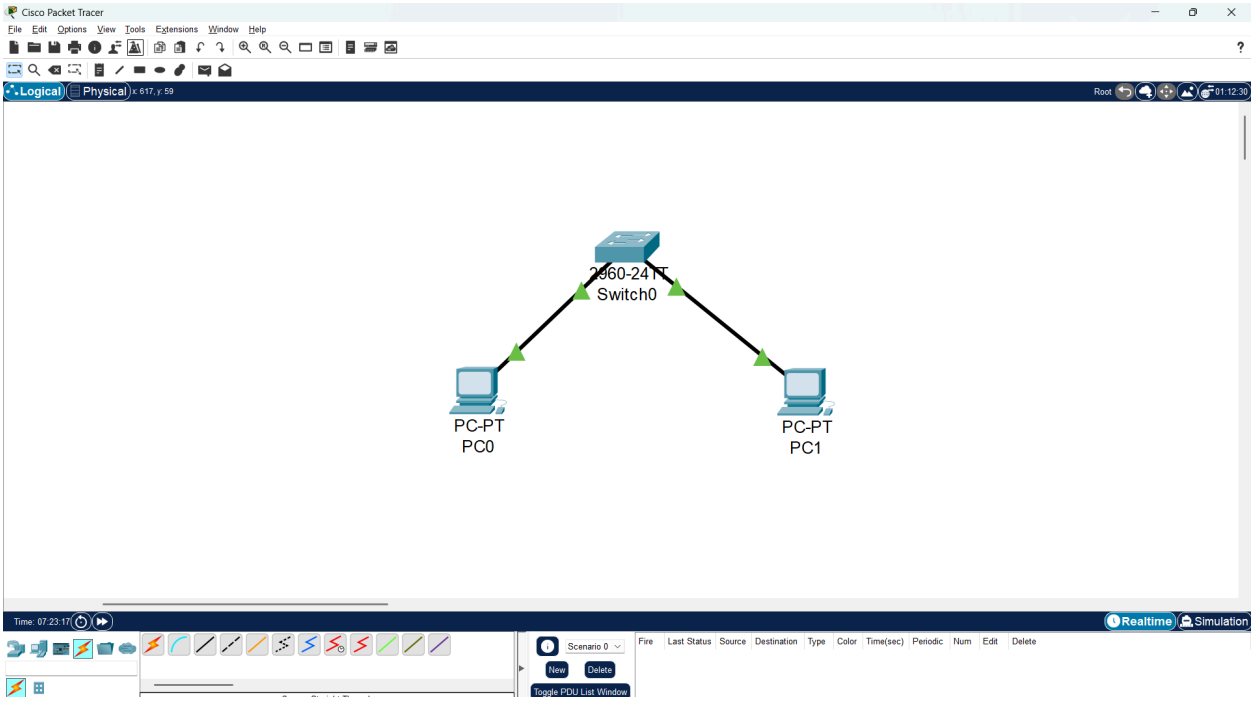
📄 Project Documentation



🔷 Project Title

Basic LAN Simulation – Physical Layer (OSI Layer 1)

🎯 Goal

Understand how devices connect physically using cables and switches, and how cable type affects communication.

🧪 Setup Summary

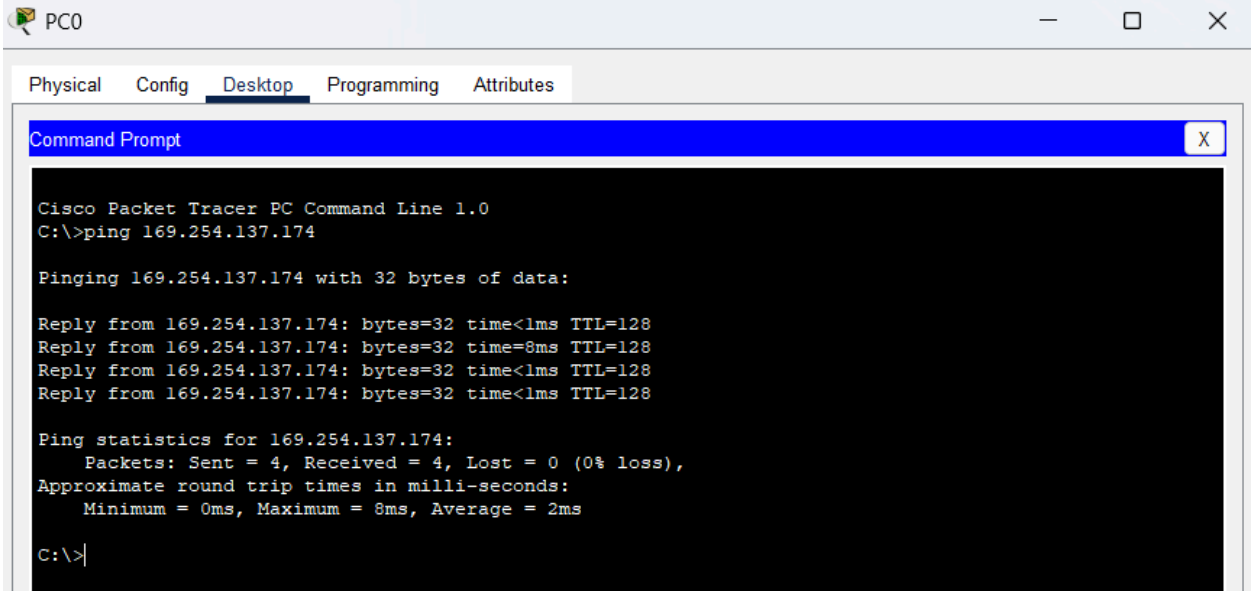
- 2 PCs, 1 switch
- Copper straight-through cables
- Assigned manual IPs

- Used ping to test physical + data layer success

🔧 Step-by-Step with Reflections

1. Connected PC0 and PC1 to Switch using straight-through cables
2. Go, to IP configuration of PCO. Its in static.
3. First try: I turned the static into DHCP. Done same with PC1
4. It shows DHCP failed. APIPA is being used.
5. Still, it shows IP address and subnet mask. So, I tried my hand at

Result:



📚 Deep Dive: What's Actually Happening

- When I selected **DHCP** on both PCs, they couldn't find a DHCP server.
- As a fallback, the operating system assigned **APIPA addresses** in the range:

  169.254.0.1 to 169.254.255.254, with subnet mask **255.255.0.0**.
- This is an OS feature (e.g., Windows) to enable limited communication when DHCP fails.

- Both PCs were assigned APIPA addresses.
- Despite not having a DHCP server, I was **able to successfully ping** from PC0 to PC1.
- This means:
  - Both PCs were on the **same switch** (same Layer 2 domain).
  - The switch forwarded the traffic successfully based on MAC address.
  - The PCs considered each other in the same subnet, so no routing was needed.

🧠 Important Note:

- **In real life**, APIPA **can** allow basic local communication on a switch — **if both devices use APIPA and are in the same subnet**.
- However, APIPA is not reliable for production environments:
  - It doesn't work across routers.
  - Some firewalls block it.
  - Not all software supports it consistently.
- In some labs or older Packet Tracer versions, APIPA pings might fail.

📌 Takeaway:

- **APIPA worked here**, but it’s still best practice to use **manual or DHCP IPs** for predictable connectivity in networks and labs.