Notes for Cisco Routing and Switching1 – Introduction to Networks
Chapter 10. Application Layer

1. The three upper layers of the OSI model, the session, presentation, and application layers, provide application services similar to those provided by the TCP/IP model application layer. Lower layers of the OSI model are more concerned with data flow.

2. The presentation layer deals with common data format. Encryption, formatting, and compression are some of the functions of the layer. Addressing occurs in the network layer, session control occurs in the session layer, and authentication takes place in the application or session layer.

3. When a user types a domain name of a website into the address bar of a web browser, a workstation needs to send a DNS request to the DNS server for the name resolution process. This request is a client/server model application. The eMule application is P2P. Sharing a printer on a workstation is a peer-to-peer network. Using ARP is just a broadcast message sent by a host.

4. IMAP and POP are protocols that are used to retrieve email messages. The advantage of using IMAP instead of POP is that when the user connects to an IMAP-capable server, copies of the messages are downloaded to the client application. IMAP then stores the email messages on the server until the user manually deletes those messages.

5. The destination email server may be offline or busy when email messages are sent. In either of these cases, SMTP spools messages to be sent at a later time. Periodically, the server checks the queue for messages and attempts to send them again. The message is returned to the sender as undeliverable if it is still not delivered after a predetermined expiration time.

6. All DHCP messages between a DHCP-enabled client and a DHCP server are using broadcast messages until after the DHCPACK message. The DHCPDISCOVER and DHCPREQUEST messages are the only messages that are sent by a DHCP-enabled client. All DHCP messages between a DHCP-enabled client and a DHCP server use broadcast messages when the client is obtaining a lease for the first time.

7. If the game site administrator decides to change the IP address of the site www.nogamename.com, it is transparent to the user because the domain name will remain the same.

8. In the DNS hierarchy, the top level domain servers (.com, .gov, .edu, etc.) contain records of second-level domain servers (netacad.com, whitehouse.gov, etc.). The second-level domain name server (netacad.com) is an authoritative DNS server because it maintains all records for the netacad company. The mx.netacad.com and www.netacad.com are either A records, CNAME records, or MX records maintained by the netacad.com DNS server.

9. When a host configured to use DHCP powers up on a network it sends a DHCPDISCOVER message. FF-FF-FF-FF-FF-FF is the L2 broadcast address. A DHCP server replies with a unicast DHCPOFFER message back to the host.

10. An FTP server runs an FTP daemon, which is a program that provides FTP services. End users who request services must run an FTP client program.

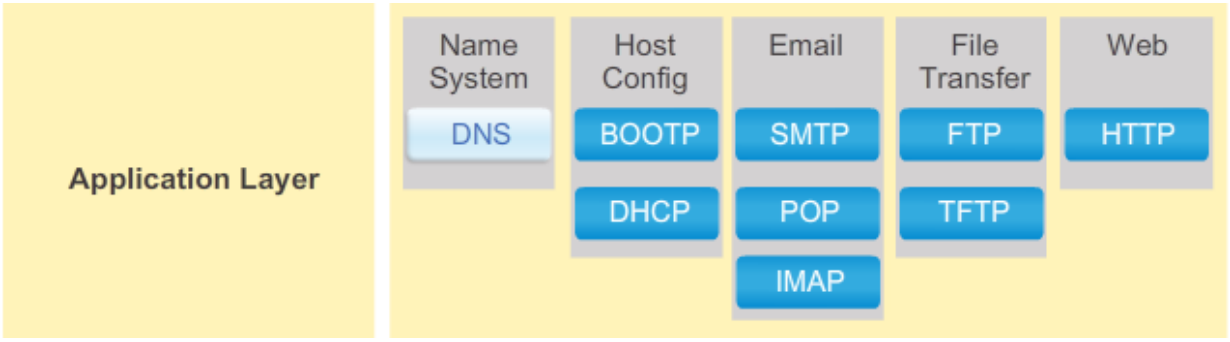
11. The Server Message Block protocol is a protocol for file, printer, and directory sharing. Clients establish a long term connection to servers and when the connection is active, the resources can be accessed. Every SMB message has the same format. The use of SMB differs from FTP mainly in the length of the sessions. SMB messages can authenticate sessions.

12. Hypertext Transfer Protocol (HTTP) is the protocol that is used for accessing or posting web server information using a usual TCP /IP communication channel.
    Hypertext Transfer Protocol Secure (HTTPS) is the protocol that is used for accessing or posting web server information using a secure communication channel.

13. A user can manually query the name servers to resolve a given host name using the **nslookup** command. Nslookup is both a command and a utility.

14. The DHCPDISCOVER message is used to identify any DHCP servers on a network. The DHCPOFFER message is used by a server to offer a lease to a client. The DHCPREQUEST message is used to identify both the specific DHCP server and the lease that the client is accepting.
    The DHCPACK message is used by a server to finalize a successful lease with a client.
    The DHCPNAK message is used when an offered lease is no longer valid.

15. Peer-to-peer networks do not require the use of a dedicated server, and devices can assume both client and server roles simultaneously on a per request basis. Because they do not require formalized accounts or permissions, they are best used in limited situations. Peer-to-peer applications require a user interface and background service to be running, and can be used in more diverse situations.



The TCP/IP application protocols specify the format and control information necessary for many common Internet communication functions. Among these TCP/IP protocols are:

- **Domain Name System (DNS)** - This protocol resolves Internet names to IP addresses.
- **Telnet** - This is used to provide remote access to servers and networking devices.
- **Simple Mail Transfer Protocol (SMTP)** - This protocol transfers mail messages and attachments.
- **Dynamic Host Configuration Protocol (DHCP)** - A protocol used to assign an IP address, subnet mask, default gateway, and DNS server addresses to a host.
- **Hypertext Transfer Protocol (HTTP)** - This protocol transfers files that make up the web pages of the World Wide Web.
- **File Transfer Protocol (FTP)** - A protocol used for interactive file transfer between systems.
- **Trivial File Transfer Protocol (TFTP)** - This protocol is used for connectionless active file transfer.
- **Bootstrap Protocol (BOOTP)** - This protocol is a precursor to the DHCP protocol. BOOTP is a network protocol used to obtain IP address information during bootup.
- **Post Office Protocol (POP)** - A protocol used by email clients to retrieve email from a remote server.
- **Internet Message Access Protocol (IMAP)** - This is another protocol for email retrieval.

DNS Record Types

A	Returns a 32-bit IPv4 address, most commonly used to map hostnames to an IP address of the host, but it is also used for DNSBLs, storing subnet masks in RFC 1101, etc.
NS	Delegates a DNS zone to use the given authoritative name servers
MX	Maps a domain name to a list of message transfer agents for that domain
CNAME	Canonical name record — Alias of one name to another: the DNS lookup will continue by retrying the lookup with the new name.