Data communication and Networks

Course Code: ECEG3174

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Experiment - 5

Familiarization of Basic network command and Network configuration commands

Aim: Study of basic network command and Network configuration commands

Experiment- 5: Basic Network Commands

1. **Basic Network Diagnosis:**
    1. Ping
    2. Tracert for windows / traceroute for Linux and MacOS
    3. nslookup
    4. netstat
    5. arp
    6. Hostname
    7. dig for Linux and MacOS
2. **Network Configuration:**
    1. Route
    2. ipconfig for windows / ifconfig for Linux and MacOS
    3. Ip addr
    4. Ip route
    5. Netsh for windows
3. **Managing Interface:**
    1. Ifdown
    2. ifup

Experiment- 5: Basic Network Commands

Ping

Purpose: Tests connectivity between two devices on the network.

Example: ping 192.168.1.3

Usage: Checks whether a host is reachable by sending ICMP (Internet Control Message Protocol) Echo Request messages

Experiment- 5: Basic Network Commands

tracert (Windows) / traceroute (Linux/macOS)

Purpose: Shows the path that packets take to reach a destination

Example: tracert www.google.com (Windows), traceroute www.google.com (Linux/macOS)

Usage: Helps identify network issues by showing where in the network path delays or failures occur

Experiment- 5: Basic Network Commands

nslookup (Windows)

Purpose: Queries the Domain Name System (DNS) to obtain domain name or IP address mapping

Example: nslookup www.google.com

Usage: Troubleshoots DNS-related issues

Experiment- 5: Basic Network Commands

dig (Linux/macOS)

Purpose: Performs DNS lookups and queries DNS servers.

Example: dig www.google.com

Usage: A more powerful alternative to nslookup, commonly used for detailed DNS queries.

Experiment- 5: Basic Network Commands

ipconfig (Windows) / ifconfig (Linux/macOS)

Purpose: Displays network configuration details such as IP address, subnet mask, default gateway, etc.

Example: ipconfig (Windows) / **ifconfig** (Linux/macOS)

Usage: Helps identify the current IP address and other configuration settings of a machine

Experiment- 5: Basic Network Commands

netstat

Purpose: Displays network statistics and active connections.

Example: netstat -an

Usage: Useful for viewing active TCP/IP connections, listening ports, and routing information.

Experiment- 5: Basic Network Commands

arp

Purpose: Displays and modifies the ARP (Address Resolution Protocol) table.

Example: arp –a

Usage: Shows IP-to-MAC address mappings, which can be helpful in diagnosing issues related to local network communication.

Experiment- 5: Basic Network Commands

route

Purpose: Views and modifies the routing table of the system.

Example: route print

Usage: Helps examine how packets are routed through a network and make adjustments to routing entries

Experiment- 5: Basic Network Commands

netsh (windows)

Purpose: Configures network interfaces and services.

Example: netsh interface ipv4 show config

Usage: Useful for configuring network interfaces, firewall settings, and wireless profiles on Windows systems

Experiment- 5: Basic Network Commands

hostname

Purpose: Displays or sets the name of the current machine.

Example: hostname

Usage: Used to view or change the hostname of the machine.

Network Configuration Commands

Experiment- 5: Network Configuration Commands

ipconfig /renew (Windows)

Purpose: Requests a new IP address from the DHCP server

Example: ipconfig /renew

Usage: Used when the current IP address is expired or when a new IP address is needed.

Experiment- 5: Network Configuration Commands

ifconfig (Linux/MacOS)

Purpose: Configures network interfaces, such as assigning IP addresses.

Example: ifconfig eth0 192.168.1.10 netmask 255.255.255.0

Usage: Used to assign, modify, or view network configuration details.

Experiment- 5: Network Configuration Commands

ip route

Purpose: Configures and displays the system's routing table.

Example: **ip route add 192.168.1.10/24 via 192.168.1.1**

Usage: Manages static routes on a system.

Experiment- 5: Network Configuration Commands

systemctl restart network (Linux)

Purpose: Restarts the network service.

Example: systemctl restart network

Usage: Used to apply new network configuration changes without rebooting the system.

Experiment- 5: Network Configuration Commands

ifdown and ifup

Purpose: Brings down and brings up network interfaces.

Example: ifdown eth0 / ifup eth0

Usage: Useful for restarting or refreshing network interfaces.

