

CCNA (200-301) Cisco Certified Network Associate

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Lecture 8

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تسعى لتكون الكيان الأول الذي يتبنى مبدأ المجتمع التعليمي
التعاوني ويقدم العلم مقابل العمل لتنمية وبناء المجتمعات.

مزيد من التفاصيل

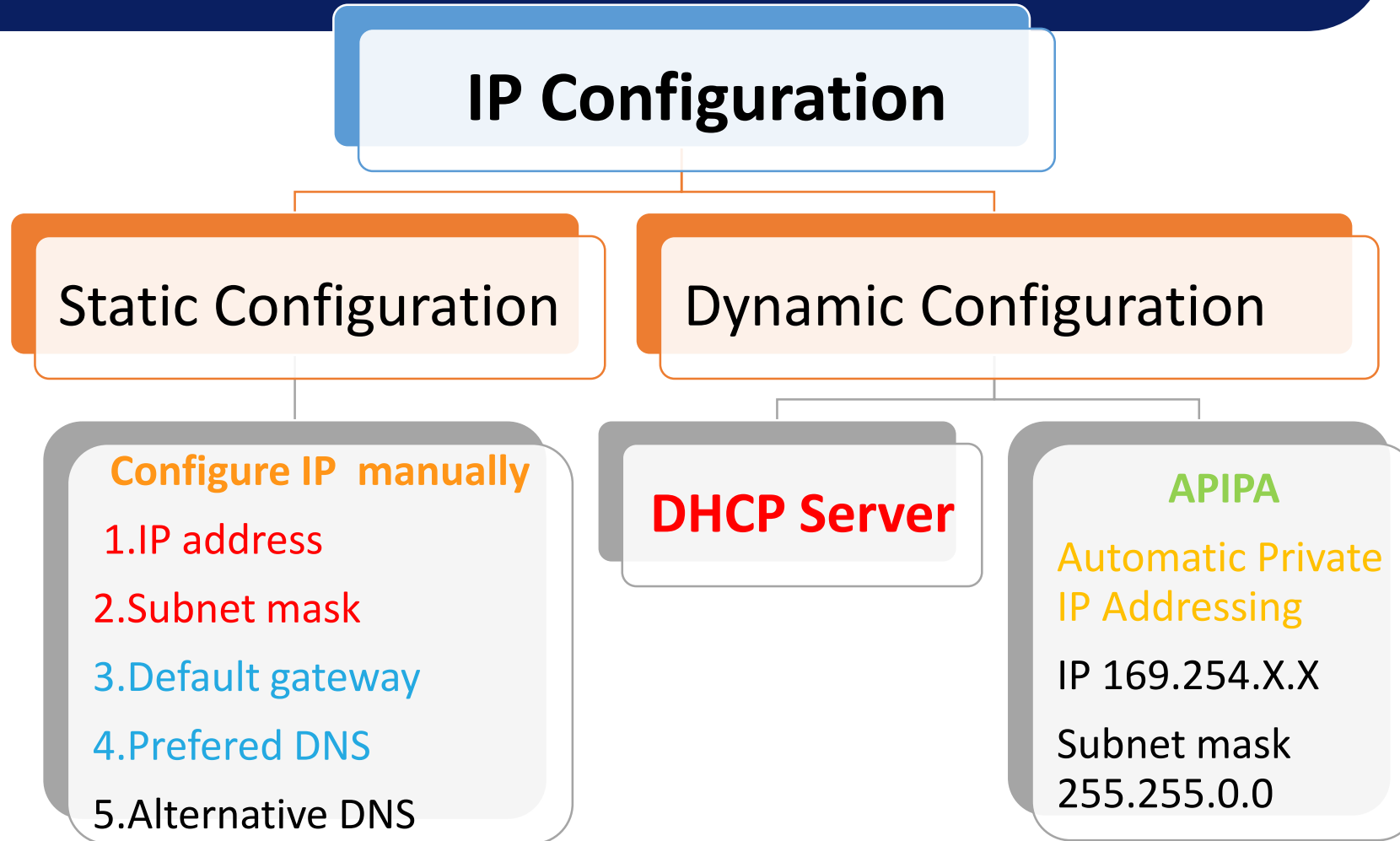
DHCP and IPv6



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DHCP (Dynamic Host Configuration Protocol)

