it is the layer that provides the interface between the applications There are many application layer protocols, and new protocols Application layer protocols are used to exchange data betweenused to communicate and the underlying network over which are always being developed. Some of the most widely known made for free at coggle.it programs running on the source and destination hosts messages are transmitted. application layer protocols include Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP), Internet Message Access Protocol (IMAP), and Domain Name System (**DNS**) protocol. The presentation layer **formats** data for the application layer, and it sets standards for file formats. Some well-known standards for video include QuickTime and Motion Picture Experts Group (MPEG). Some well-known graphic image formats that are used The presentation on networks are Graphics Interchange Format (GIF), Joint Encrypting data for transmission and decrypting data upon layer has three Photographic Experts Group (JPEG), and Portable Network Presentation primary functions: Graphics (PNG) format Formatting, or presenting, data at the source device into a compatible form for receipt by the destination device **Compressing** data in a way that can be decompressed by the Presentation, and Create and maintain dialogs between source and destination applications. The Session Layer The session layer handles the exchange of information to initiate dialogs, keep them active, and to restart sessions that are disrupted or idle for a long period of time. **How Application Protoc** Application layer protocols describe the In the client-server model, the device requesting the Interact with End-User format of the requests and responses information is called a client and the device responding data transfer from a client to a Client-Server Model **Applications** to the request is called a server. between clients and servers server is referred to as an upload and data from a server to a client as a download. In the peer-to-peer (P2P) networking model, the data is accessed from a peer device without the use of a dedicated server. The P2P network model involves two parts: P2P networks and P2P applications. Both parts have similar features, but in practice work quite differently. Peer-to-Peer Some P2P applications use a hybrid system where resource Networks sharing is decentralized, but the indexes that point to resource locations are stored in a centralized directory. In a hybrid system, each peer accesses an index server to get the location of a A P2P application allows a device Peer-to-Peer resource stored on another peer. to act as both a client and a **Applications** server within the same communication, Some P2P applications are based on the Gnutella protocol, where each user shares whole files with other users. As shown in the figure, Gnutella-compatible client software allows users to connect to Gnutella services over the Internet and to locate and access resources shared by other Gnutella peers. Many Gnutella client applications are available, including gtk-gnutella, WireShare, Shareaza, and Bearshare. Many P2P applications allow users to share pieces of many files with each other at the same time. Clients use a small file called a torrent file to locate other users who have pieces that they need so that they can connect directly to them. This file also contains information about tracker computers that keep track of which users have 🔳 what files. Clients ask for pieces from multiple users at the same time, known as a Common P2P Applications swarm. This technology is called BitTorrent. There are many BitTorrent clients including BitTorrent, uTorrent, Frostwire, and qBittorrent. the browser interprets the three parts of the URL: http (the protocol or scheme) When a web address or uniform resource locator (URL) is typed 2. www.cisco.com (the server name) into a web browser, the web browser establishes a connection to 3. index.html (the specific filename requested) the web service running on the server using the HTTP protocol. URLs and Uniform Resource Identifier (URIs) are the names most people associate with web addresses. GET - A client request for data. A client (web browser) sends the GET message to the web server to request HTML pages. HTTP is a request/response protocol. When a client, typically a web browser, sends a request to a web server, HTTP POST - Uploads data files to the web server such as form data. specifies the message types used for that Hypertext Transfer Protocol and PUT - Uploads resources or content to the web server such as an image. message types are GET, POST, and PUT Hypertext Markup Language For secure communication across the Internet, the HTTP Secure (HTTPS) protocol is used. HTTPS uses authentication and encryption to secure data as it travels between the client and server. HTTPS uses the same client request-server response Although HTTP is remarkably flexible, it is not a secure protocol. process as HTTP, but the data stream is encrypted with Secure The request messages send information to the server in plain text Socket Layer (SSL) before being transported across the network. that can be intercepted and read. The server responses, typically HTML pages, are also unencrypted. Email is a store-and-forward method of sending, storing, and etrieving electronic messages across a network. Email An email client does not communicate directly messages are stored in databases on mail servers. with another email client when sending email. Instead, both clients rely on the mail server to **Email Protocols** transport messages. When a client sends email, the client SMTP process connects with a server SMTP process on well-known port 25. After the connection is made, the client attempts to send the email to the server across the connection. When the server receives the SMTP message formats require a message header and a message, it either places the message in a local account, if the message body. While the message body can contain any amount The destination email server may not be online or may be busy recipient is local, or forwards the message to another mail server of text, the message header must have a properly formatted when email messages are sent. Therefore, SMTP spools **SMTP Operation** for delivery recipient email address and a sender address. messages to be sent at a later time. Periodically, the server checks the queue for messages and attempts to send them again. If the message is still not delivered after a predetermined expiration time, it is returned to the sender as undeliverable. The server starts the POP service by passively listening on TCP port 110 for client connection requests. When a client wants to make use of the service, it sends a request to establish a TCP connection with the server. When the connection is established, the POP server sends a greeting. The client and POP server therPOP is used by an application to retrieve mail from a mail server. exchange commands and responses until the connection is With POP, mail is downloaded from the server to the client and With POP, email messages are downloaded to the client and then deleted on the server. This is how POP operates, by default. POP Operation removed from the server, so there is no centralized location closed or aborted. where email messages are kept. Because POP does not store messages, it is undesirable for a small business that needs a Email supports three separate protocols for operation: Simple centralized backup solution. Mail Transfer Protocol (SMTP), Post Office Protocol (POP), and **IMAP**. The application layer process that sends mail uses SMTP. A client retrieves email, however, using one of the two application IMAP is another protocol that describes a method to retrieve email layer protocols: POP or IMAP. messages. Unlike POP, when the user connects to an IMAPcapable server, copies of the messages are downloaded to the

