DHCP

**DHCP Server Interview Questions and Answers**

**1. What is DHCP?**   
DHCP stands for "Dynamic Host Configuration Protocol".   
  
**2.What is DHCP's purpose?**   
DHCP's purpose is to enable individual computers on an IP network to extract their configurations from a server (the 'DHCP server') or servers, in particular, servers that have no exact information about the individual computers until they request the information. The overall purpose of this is to reduce the work necessary to administer a large IP network. The most significant piece of   
information distributed in this manner is the IP address.   
  
**3. Can DHCP work with AppleTalk or IPX?**   
No, it is too tied to IP. Furthermore, they don't need it since they have always had automated mechanisms for assigning their own network addresses.   
  
**4. Who Created It? How Was It Created?**   
DHCP was created by the Dynamic Host Configuration Working Group of the Internet Engineering Task Force (IETF; a volunteer organization which defines protocols for use on the Internet). As such, it's definition is recorded in an Internet RFC and the Internet Activities Board (IAB) is asserting its status as to Internet Standardization. As of this writing (June 1998), DHCP is an Internet   
Draft Standard Protocol and is Elective. BOOTP is an Internet Draft Standard Protocol and is recommended. For more information on Internet standardization, see RFC2300 (May 1998)   
  
**5. How is it different than BOOTP or RARP?**   
DHCP is based on BOOTP and maintains some backward compatibility. The main difference is that BOOTP was designed for manual pre-configuration of the host information in a server database, while DHCP allows for dynamic allocation of network addresses and configurations to newly attached hosts. Additionally, DHCP allows for recovery and reallocation of network addresses through a leasing mechanism.   
RARP is a protocol used by Sun and other vendors that allows a computer to find out its own IP number, which is one of the protocol parameters typically passed to the client system by DHCP or BOOTP. RARP doesn't support other parameters and using it, a server can only serve a single LAN. DHCP and BOOTP are designed so they can be routed.

**6.How is it different than VLANs?**   
DHCP and VLANs, which are very different in concept, are sometimes cited as different solutions to the same problem. While they have a goal in common (easing moves of networked computers), VLANs represent a more revolutionary change to a LAN than DHCP. A DHCP server and forwarding agents can allow you to set things up so that you can unplug a client computer from one network or subnet and plug it into another and have it come alive immediately, it having been reconfigured automatically. In conjunction to Dynamic DNS, it could automatically be given its same name in its new place. VLAN-capable LAN equipment with dynamic VLAN assignment allows you to configure things so a client computer can be plugged into any port and have the same IP number (as well as name) and be on the same subnet. The VLAN-capable network either has its own configuration that lists which MAC addresses are to belong to each VLAN, or it makes the determination from the source IP address of the IP packets that   
the client computer sends. Some differences in the two approaches:

* + DHCP handles changes by reconfiguring the client while a VLAN-capable network handles it by reconfiguring the network port the client is moved to.
  + DHCP dynamic reconfiguration requires a DHCP server, forwarding agent in each router, and DHCP capability in each client's TCP/IP support.

The analogous capability in VLANs requires that all hubs throughout the network be VLAN-capable, supporting the same VLAN scheme. To this point VLAN support is proprietary with no vendor interoperability, but standards are being developed.

* + DHCP can configure a new client computer for you while a VLAN-capable network can't.
  + DHCP is generally aimed at giving "easy moves" capability to networks that are divided into subnets on a geographical basis, or on separate networks. VLANs are generally aimed at allowing you to set up subnets

on some basis other than geographical, e.g. instead of putting everyone in one office on the same subnet, putting each person on a subnet that has access to the servers that that person requires.   
  
There is an issue with trying to use DHCP (or BOOTP) and VLANs at the same time, in particular, with the scheme by which the VLAN-capable network determines the client's VLAN based upon the client computer's source IP address. Doing so assumes the client computer is already configured, which precludes the use of network to get the configuration information from a DHCP or BOOTP server.   
  
