LAB 3: Simulation of Network Devices Using Cisco Packet Tracer

OBJECTIVES

- To gain a fundamental understanding of computer networking concepts using simulation software.• To examine the internal working principles and operational logic of hardware like hubs, switches, and bridges.
- To study the roles of routers and repeaters in extending and directing network traffic.
- To analyze how data packets flow between different nodes to understand transmission patterns.
- To observe real-time communication processes and understand how various devices handle data delivery.

THEORY

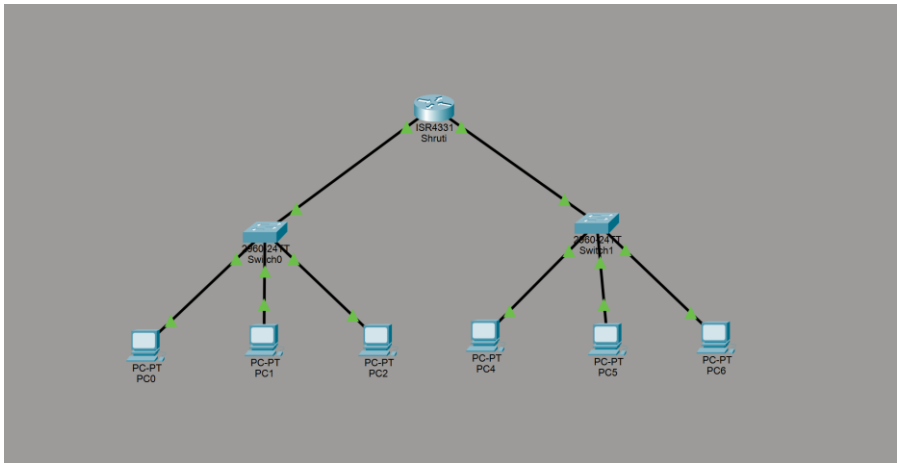
Cisco Packet Tracer is an interactive network simulation and visualization application used to design and analyze network topologies without relying on actual networking hardware. It is based on packet-level simulation principles, enabling users to create networks by placing virtual routers, switches, and end devices and studying how they communicate within a simulated environment.

The tool offers two operating modes:

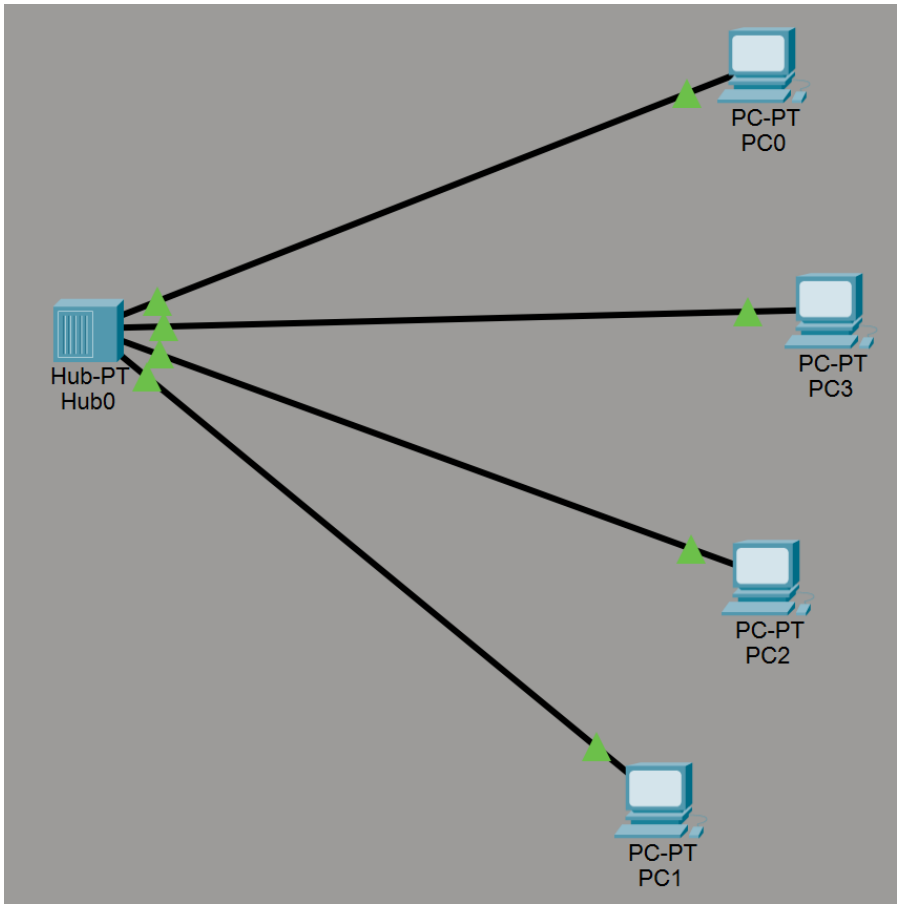
- Real-Time Mode – configuration changes take effect instantly.
- Simulation Mode – allows users to pause network activity and examine packet movement across OSI layers.

