

OBJECTIVE: Introduction to Network Simulation CISCO Packet Tracer.

THEORY: CISCO - Packet Tracer is a widely-used network simulation tool that helps network professionals to design, configure, and troubleshoot network in a safe, virtual environment. This tool simulates network protocols and devices, allowing users to experiment with different network topologies, configurations and scenarios without needing physical hardware.

Cisco Packet Tracer gets used by network professionals, students and educators.

Features Of Cisco Packet Tracer:

- Supports multiple protocols and technologies such as TCP/IP, OSPF, EIGRP, BGP.
- Provides a comprehensive set of networking tools
- Includes a range of network devices and topologies
- Allows for multi-user collaboration.
- Provides a safe and virtual environment for network experimentation
- Reduces the need for Physical hardware
- Helping to develop essential network hardware and knowledge

Installation:

- Step 1: Visit the Cisco Networking Academy website at netacad.com
- Step 2: Log in or create an account if new user.
- Step 3: Click on the "Resources" tab at the top of the page.
- Step 4: Click on the "Packet Tracer" in drop down menu.
- Step 5: Click on the "Download Packet Tracer".

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Step6: Select the Packet Tracer version and Click "Download".

Result: Understand the benefits and features of Cisco packet tracer and installed it successfully.

OBJECTIVE : Establish Peer to Peer Network

REQUIRED TOOLS : Cisco Packet Tracer.

THEORY: A peer-to-peer network is a distributed network architecture where all connected devices, or "peers", have equal status and can communicate directly with each other without relying on a central server. Each device in the network can both request and provide resources, services or information to other devices. This decentralized structure enables efficient sharing of data, files and computing resources among peers without the need for centralized authority or infrastructure.

PROCEDURE :

- Step 1: Launch the Cisco Packet Tracer application on own computer.
- 2: Started by creating a new network topology by dragging routers, switches, PCs, or other network devices onto the works pace.
- 3: Connect the devices using appropriate cables. For P2P network, we typically connects PCs using Ethernet cables.
- 4: Assign IP address to each PC in the network. Go to ~~the~~ each PC in the network. Go to each PC's configurations and set the IP Address, subnet mask. and default gateway. IP network are different and subnet mask are same for each PC.

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Step 5: We can test connectivity between the PC's by ping each other's IP Address. Type "ping (PCs IP)" in CMD

RESULT: Successfully established Peer to Peer network in Cisco Packet Tracer.

OBJECTIVE: To establish a network using switch and hub.

REQUIRED TOOL: Cisco Packet Tracer.

THEORY:

Switch

1. Efficiently forwards data packets to their intended destination based on MAC Address, reducing network congestion & improving performance.
2. Creates dedicated communication paths between devices, allowing simultaneous data transmission without interference thereby enhancing network reliability.

Hub:

1. Broadcasts incoming data to all connected devices indiscriminately. Lacking the ability to target specific recipients which can lead to unnecessary traffic to network slowdowns.
2. Operates at the physical layer of OSI Model. Simply repeating incoming signals to all connected devices, without the intelligence to filter or manage data traffic efficiently.

PROCEDURE:

Step 1: Open Cisco Packet Tracer.

Step 2: Start a new Topology by dragging hub/switch and PC's

on to the workspace.

Step3: ~~Star~~ ~~bus~~ ~~ring~~ ~~mesh~~ ~~topology~~ Connect the PC's to the hub / switch using Ethernet cables.

Step4: Make sure that all devices are powered on.

Step5: Go to each PC's configuration and set the IP address and subnet mask.

Step6: Test connectivity between PC's.

RESULT: Successfully established the connections through hub and switch with PCs and understood the working through simulation.

EXPERIMENT - 3

OBJECTIVE: To establish all the topology of network

TOOL REQUIRED: Cisco Packet Tracer.

THEORY: Network topology refers to the arrangement of nodes (devices). There are several types of network topologies.