**7. What protocol and port does DHCP use?**   
DHCP, like BOOTP runs over UDP, utilizing ports 67 and 68.   
  
**8. What is an IP address?**   
An IP address (also called an IP number) is a number (typically written as four numbers separated by periods, i.e. 107.4.1.3 or 84.2.1.111) which uniquely identifies a computer that is making use of the Internet. It is analogous to your telephone number in that the telephone number is used by the telephone network to direct calls to you. The IP address is used by the Internet to direct   
data to your computer, e.g. the data your web browser retrieves and displays when you surf the net. One task of DHCP is to assist in the problem of getting a functional and unique IP number into the hands of the computers that make use of the Internet.   
  
**9. What is a MAC address?**   
A MAC address (also called an Ethernet address or an IEEE MAC address) is a number (typically written as twelve hexadecimal digits, 0 through 9 and A through F, or as six hexadecimal numbers separated by periods or colons, i.e. 0080002012ef, 0:80:0:2:20:ef) which uniquely identifes a computer that has an Ethernet interface. Unlike the IP number, it includes no indication of where your computer is located. In DHCP's typical use, the server uses a requesting computer's MAC address to uniquely identify it.   
  
**10. What is a DHCP lease?**   
A DHCP lease is the amount of time that the DHCP server grants to the DHCP client permission to use a particular IP address. A typical server allows its administrator to set the lease time.   
  
**11. What is a Client ID?**   
What is termed the Client ID for the purposes of the DHCP protocol is whatever is used by the protocol to identify the client computer. By default, DHCP implementations typically employ the client's MAC address for this purpose, but the DHCP protocol allows other options. Some DHCP implementations have a setup option to specify the client ID you want. One alternative to the MAC address is simply a character string of your choice. In any case, in order for DHCP to function, you must be certain that no other client is using the client ID you choose, and you must be sure the DHCP server will accept it.

**12.Can DHCP support statically defined addresses?**   
Yes. At least there is nothing in the protocol to preclude this and one expects it to be a feature of any DHCP server. This is really a server matter and the client should work either way. The RFC refers to this as manual allocation.   
  
**13. How does DHCP and BOOTP handle multiple subnets?**   
For the situations where there is more than one LAN, each with its own subnet number, there are two ways. First of all, you can set up a seperate server on each subnet. Secondly, a feature of some routers known as "BOOTP forwarding" to forward DHCP or BOOTP requests to a server on another subnet and to forward the replies back to the client. The part of such a router (or server acting as a router) that does this is called a "BOOTP forwarding agent". Typically you have to enable it on the interface to the subnet to be served and have to configure it with the IP address of the DHCP or BOOTP server. On a Cisco router, the address is known as the "UDP Helper Address".   
  
**14. Can a BOOTP client boot from a DHCP server?**   
Only if the DHCP server is specifically written to also handle BOOTP queries.   
  
**15. Can a DHCP client boot from a BOOTP server?**   
Only if the DHCP client were specifically written to make use of the answer from a BOOTP server. It would presumably treat a BOOTP reply as an unending lease on the IP address. In particular, the TCP/IP stack included with Windows 95 does not have this   
capability.   
  
**16. Is a DHCP server "supposed to" be able to support a BOOTP client?**   
The RFC on such interoperability (1534) is clear: "In summary, a DHCP server:   
... MAY support BOOTP clients," (section 2). The word "MAY" indicates such support, however useful, is left as an option.   
A source of confusion on this point is the following statement in section 1.5 of RFC 1541: "DHCP must provide service to existing BOOTP clients." However, this statement is one in a list of "general design goals for DHCP", i.e. what the designers of the DHCP protocol set as their own goals. It is not in a list of requirements for DHCP servers.   
  
**17. Is a DHCP client "supposed to" be able to use a BOOTP server?**   
The RFC on such interoperability (1534) is clear: "A DHCP client MAY use a reply from a BOOTP server if the configuration returned from the BOOTP server is acceptable to the DHCP client." (section 3). The word "MAY" indicates such support, however useful, is left as an option.   
  