- ❑ **Dynamic Host Configuration Protocol (DHCP)** is a network management protocol used to dynamically assign an IP address to any device, or node, on a network so they can communicate using IP (Internet Protocol).
- ❑ **DHCP** automates and centrally manages these configurations. There is no need to manually assign IP addresses to new devices. Therefore, there is no requirement for any user configuration to connect to a DHCP based network.
- ❑ **DHCP can be implemented on local networks** as well as large enterprise networks. DHCP is the default protocol used by the most routers and networking equipment. **DHCP is also called RFC 2131 (Request for comments).**



DHCP (Dynamic Host Configuration Protocol)

DHCP does the following:

- DHCP manages the provision of all the nodes or devices added or dropped from the network.
- DHCP maintains the unique IP address of the host using a DHCP server. It sends a request to the DHCP server whenever a client/node/device, which is configured to work with DHCP, connects to a network.
- The server acknowledges by providing an IP address to the client/node/device.
- DHCP is also used to configure the proper subnet mask, default gateway and DNS server information on the node or device.
- There are many versions of DCHP are available for use in IPV4 (Internet Protocol Version 4) and IPV6 (Internet Protocol Version 6).

DHCP (Dynamic Host Configuration Protocol)

How DHCP works

- ❑ DHCP runs at the **application layer** of the **TCP/IP protocol stack** to dynamically assign IP addresses to DHCP clients/nodes and to allocate TCP/IP configuration information to the DHCP clients.
- ❑ Information includes subnet mask information, default gateway, IP addresses and domain name system addresses.
- ❑ DHCP is based on client-server protocol in which servers manage a pool of unique IP addresses, as well as information about client configuration parameters, and assign addresses out of those address pools.

❑ Dynamic Host Configuration Protocol (DHCP) Configuration :

1.IP address pool:

- Start ip
- End ip
- Mask /prefix

2.Exclude List

There are some ip addresses from the pool will be used statically like:

- Default gateway ip
- Any interval server
- So, we must exclude these ip addresses from the pool.

3. Lease Duration:

- Is the interval used to make DHCP client take some configuration from (DHCP) server during it.

4. DHCP Options :

- Default gateway address (must be only one on the subnet at the pool).
- DNS ip address.

Benefits of DHCP

❑ There are following benefits of DHCP:

1. Centralized administration of IP configuration:

DHCP IP configuration information can be stored in a single location and enables that administrator to centrally manage all IP address configuration information.

2. Dynamic host configuration:

DHCP automates the host configuration process and eliminates the need to manually configure individual host. When TCP/IP (Transmission control protocol/Internet protocol) is first deployed or when IP infrastructure changes are required.

3. Seamless IP host configuration:

The use of DHCP ensures that DHCP clients get accurate and timely IP configuration IP configuration parameter such as IP address, subnet mask, default gateway, IP address of DNS server and so on without user intervention.

4. Flexibility and scalability:

Using DHCP gives the administrator increased flexibility, allowing the administrator to move easily change IP configuration when the infrastructure changes.