Cables Used

Straight-Through Cable

Definition: A straight-through cable has the same wiring pattern on both ends

Applications:

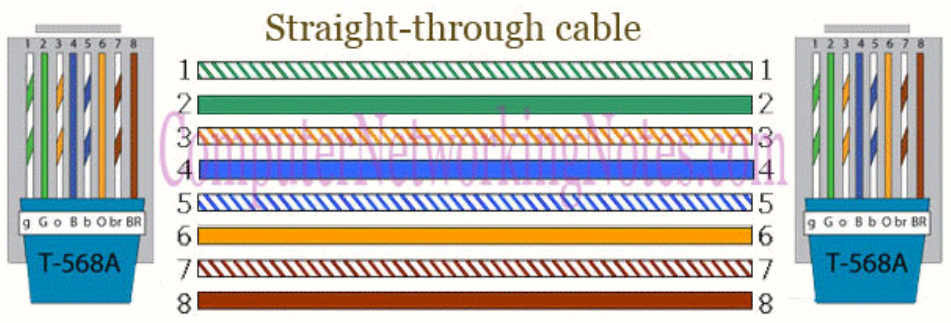
Used to connect **different types of devices** such as:

- ✓ **PC to Switch**
- ✓ **Router to Switch**
- ✓ **PC to Hub**
- ✓ **Switch to Router**

Ideal for connecting devices that operate on **different layers** of the OSI model.

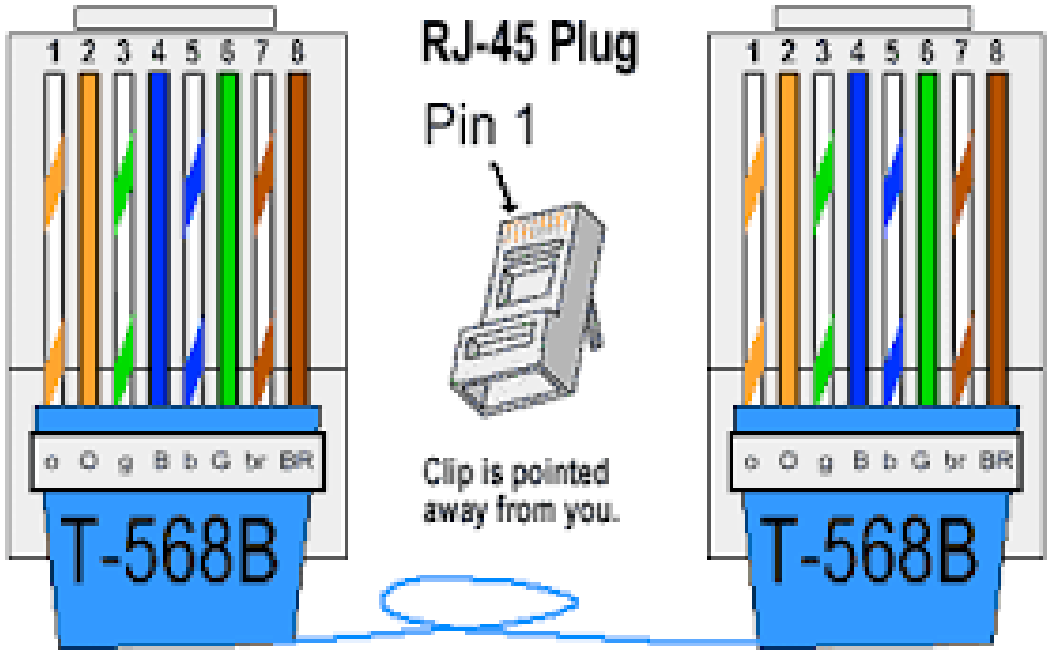
Cables: Straight-Through Cable

- **Color Coding for T568A (Standard 1):**
- 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



Cables: Straight-Through Cable

- **Color Coding for T568B (Standard 2):**
- 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



Cables: Cross-Over Cable

Definition: A cross-over cable has different wiring patterns at each end (pin 1 connects to pin 3, pin 2 connects to pin 6, etc.).

Applications:

Used to **connect similar types of devices directly**, such as:

- PC to PC
- Switch to Switch
- Router to Router

Helpful for creating local networks without the need for a switch or hub.