**COMPUTER NETWORKS**

**Task 11**

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**Question: What is “DHCP, VLAN & DNS”, explain with Example  
Answer:**

**1. DHCP (Dynamic Host Configuration Protocol)**

**Definition**:  
DHCP is a network management protocol that automatically assigns IP addresses and other network configuration parameters (like subnet mask, gateway, and DNS server) to devices in a network. It eliminates the need for manual configuration.

**How It Works**:

* A device (like a laptop) connects to the network and sends a **DHCP Discover** message.
* The DHCP server responds with a **DHCP Offer** containing an available IP address.
* The device accepts the IP via a **DHCP Request**, and the server confirms with a **DHCP Acknowledge**.

**Example**:

* Suppose a company has a network with 100 PCs.
* A DHCP server assigns IPs dynamically from the range **192.168.1.1 – 192.168.1.100**.
* When a laptop connects, it might receive **192.168.1.10**, and when it disconnects, the IP becomes available for another device.

**2. VLAN (Virtual Local Area Network)**

**Definition**:  
VLAN is a logical grouping of devices in a network that behaves like a separate network, even if connected to the same physical infrastructure. It enhances network segmentation, security, and efficiency.

**How It Works**:

* Switch ports are configured into VLANs.
* Devices in the same VLAN can communicate directly.
* Communication between different VLANs requires a router or Layer 3 switch.

**Example**:

* A company has three departments: **HR**, **IT**, and **Finance**.
* All PCs are connected to the same physical switch.
* The network admin creates:
  + VLAN 10 for HR (192.168.10.0/24),
  + VLAN 20 for IT (192.168.20.0/24),
  + VLAN 30 for Finance (192.168.30.0/24).
* HR devices cannot access IT or Finance networks unless explicitly allowed via routing.

**3. DNS (Domain Name System)**

**Definition**:  
DNS translates human-readable domain names (e.g., [**www.google.com**](http://www.google.com)) into machine-readable IP addresses (e.g., **172.217.0.46**). It works as the "phonebook" of the internet.

**How It Works**:

1. A user enters a URL in a browser.
2. The DNS server resolves the domain name to its IP address.
3. The browser uses the IP to connect to the website's server.

**Example**:

* When you type [**www.example.com**](http://www.example.com), the DNS server might resolve it to **93.184.216.34**.
* If the DNS server isn't configured, users would have to type the IP address instead of the domain name to access the site.

**Network Example**

Imagine a small office with:

* **DHCP**: Automatically assigns IPs to devices in the range **192.168.1.0/24**.
* **VLAN**: Separates HR (VLAN 10) and IT (VLAN 20) traffic.
* **DNS**: Resolves **www.company.local** to **192.168.1.50** (the web server).