**.Computer** **Networks** **Rasikh** **Ali**

**Research** **on** **Super-Netting,** **DHCP,** **VLAN** **&** **DNS***Lab* *11*

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What is “DHCP, VLAN & DNS”, explain with Example (draw structure in cisco)

**Answer**

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

**DHCP** is a network protocol used to dynamically assign IP addresses and other network configuration details to devices (hosts) on a network. Instead of manually assigning IP addresses, DHCP automatically provides each device with an IP address, subnet mask, default gateway, and DNS server, reducing administrative workload and preventing IP conflicts.

#### Example:

In a home network, a router acts as the DHCP server. When a device like a laptop connects to the network, it sends a request to the router for an IP address. The router assigns it an available IP from a predefined pool.

* **DHCP Server (Router)**: 192.168.1.1
* **Assigned IP Range**: 192.168.1.100 - 192.168.1.200

**Process:**

1. A device sends a DHCP Discover message.
2. The DHCP server responds with a DHCP Offer message, which includes an IP address.
3. The device sends a DHCP Request message to accept the offered IP.
4. The DHCP server sends an acknowledgment (DHCP ACK) confirming the lease.

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

A **VLAN** is a logical grouping of devices within a local area network (LAN) that allows them to communicate as if they are on the same physical network, regardless of their actual location. VLANs improve security and reduce broadcast traffic by segmenting networks.

#### Example:

Consider a company with two departments: Sales and HR. Even though both departments are physically connected to the same switch, you can create separate VLANs to keep their traffic isolated.

* **VLAN 10**: Sales Department (IP Range: 192.168.1.0/24)
* **VLAN 20**: HR Department (IP Range: 192.168.2.0/24)

The devices in VLAN 10 can only communicate with each other, and the same applies to devices in VLAN 20. If inter-VLAN communication is needed, it must be routed through a **Layer 3 device** like a router.

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

**DNS** is a protocol that translates human-readable domain names (like [www.example.com](http://www.example.com)) into IP addresses that computers can understand (like 192.168.1.1). DNS helps users access websites without needing to remember numeric IP addresses.

#### Example:

When you type "[www.google.com](http://www.google.com)" into your browser, your computer contacts a DNS server to resolve the domain name into an IP address (e.g., 142.250.182.14). This IP address is then used to establish a connection to the Google server.

### Structure in Cisco (Example Diagram)

Here is a simple network setup with DHCP, VLAN, and DNS:

* **Router**: Acts as DHCP server, routing device, and DNS server.
* **Switch**: Connects devices within VLANs and facilitates communication between them.