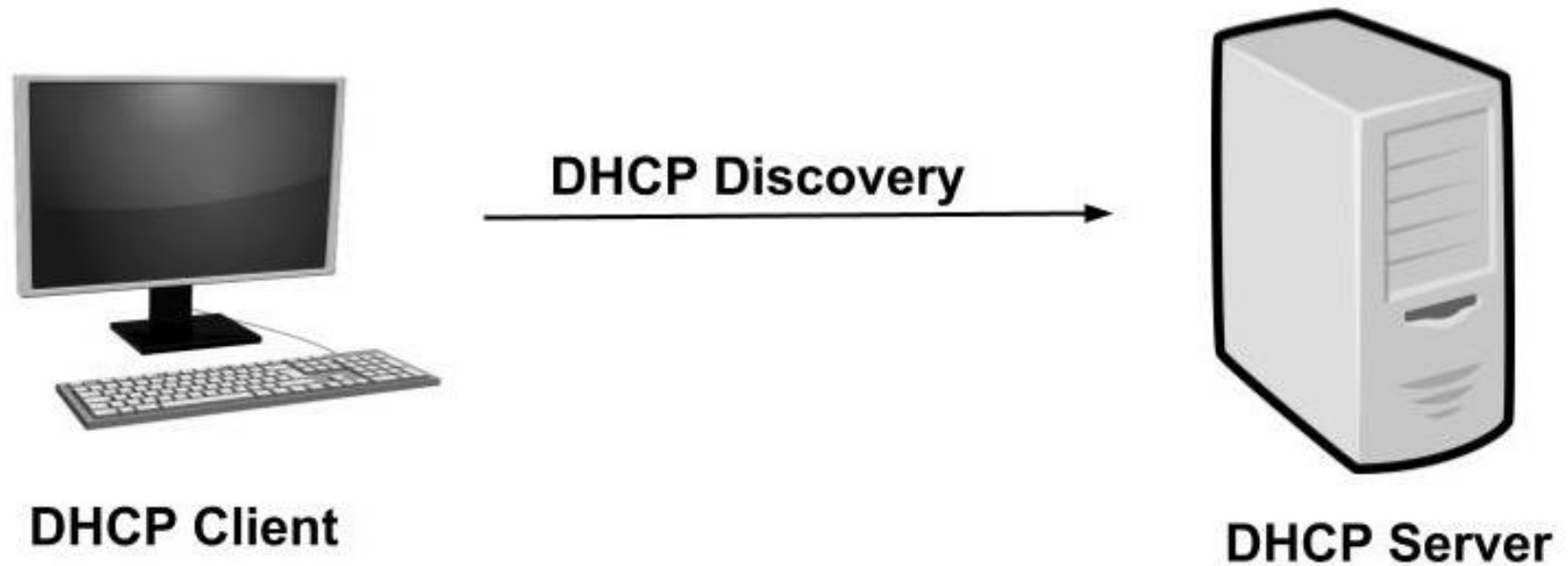
DHCP Server Operation

- ❑ DHCP works at the application layer to dynamically assign the IP address to the client and this happens through the exchange of a series of messages called DHCP transactions or DHCP conversation.

1.DHCP Discovery: The DHCP client broadcast messages to discover the DHCP servers. The client computer sends a packet with the default broadcast destination of **255.255.255.255** or the specific subnet broadcast address if any configured.

255.255.255.255 is a **special broadcast address**, which means “**this network**”: it lets you send a broadcast packet to the network you’re connected to

DHCP (Dynamic Host Configuration Protocol)



2.DHCP Offer:

❑ When the DHCP server receives the DHCP Discover message then it suggests or offers an IP address(form IP address pool) to the client by sending a DHCP offer message to the client. This DHCP offer message contains the proposed IP address for DHCP client, IP address of the server, MAC address of the client, subnet mask, default gateway, DNS address, and lease information.

- ❖ 1.the proposed IP address for DHCP client (here 192.168.1.11)
- ❖ 2.Subnet mask to identify the network (here 255.255.255.0)
- ❖ 3.IP of the default gateway for the subnet (here 192.168.1.1)
- ❖ 4.IP of DNS server for name translations (here 8.8.8.8)

DHCP (Dynamic Host Configuration Protocol)



