Faculté des Sciences et de la Technologie
Master en Réseaux et Télécommunication
TP administration des services réseaux

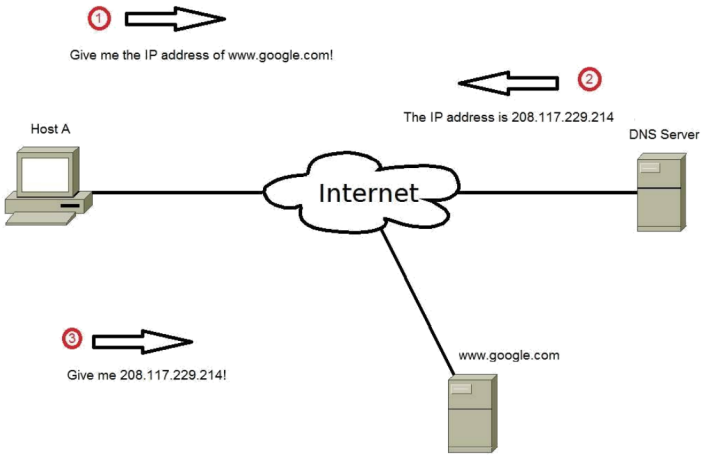
Lab1 : DNS and DHCP services using Cisco Packet Tracer

1 Background

1.1 Domain Name Service (DNS)

DNS is an application layer protocol used to resolve hostnames to IP addresses. For example, we can access the Google website by typing *http://208.117.229.214* in a web browser, but it is much easier to type *http://www.google.com*.

Each host that wants to use DNS needs to have a DNS server configured. When we type a URL in a web browser, the host will query the DNS server for the IP address of www.google.com. The DNS server will resolve the query and send the answer back to the host. The host will then be able to establish a connection to http://www.google.com.Consider the following example:



1. The user enters *www.google.com* in his browser. The host sends a DNS query to its DNS server, looking for the IP address of *www.google.com*.

2. The DNS server sends a reply back to the host, listing the IP address of *208.117.229.214* as *www.google.com's* IP address.

3. The host can establish a network connection to the web server hosting *www.google.com*.

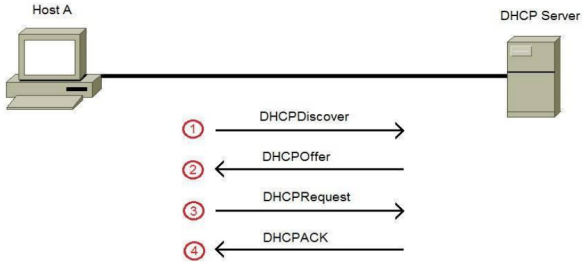
DNS uses a well-known UDP port 53.

1.2 Dynamic Host Configuration Protocol (DHCP)

DHCP is an application layer protocol used to distribute network configuration parameters, such as IP addresses, subnet masks, default gateways, etc. to hosts on a TCP/IP network. Assigning network parameters using DHCP reduces the amount of work of a network administrator, since there is no need to statically configure parameters on each device.

DHCP employs a client-server architecture; a DHCP client is configured to request network parameters from a DHCP server. A DHCP server is configured with a pool of available IP addresses and assigns one of them to the DHCP client. Besides IP addresses, a DHCP server can provide some additional network parameters, such as:

- Default gateway
- Subnet mask
- Domain name DNS server



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As we can see from the picture above, a DHCP client goes through the four-step process:

1. A DHCP client sends a broadcast packet (*DHCPDiscover*) to discover DHCP servers on the network.

2. The DHCP server receives the DHCPDiscover packet and respond with a *DHCPOffer* packet, offering IP addressing information to the DHCP client.

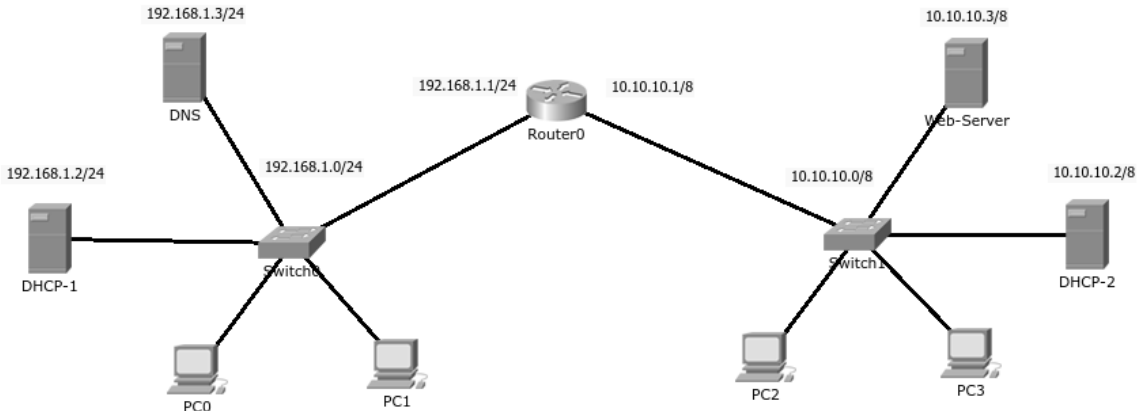
3. If there is more than one DHCP server on the network segment and the DHCP client receives more than one DHCPOffer packets, the client will accept the first DHCPOffer packet. The DHCP client responds by broadcasting a *DHCPRequest* packet, requesting network parameters from the DHCP server.

4. The DHCP server approves the lease with a *DHCPACK (Acknowledgement)* packet. The packet includes the lease duration and other configuration information.

DHCP uses a well-known UDP port number 67 for the DHCP server, and the UDP port number 68 for the client.

2 DNS and DHCP Lab

Let's construct the following topology using Packet Tracer:



Steps:

- add a router (1841) and connect the interfaces Fa0/0 and Fa0/1 to two switches (2950),

- configure the router interfaces IP address as depicted in the topology,

- add two generic DHCP servers (DHCP-1 and DHCP-2) and configure their IP address, subnet masks, default gateways like in the topology and leave the DNS server without modification,

- enable and configure the DHCP service on both DHCP servers (Pool Name, Default Getway, the start IP address),

- enable DHCP on all hosts and verify their network parameters (IP address…),

- add a web server and configure its IP address and enable HTTP service on it,

- using the web browsers on PC's try to log to the web page on he web server using its IP address,

- add and configure the DNS server in the topology,

- update the DHCP servers with the DNS IP address,

- update DHCP on all host's and verify again their network parameters,

- add a DNS record (www.mrt.com) on he DNS sevrver to point to the web page on the web-server,

- from the four hosts, try to log in the hostname (www.mrt.com) using the web browsers.