- 1) Bus topology → All devices are connected to a single backbone cable. It's simple & inexpensive but can suffer from a single point of failure.
- 2) Star topology → Each device is connected to a central hub or switch. If one connection fails, it doesn't affect the rest of the network, but the central hub can be a single point of failure.
- 3) Ring Topology → Devices are connected in a circular manner where each device is connected to exactly two other devices. Data flows in one direction around the ring. Failure of one device can disrupt the entire network.
- 4) Mesh Topology → Every device is connected to every other device in the network. It's robust & fault tolerant but expensive & complex to setup.

5) Hybrid Topology → Combines two or more different types of topologies. For example, a network might have a combination of star & mesh topologies to balance cost & performance.

Procedure:

→ BUS Topology

Step1: Open Cisco Packet Tracer.

Step2: Drag all devices such as PCs and switch.

Step3: Connect all the switches with each other.

Step4: Connect each switch to a PC and give IP Address to it

Step5: Test connectivity between devices.

→ STAR Topology

Step1: Open Cisco Packet Tracer.

Step2: Drag a switch and some PCs.

Step3: Connect all PCs to switch & give IP-address to it.

Step4: Test the connectivity.

→ RING Topology

Step1: Start by placing devices on workspace.

Step2: Connect the switch/hub in a circular manner, ensure that each switch is connected to exactly 2 devices.

Step3: Connect all switches/hub to a PC.

Step4: Give IP address to PCs

Step5: Test the connectivity.

→ MESH Topology

1. Drag all devices to the workspace
2. Connect each switch to every other device using appropriate cables.
3. Connect PCs to the switches.
4. Configure IP addresses to each PC.
5. Test the connectivity.

→ Hybrid Topology

1. Combine elements from two or more established topologies (mesh, Bus, etc).
2. Performance simulation to test the connectivity of hybrid network and check its functions as intended.

RESULT:

Successfully established the topologies of network (Bus, star, Ring, Mesh and Hybrid).

EXPERIMENT - 4

OBJECTIVE: Introduction to network Protocol analyzer. wireshark.

THEORY: Wireshark is a network protocol analyzer tool. It is a powerful tool used for capturing, analyzing and interpreting network traffic in real time. Wireshark allows user interface providing detailed information about the protocol communication happening on the network. It's commonly used for network troubleshooting, security analysis, and protocol development.

FEATURES OF WIRESHARK:

- 1) **Packet capture** — Wireshark allows user to capture live network traffic from various network interface in real time.
- 2) **Offline Packet Analysis:** Users can also analyse pre-captured packet capture files (PCAP or other formats).
- 3) **Graphical Packet Analysis:** It provides graphical representations of packet data including packet size distribution, protocol wireframes, etc.
- 4) **Cross Platform Compatibility:** It is available for multiple operating systems including windows, MAC OS & various linux distribution, making it accessible to a wide range of users.

5) Packet Reconstruction: Users can reconstruct and re-assemble fragmented and segmented packets to analyse computer data streams such as TCP streams in HTTP session.

LEARNING OUTCOMES: Understood the function and features of network protocol analyzer that is wireshark.

EXPERIMENT - 5

AIM: Running and using services / commands related to Networking

TOOL USED: Command Prompt.

THEORY:

- 1) **IP Config:** This command is used in windows operating system to display the current TCP/IP network configuration values. It shows details such as IP address, subnetmask, default gateway and DNS servers of the network interface on the local machine.
- 2) **nslookup:** This command is used to query DNS Server, to obtain domain name, or IP address mapping, or to perform other DNS lookups. It is commonly used to query DNS server to obtain name or IP address mapping, or to perform other DNS lookups. It is commonly used to troubleshoot DNS-related issues, as it can help you diagnose problems with domain name resolution.
- 3) **IP config/all:** This is an extension of IPconfig/all. It displays more detailed information about all network interfaces on system including MAC address and additional configuration details.

4. Ping: It is a command line utility used to test the reachability of a host on an IP network. It works by sending ICMP (Internet Control Message Protocol) echo request packets to the target host and waiting for ICMP echo reply packets to come back.

5. Tracent: This command is used to trace the route that packets take from your computer to a destination IP address or domain name. It shows the IP addresses of routers that the packets traverse as they travel to destination.

RESULT:

Successfull run all the commands (IP Config, IPConfigall, nslookup, tracent and ping) on command prompt.