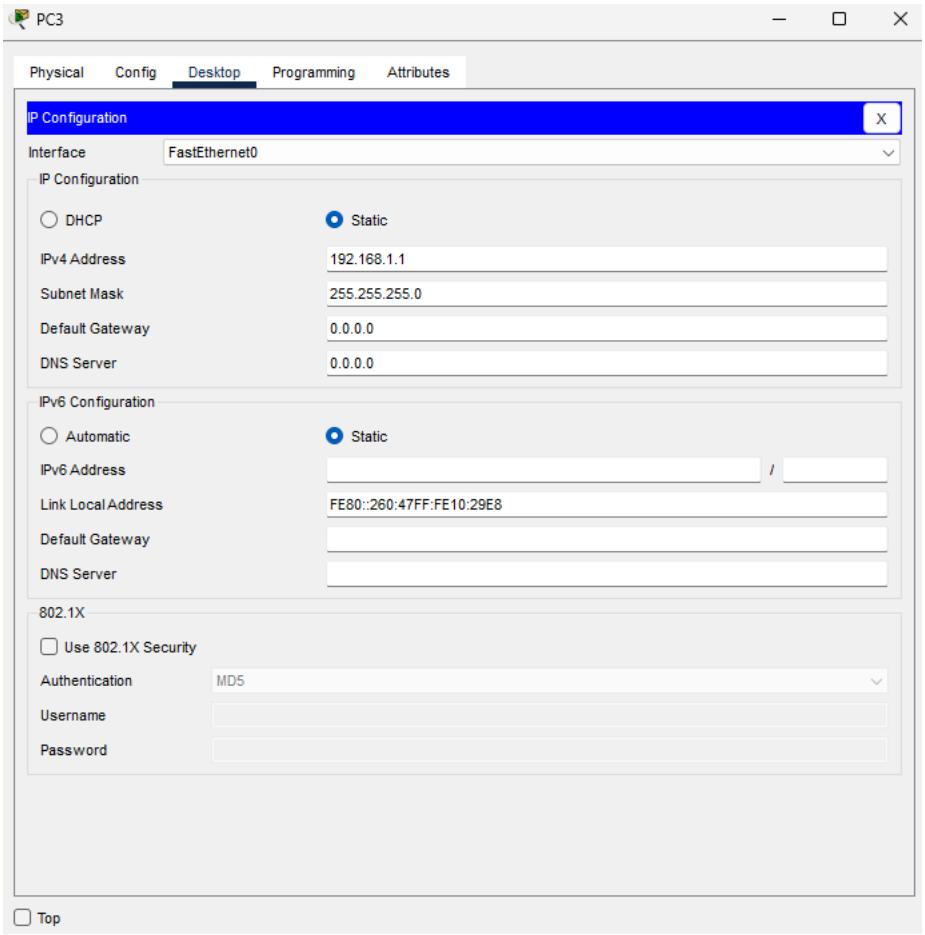
Part 1: Introduction to Packet Tracer

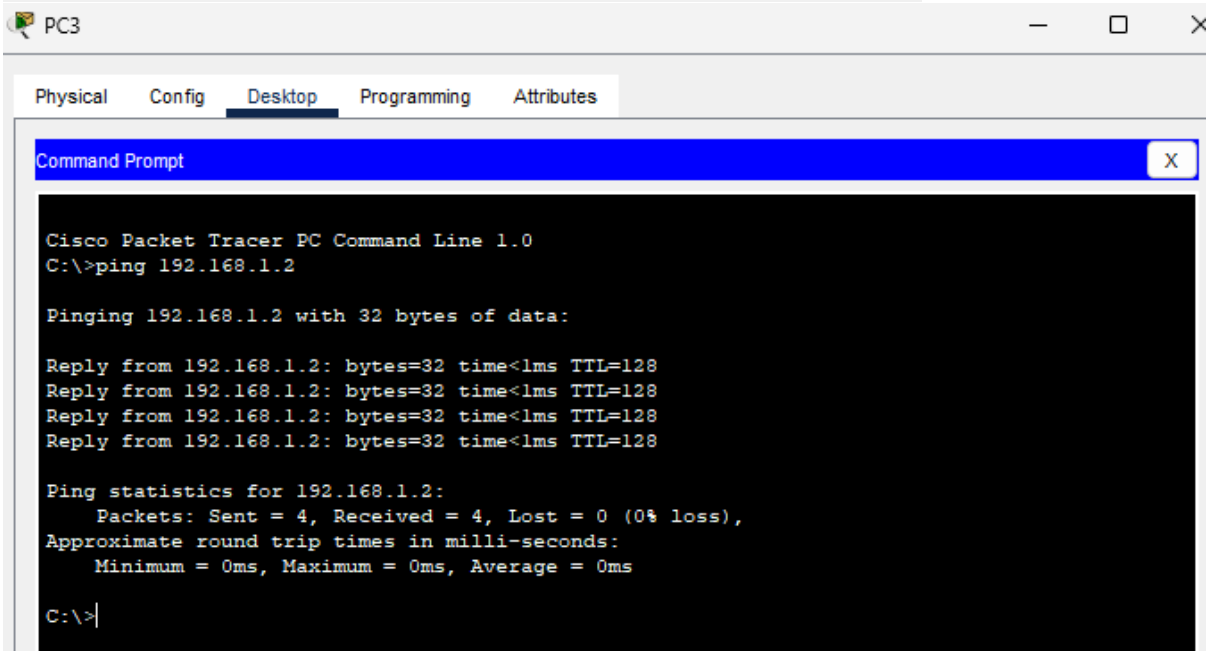
- Ensure you have Cisco Packet Tracer installed on your computer. If not, download it from the Cisco Networking Academy website.
- Open Packet Tracer and explore the user interface. Familiarize yourself with different tools and components available in the software.