**18. Can a DHCP client or server make a DNS server update the client's DNS entry to match the client's dynamically assigned address?**   
RFCs 2136 and 2137 indicate a way in which DNS entries can be updated dynamically. Using this requires a DNS server that supports this feature and a DHCP server that makes use of it. The RFCs are very recent (as of 5/97) and implementations are few. In the mean time, there are DNS and DHCP servers that accomplish this through proprietary means.   
  
**19. Can a DHCP server back up another DHCP server?**   
You can have two or more servers handing out leases for different addresses. If each has a dynamic pool accessible to the same clients, then even if one server is down, one of those clients can lease an address from the other server. However, without communication between the two servers to share their information on current leases, when one server is down, any client with a lease from it will not be able to renew their lease with the other server. Such communication is the purpose of the "server to server protocol" (see next question). It is possible that some server vendors have addressed this issue with their own proprietary server-to-server communication.   
  
**20. When will the server to server protocol be defined?**   
The DHC WG of the IETF is actively investigating the issues in inter-server communication. The protocol should be defined "soon".   
  
**21.Where is DHCP defined?**   
In Internet RFCs.   
  
**22. Can DHCP support remote access?**   
PPP has its own non-DHCP way in which communications servers can hand clients an IP address called IPCP (IP Control Protocol) but doesn't have the same flexibility as DHCP or BOOTP in handing out other parameters. Such a communications server may support the use of DHCP to acquire the IP addresses it gives out. This is sometimes called doing DHCP by proxy for the client. I know that Windows NT's remote access support does this.   
  
A feature of DHCP under development (DHCPinform) is a method by which a DHCP server can supply parameters to a client that already has an IP number. With this, a PPP client could get its IP number using IPCP, then get the rest of its parameters using this feature of DHCP.   
  
SLIP has no standard way in which a server can hand a client an IP address, but many communications servers support non-standard ways of doing this that can be utilized by scripts, etc. Thus, like communications servers supporting PPP, such communications servers could also support the use of DHCP to acquire the IP addressees to give out.   
  
The DHCP protocol is capable of allocating an IP address to a device without an IEEE-style MAC address, such as a computer attached through SLIP or PPP, but to do so, it makes use of a feature which may or may not be supported by the DHCP server: the ability of the server to use something other than the MAC address to identify the client. Communications servers that acquire IP numbers for their clients via DHCP run into the same roadblock in that they have just one MAC address, but need to acquire more than one IP address. One way such a communications server can get around this problem is through the use of a set of unique pseudo-MAC addresses for the purposes of its communications with the DHCP server. Another way (used by Shiva) is to use a different "client ID type" for your hardware address. Client ID type 1 means you're using MAC addresses. However, client ID type 0 means an ASCII string.   
  
**23.How can I relay DHCP if my router does not support it?**   
A server on a net(subnet) can relay DHCP or BOOTP for that net. Microsoft has software to make Windows NT do this.   
  
**24.What is DHCP Spoofing?**   
Ascend Pipeline ISDN routers (which attach Ethernets to ISDN lines) incorporate a feature that Ascend calls "DHCP spoofing" which is essentially a tiny server implementation that hands an IP address to a connecting Windows 95 computer, with the intention of giving it an IP number during its connection process.

**25. How long should a lease be?**   
A very relevant factor is that the client starts trying to renew the lease when it is halfway through: thus, for example, with a 4 day lease, the client which has lost access to its DHCP server has 2 days from when it first tries to renew the lease until the lease expires and the client must stop using the network. During a 2-day outage, new users cannot get new leases, but no lease will expire for any computer turned on at the time that the outage commences.   
Another factor is that the longer the lease the longer time it takes for client configuration changes controlled by DHCP to propogate.   
  
**25. How can I control which clients get leases from my server?**   
There is no ideal answer: you have to give something up or do some extra work.

* + You can put all your clients on a subnet of your own along with your own DHCP server.
  + You can use manual allocation.
  + Perhaps you can find DHCP server software that allows you to list which

MAC addresses the server will accept. DHCP servers that support roaming machines may be adapted to such use.

* + You can use the user class option assuming your clients and server support it: it will require you to configure each of your clients with a user class name. You still depend upon the other clients to respect your wishes.