> client application. The original messages are kept on the server until manually deleted. Users view copies of the messages in their

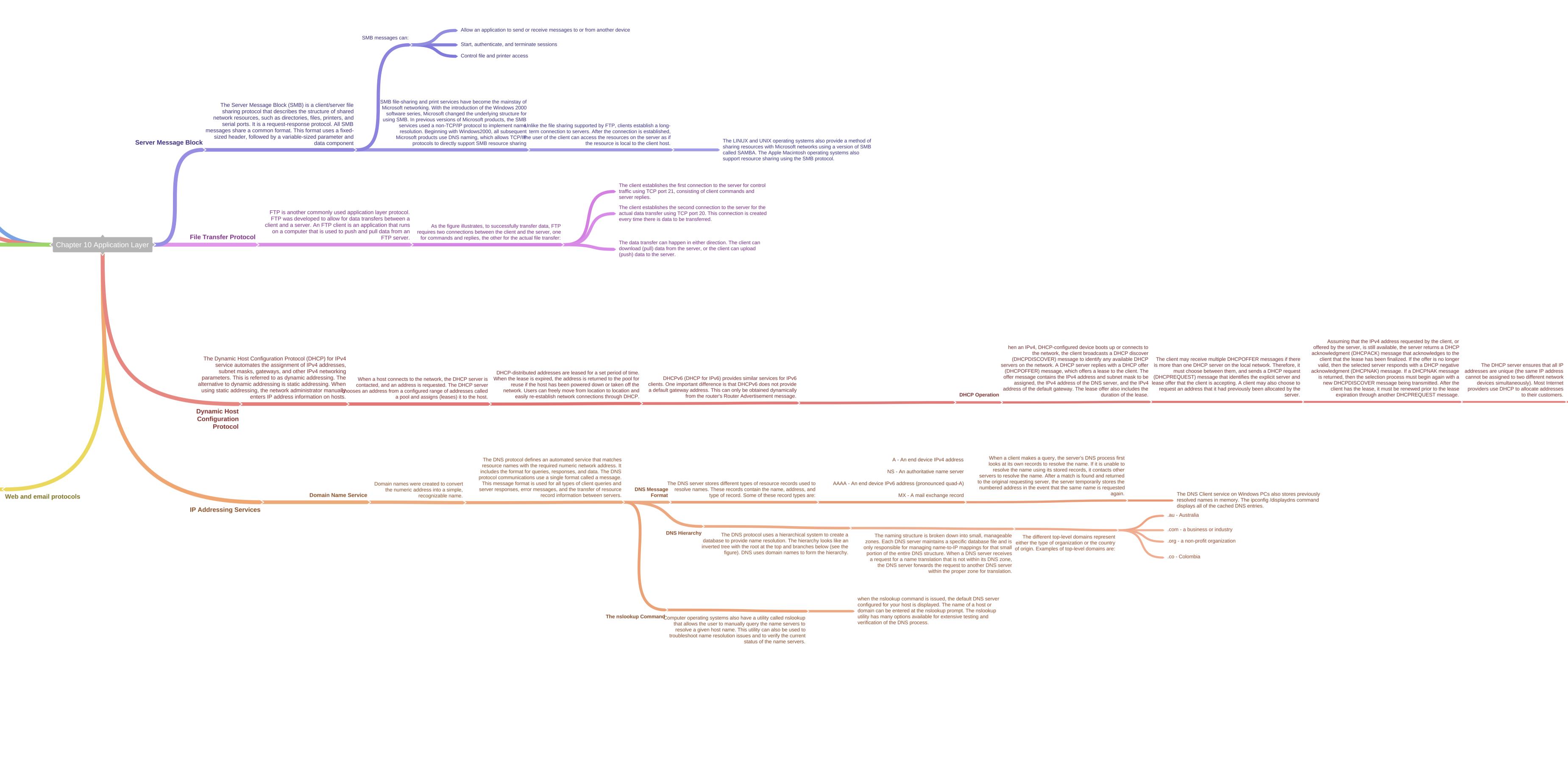
> > **IMAP Operation**

email client software.

Users can create a file hierarchy on the server to organize and store mail. That file structure is duplicated on the email client as

well. When a user decides to delete a message, the server synchronizes that action and deletes the message from the

server.



DHCPv6 has similar set of messages to those shown in the figure

for DHCP for IPv4. The DHCPv6 messages are SOLICIT,

ADVERTISE, INFORMATION REQUEST, and REPLY