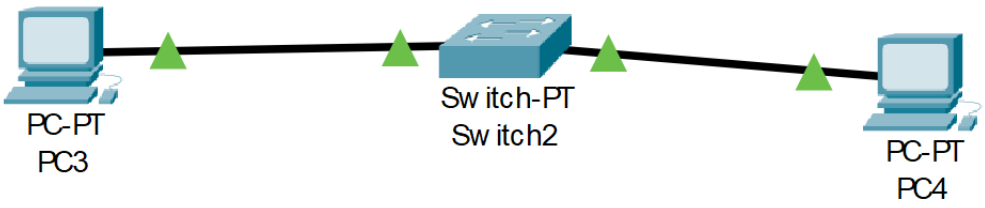
Part 2: Peer-to-Peer Communication Setup

- Open Packet Tracer and create a new network.
- Add two PCs to the workspace.
- Use a copper straight-through cable to connect the FastEthernet0 port of PC0 to the FastEthernet0 port of PC1.
- Assign IP addresses to both PCs:
- PC0: IP address: 192.168.1.1, Subnet Mask: 255.255.255.0
- PC1: IP address: 192.168.1.2, Subnet Mask: 255.255.255.0
- Open the command prompt on PC0 and ping PC1 using the command ping 192.168.1.2.
- Take a screenshot of the successful ping results.

Results:


PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.1
Subnet Mask
255.255.255.0
Default Gateway
0.0.0.0
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::260:47FF:FE10:29E8
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


PC3
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>



Study of Network Cables and Color Codes

Types of Network Cables in Computer Networking

1. **Copper Cables**
    - **Straight-Through Cable**
        - Purpose: Used to connect different types of devices, such as a computer to a switch or a switch to a router.
        - Structure: The wiring is consistent on both ends of the cable, meaning Pin 1 is connected to Pin 1, Pin 2 to Pin 2, and so on.
        - Common Use: Connecting a computer to a network device like a hub, switch, or router.
    - **Crossover Cable**
        - Purpose: Used to connect similar devices directly, such as connecting two computers or two switches without a hub or switch.
        - Structure: The wiring is crossed on the ends of the cable, where Pin 1 is connected to Pin 3 and Pin 2 to Pin 6.
        - Common Use: Connecting two similar network devices directly, such as PC-to-PC or switch-to-switch.
    - **Shielded Twisted Pair (STP) Cable**
        - Purpose: Provides more protection against electromagnetic interference (EMI) and crosstalk.
        - Structure: Similar to UTP but with an additional shielding layer.
        - Common Use: Environments with high EMI, such as industrial settings or places with many electronic devices.
    - **Unshielded Twisted Pair (UTP) Cable**
        - Purpose: The most common type of copper cable used in networks, without additional shielding.
        - Structure: Consists of pairs of wires twisted together.

        - Common Use: General network cabling, including both straight-through and crossover cables.

2. **Fiber Optic Cables**
    - **Single-Mode Fiber (SMF)**
        - Purpose: Used for long-distance communication, typically in telecom networks.
        - Structure: Uses a single strand of glass fiber to carry data via light waves.
        - Common Use: Long-distance data transmission, such as between buildings or across cities.
    - **Multi-Mode Fiber (MMF)**
        - Purpose: Used for shorter distances, like within a building or between buildings on the same campus.
        - Structure: Uses multiple light paths to carry data, allowing for more data to be transmitted over shorter distances.
        - Common Use: Data centers, LAN backbones, and other short-distance applications.

Standard Color Codes for Copper Straight-Through and Crossover Cables

Straight-Through Cable (TIA/EIA-568-B Standard):

- Pin 1: White/Orange
- Pin 2: Orange
- Pin 3: White/Green
- Pin 4: Blue
- Pin 5: White/Blue
- Pin 6: Green
- Pin 7: White/Brown
- Pin 8: Brown

Crossover Cable:

- **End 1 (TIA/EIA-568-B Standard):**
    - Pin 1: White/Orange
    - Pin 2: Orange
    - Pin 3: White/Green
    - Pin 4: Blue
    - Pin 5: White/Blue

- Pin 6: Green
- Pin 7: White/Brown
- Pin 8: Brown

- **End 2 (TIA/EIA-568-A Standard):**
  - Pin 1: White/Green
  - Pin 2: Green
  - Pin 3: White/Orange
  - Pin 4: Blue
  - Pin 5: White/Blue
  - Pin 6: Orange
  - Pin 7: White/Brown
  - Pin 8: Brown

Purpose and Use Cases of Each Type of Cable

1. **Straight-Through Cable:**
   - Purpose: Primarily used for connecting different types of devices within a network.
   - Use Cases: Connecting computers to switches, switches to routers, or computers to hubs.
2. **Crossover Cable:**
   - Purpose: Enables direct communication between two similar devices without an intermediary device.
   - Use Cases: Directly connecting two computers, two switches, or two routers for data transfer.
3. **Fiber Optic Cables:**
   - **Single-Mode Fiber (SMF):**
     - Purpose: For high-speed, long-distance data transmission.
     - Use Cases: Telecommunications, connecting different buildings within a campus, or connecting cities.
   - **Multi-Mode Fiber (MMF):**
     - Purpose: For high-speed data transmission over shorter distances.
     - Use Cases: Data centers, LAN backbones, and other applications where high bandwidth over shorter distances is required.