**26. How can I prevent unauthorized laptops from using a network that uses DHCP for dynamic addressing?**   
This would have to be done using a mechanism other than DHCP. DHCP does not prevent other clients from using the addresses it is set to hand out nor can it distinguish between a computer's permanent MAC address and one set by the computer's user. DHCP can impose no restrictions on what IP address can use a particular port nor control the IP address used by any client.   
  
**27. What features or restrictions can a DHCP server have?**   
While the DHCP server protocol is designed to support dynamic management of IP addresses, there is nothing to stop someone from implementing a server that uses the DHCP protocol, but does not provide that kind of support. In particular, the maintainer of a BOOTP server-implementation might find it helpful to enhance their BOOTP server to allow DHCP clients that cannot speak "BOOTP" to retrieve statically defined addresses via DHCP. The following terminology has become common to describe three kinds of IP address allocation/management.   
These are independent "features": a particular server can offer or not offer any of them:

* + Manual allocation: the server's administrator creates a configuration for the server that includes the MAC address and IP address of each DHCP client that will be able to get an address: functionally equivalent to BOOTP though the protocol is incompatible.
  + Automatic allocation: the server's administrator creates a configuration for the server that includes only IP addresses, which it gives out to clients. An IP address, once associated with a MAC address, is permanently associated with it until the server's administrator intervenes.
  + Dynamic allocation: like automatic allocation except that the server will track leases and give IP addresses whose lease has expired to other DHCP clients.

Other features which a DHCP server may or may not have:

* + Support for BOOTP clients.
  + Support for the broadcast bit.
  + Administrator-settable lease times.
  + Administrator-settable lease times on manually allocated addresses.
  + Ability to limit what MAC addresses will be served with dynamic addresses.
  + Allows administrator to configure additional DHCP option-types.
  + Interaction with a DNS server. Note that there are a number of interactions that one might support and that a standard set & method is in the works.
  + Interaction with some other type of name server, e.g. NIS.
  + Allows manual allocation of two or more alternative IP numbers to a single MAC address, whose use depends upon the gateway address through which the request is relayed.
  + Ability to define the pool/pools of addresses that can be allocated dynamically. This is pretty obvious, though someone might have a server that forces the pool to be a whole subnet or network. Ideally, the server does not force such a pool to consist of contiguous IP addresses.
  + Ability to associate two or more dynamic address pools on separate IP networks (or subnets) with a single gateway address. This is the basic support for "secondary nets", e.g. a router that is acting as a BOOTP relay for an interface which has addresses for more than one IP network or subnet.
  + Ability to configure groups of clients based upon client-supplied user and/or vendor class. Note: this is a feature that might be used to assign different client-groups on the same physical LAN to different logical subnets.
  + Administrator-settable T1/T2 lengths.
  + Interaction with another DHCP server. Note that there are a number of interactions that one might support and that a standard set & method is in the works.
  + Use of PING (ICMP Echo Request) to check an address prior to dynamically allocating it.
  + Server grace period on lease times.
  + Ability to force client(s) to get a new address rather than renew.

1**. What is an exclusion range and reservation?**  
  
An exclusion range is a range of IP addresses which needs to be excluded from DHCP scope, so that these IP’s never assigned automatically. A reservation is an IP address will be reserved for a server every time it boots up and it has been done using the MAC address of that server. Before configuring reservations, we need to exclude them from DHCP scope.   
  
**2. How do you configure the AD Server, DNS Server, IIS Server and FTP Server using the DHCP server?**  
  
Using the reservations only, so that every time the same address will be assigned to the server. If you take a DNS server, it should have same IP all the time, because it is responsible for name resolutions in that network. If the IP address getting changed every time, its very difficult to the clients which are requesting name resolutions. That is the reason, it should have same IP all the time, we can do that automatically using reservations.   
**3. What is DHCP relay agent?**   
  
DHCP relay agent, is an option configured on DHCP server. Which enables the client machine requests to go through the routers. That means, if the DHCP server is in one network and the client is in another network, these networks are connected by routers. By default the routes will never allow the DHCP packets through them, by configuring this option, these requests will pass between two networks.