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Introduction to Networking Fundamentals

Lab Exercise Answers

1. **Difference between a node and a host :**

Node: Any device that connects to a network (like printers, switches, routers, computers).

Host: A node that can send and receive data directly (like computers, phones, servers).

Every host is a node, but not every node is a host.

2. **NIC (Network Interface Card) :**

A hardware component that allows a computer or device to connect to a network — either wired (Ethernet) or wireless (Wi-Fi). Example: The Wi-Fi card inside a laptop.

3. **MAC address** :

Media Access Control (MAC) address is a unique hardware address assigned to every NIC. Example: 00:1A:2B:3C:4D:5E. Used at the Data Link Layer (Layer 2).

4. **Default gateway** :

The router's IP address that connects your local network (LAN) to other networks or the Internet. It acts as the "exit door" of the network.

5. **Purpose of DNS :**

DNS (Domain Name System) translates domain names (like www.google.com) into IP addresses (like 142.250.190.14). It acts like a phonebook of the Internet.

6. **DHCP and its uses:**

DHCP (Dynamic Host Configuration Protocol) automatically assigns IP addresses and other settings to devices when they connect to a network. It saves time by avoiding manual setup.

7. Static vs Dynamic IP addressing :

Static IP: Manually assigned, does not change (used for servers).

Dynamic IP: Assigned automatically by DHCP, changes periodically (used for home computers).

8. Data transmission :

Process of sending data from one device to another over a network using wired or wireless media. Example: Sending a message or loading a website.

9. Network topology and its types:

Defines how devices are connected in a network. Types: Bus, Star, Ring, Mesh, Hybrid.

10. Firewall :

A security device or software that monitors and controls network traffic based on rules. It protects against unauthorized access.

11. Encryption :

Converts readable data into unreadable form so only authorized users can understand it. Used in WhatsApp, online banking, VPNs, etc.

12. VPN :

Virtual Private Network (VPN) creates a secure, encrypted connection over the Internet. Used for privacy and secure remote access.