

DHCP – 5

Introduction :

The DHCP server (Dynamic Host Configuration Protocol) is an essential element in the management of local area networks (LAN). It automatically assigns IP addresses and other network configuration settings to devices connected to a local network. By simplifying and automating the management of IP addresses, DHCP servers make it easier to set up and maintain networks and reduce the risk of human error. DHCP servers play a crucial role in local area networks by enabling efficient and centralized management of IP addresses and network configurations. Using DHCP servers, network administrators can manage IP address pools and automatically assign addresses to devices connected to the network. This avoids having to manually configure each device and allows better management of available IP resources. In this text, we will explore how DHCP servers work, as well as a practical case of creating a DHCP server.

How a DHCP server work :

DHCP Server is a service that automatically assigns IP addresses, subnet masks, default gateways, and other network configuration settings to devices connected to a local network. DHCP servers simplify and speed up the management of IP addresses by avoiding the need to manually configure each device.

The process of allocating IP addresses with DHCP follows a sequence called DORA (Discover, Offer, Request, Acknowledge). First, a device connected to the local network sends a Discover message to request an IP address from the DHCP server. The DHCP server responds with an Offer message which contains an available IP address for the device. Then the device sends a Request to confirm its choice of IP address. The DHCP server responds with an Acknowledge message that confirms the allocation of the IP address to the device. At this point, the device can begin to use the allocated IP address to communicate with the network.

In addition to IP address allocation, DHCP servers can also provide other network configuration parameters such as DNS server addresses . DHCP can be vulnerable to certain attacks, such as denial of service (DoS) attacks and IP

spoofing attacks. To counter these risks, networks can implement security mechanisms such as DHCP Snooping, which monitors and filters out malicious DHCP messages, and access controls to limit access to DHCP servers.

In our project :

As part of our project, we have created a simple DHCP server using the Python language and the Scapy library. We started by setting some variables for the network, such as the DHCP server IP address, the range of available IP addresses, the gateway address, the subnet mask, and the number of allocations. IP addresses.

We then created a "generate_ip" function to generate IP addresses from the available IP range. This function takes into account the number of allocations already made and returns a unique IP address from the range of available IP addresses.

We then created two functions "discover_to_offer" and "request_to_ack" to handle the DHCP Discover and Request messages respectively. The first function takes as input a Scapy packet containing a DHCP Discover message and the IP address offered by our DHCP server. It then constructs a DHCP Offer response using this IP address and sends the response to the DHCP client.

The second function takes as input a Scapy packet containing a DHCP Request message and sends a DHCP Acknowledge response to the DHCP client using the previously allocated IP address.

Finally, we used the main "main" function to run our DHCP server continuously, listening and responding to incoming DHCP Discover and Request packets. With these steps, we managed to create a simple DHCP server for our project.

Conclusion :

In conclusion, creating a DHCP server is a key part of managing a network, making it possible to centrally provide IP addresses to each connected device. In this project, we used Python and the Scapy library to create a simple yet effective DHCP server. By using the functions and variables we defined, we were able to offer a solution for more efficient IP address management.

This project allowed us to better understand the operation of the DHCP protocol and its role in the management of IP addresses in a network. We also learned how to use Scapy, a very useful network packet manipulation library.

Creating an efficient DHCP server can help maintain an organized network, avoiding address conflicts and ensuring stable connectivity for each device.