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DHCP: Dynamic Host Configuration Protocol

Definition:

Dynamic Host Configuration Protocol (DHCP) is a network management protocol used to automate the process of configuring devices on IP networks. It assigns IP addresses and other necessary network configurations dynamically to devices, enabling them to communicate effectively on a network.

Functions:

Automatic IP Assignment: DHCP automatically assigns a unique IP address to each device on a network, ensuring no conflicts and efficient IP address management.

Configuration Parameters: In addition to IP addresses, DHCP provides other configuration information such as subnet mask, default gateway, and DNS servers.

Lease Mechanism: DHCP assigns IP addresses for a limited period called a lease, after which the address can be reassigned to another device if not renewed.

Designing a System to Connect More than 2^{32} Hosts:

The limitation of 32-bit IP addresses in IPv4 allows for a theoretical maximum of about 4.3 billion unique addresses. To address the need for a larger address space, IPv6 was developed. IPv6 uses 128-bit addresses, vastly increasing the number of possible unique IP addresses.