By emulating the functionality of Cisco IOS (Internetwork Operating System), Packet Tracer bridges networking theory with hands-on practice and helps in understanding real-world network implementation.

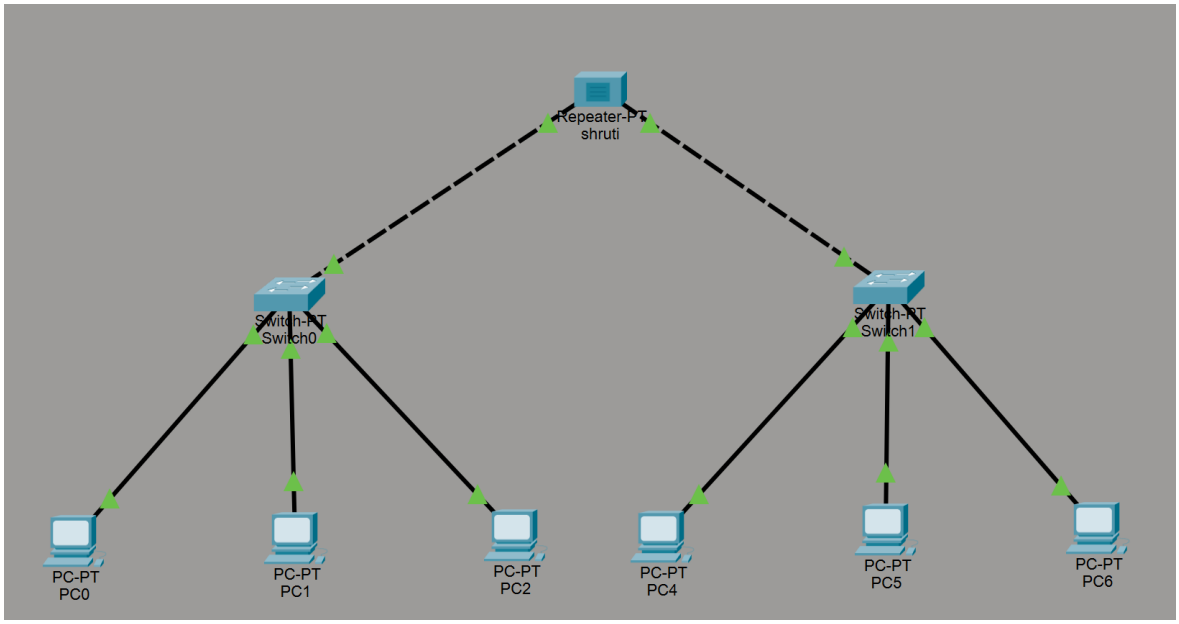
Outputs



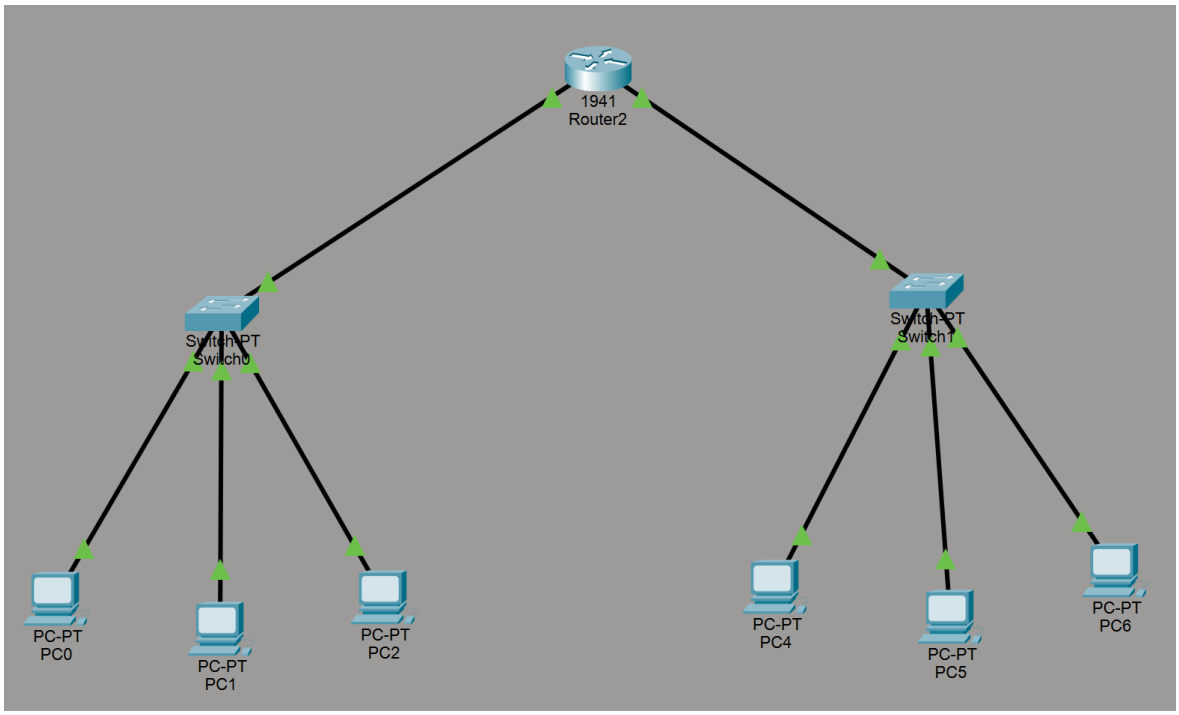
Bridge 1



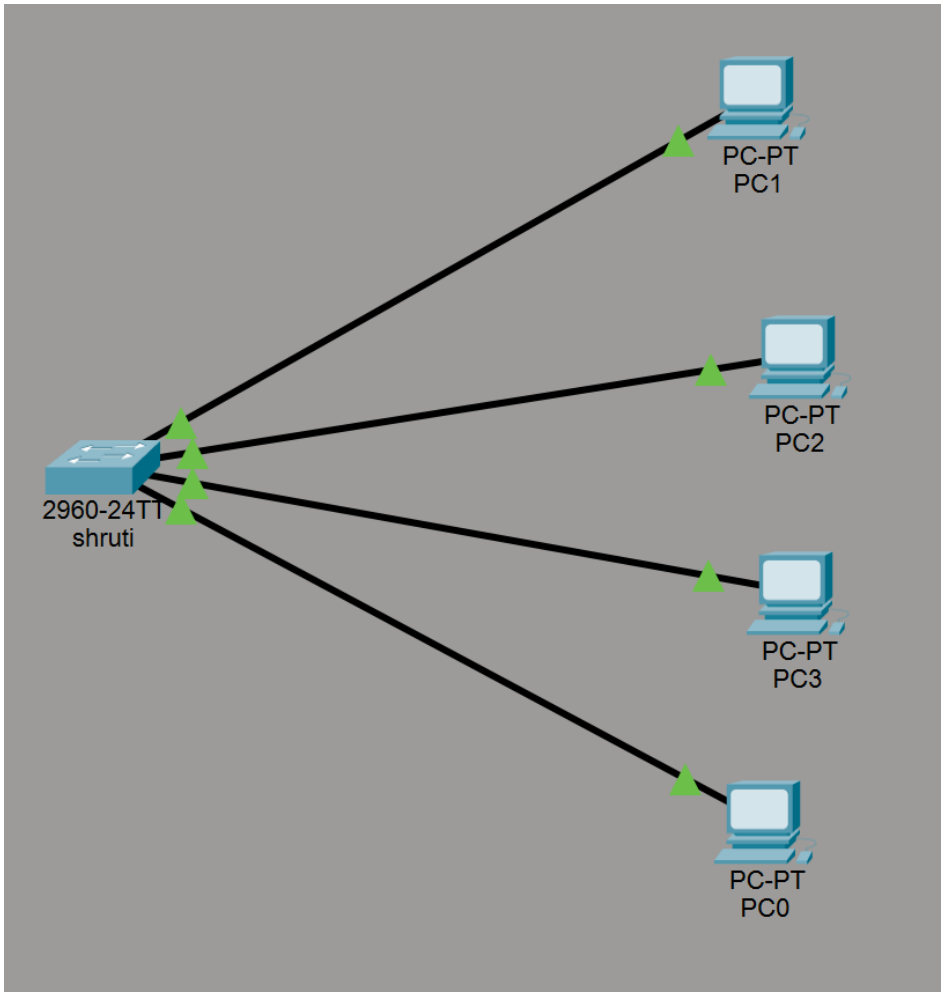
Hub



Repeater



Router



Switch

CONCLUSION

This experiment successfully demonstrated the working of key network devices using Cisco Packet Tracer. Hubs and repeaters operate at the Physical Layer (Layer 1) without address awareness. Switches and bridges function at the Data Link Layer (Layer 2) using MAC addresses, while routers operate at the Network Layer (Layer 3) using IP addresses. The simulation clearly showed the evolution of intelligence across networking devices.