DHCP Client

DHCP Offer

←

Proposed IP: 192.168.1.15

Subnet: 255.255.255.0

Gateway: 192.168.1.1

DNS: 8.8.8.8

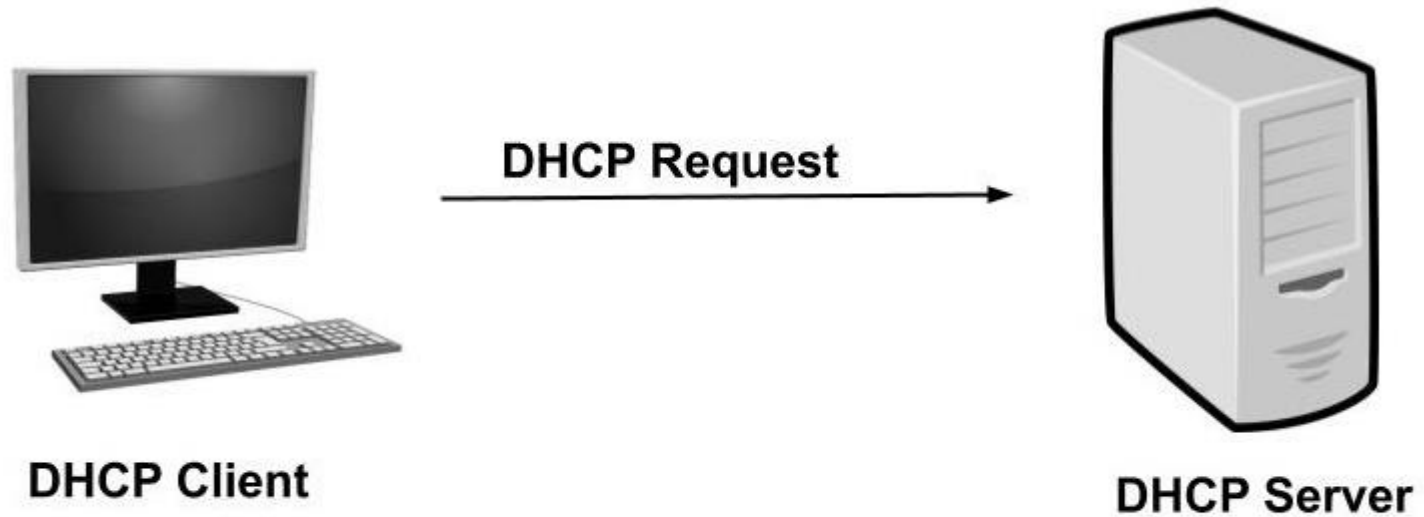


DHCP Server

3.DHCP Request:

- ☐ In most cases, the client can receive multiple DHCP offer because in a network there are many DHCP servers(as they provide fault tolerance).
- ☐ If the IP addressing of one server fails then other servers can provide backup. But, the client will accept only one DHCP offer. In response to the offer, the client sends a DHCP Request requesting the offered address from one of the DHCP servers.
- ☐ All the other offered IP addresses from remaining DHCP servers are withdrawn and returned to the pool of IP available addresses.

DHCP (Dynamic Host Configuration Protocol)



4.DHCP Acknowledgment:

- ☐ The server then sends Acknowledgment to the client confirming the DHCP lease to the client.
- ☐ The server might send any other configuration that the client may have asked. At this step, the IP configuration is completed and the client can use the new IP settings.

DHCP (Dynamic Host Configuration Protocol)



DHCP Client

DHCP ACK



IP Settings

IP: 192.168.1.15

Subnet: 255.255.255.0

Default Gateway: 192.168.1.1

DNS: 8.8.8.8



DHCP Server

Advantages of DHCP

- 1.It is easy to implement and automatic assignment of an IP address means an accurate IP address.
- 2.The manual configuration of the IP address is not required. Hence, it saves time and workload for the network administrators.
- 3.Duplicate or invalid IP assignments are not there which means there is no IP address conflict.
- 4.It is a great benefit for mobile users as the new valid configurations are automatically obtained when they change their network.

Disadvantages of DHCP

1.As the DHCP servers have no secure mechanism for the authentication of the client so any new client can join the network. This poses security risks like unauthorized clients being given IP address and IP address depletion from unauthorized clients.

1.The DHCP server can be a single point of failure if the network has only one DHCP server.



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