Message Handling Systems

The message handling system (MHS) is a concept developed by ITU-T that is intended to lead to the interconnectivity of all different types of message conveying systems (facsimile, electronic mail, voicemail, telex etc). MHS set out a simple model of basic interconnection between systems.

Electronic mail (e-mail) represents one of the most successful classes of network applications currently enjoyed by many users. Early e-mail systems were network dependent, and their use was limited to the private networks of individual organizations. The CCITT X.400 and the ISO 10021 series of standards for Message Handling Systems (MHS) have paved the way for standardized and widely-available e-mail services.
At the center of MHS is a Message Transfer System (MTS) which handles the delivery of messages. The system consists of the following components:

A Message Transfer Agent (MTA) is responsible for the routing of complete e-mail messages (called envelopes) through the MTS. MTAs handle envelopes in a store-and-forward fashion.

A User Agent (UA) manages a user's mailbox. It enables the user to create, submit, and receive messages. The UA may serve an application or provide a user interface for direct interaction. UAs typically run on multi-user systems (e.g., mainframes).

A Message Store (MS) acts on behalf of a UA running on a system which may not be available on a continuous basis (e.g., personal computers). MSs are typically used within a LAN environment, serving a collection of personal computers.

X.400

X.400 is a set of standards defined in 1984 and 1988 by the International Telecommunication Union (ITU) for computer-based handling of e-mail. It's an alternative to the more prevalent e-mail protocol, Simple Mail Transfer Protocol (SMTP). X.400 is widely considered to be the standard framework for global messaging, although the Simple Mail Transfer Protocol (SMTP) for Internet e-mail might have an even better claim to the title. X.400 is widely implemented in Europe by most post, telephone, and telegraph (PTT) authorities.

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How X.400 Works

X.400 defines a global Message Handling System (MHS) that consists of a number of messaging components. From an administrative point of view, the building blocks of the MHS are management domains (MDs). A management domain is a collection of messaging systems with at least one Message Transfer Agent (MTA) managed by a specific organization.

An X.400 MHS consists of the following five kinds of messaging components:

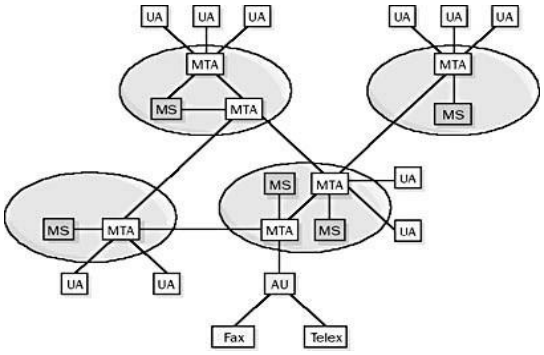
Message Transfer Systems (MTS's): Collections of one or more MTAs that function together to provide message forwarding services for a particular X.400 domain.

Message Transfer Agents (MTAs): Route and deliver transport messages to and from User Agents (UAs) and with other MTAs. An MTA corresponds to a mail server in a typical LAN–based messaging system. MTAs maintain a database of all UAs registered in their domain and routing tables that indicate how messages should be forwarded to other domains.

Messages Stores (MS's): Temporarily store messages that an MTA has received until they can be processed and forwarded for delivery. X.400 thus uses a store-and-forward method of message delivery.

User Agents (UAs): Provide messaging functionality directly to users. From a practical point of view, a UA can be identified as the e-mail client software that a user is running; from an abstract point of view, a UA is a domain belonging to a user and consisting of additional subcomponents. The goal of an X.400 MHS is to facilitate exchange of messages between different UAs.

Access Units (AUs): Gateways between an X.400 MHS and another messaging system such as a telex or fax system.



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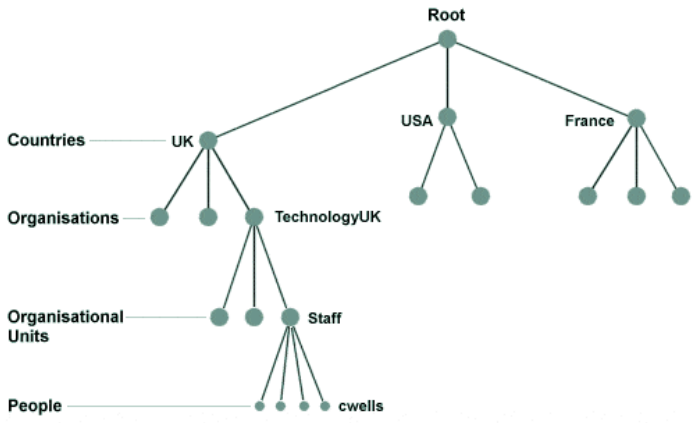
X.500

X.400 messaging cannot exploit its real power without an operational X.500 Directory Service in place. Improvement is needed on several levels. **X.500** is a series of computer networking standards covering electronic directory services. The X.500 series was developed by the Telecommunication Standardization Sector of the International Telecommunications Union (ITU-T). Its purpose is to centralize an organization's contacts so that anyone within (and sometimes without) the organization who has Internet access can look up other people in the same organization by name or department. Several large institutions and multinational corporations have implemented X.500.The directory services were developed to support requirements of X.400 electronic mail exchange and name lookup. The International Organization for Standardization (ISO) was a partner in developing the standards, incorporating them into the Open Systems Interconnection suite of protocols.

The protocols defined by X.500 include

- **DAP** (Directory Access Protocol)
- **DSP** (Directory System Protocol)
- **DISP** (Directory Information Shadowing Protocol)
- **DOP** (Directory Operational Bindings Management Protocol)



Features of X.500 include the following:

- A standards-based directory service for those applications that require directory information
- A single, global, hierarchical namespace of objects and their attributes

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- Data management functions for viewing, adding, modifying, and deleting directory objects
- Search capabilities for customizing complete data queries

How X.500 Works

X.500 defines a global directory service that consists of several components. From an administrative point of view, the building blocks of the X.500 directory service are Directory Management Domains (DMDs). An X.500 DMD is a collection of X.500 components that includes at least one Directory System Agent (DSA) and is managed by a Domain Management Organization (DMO). There are two types of DMDs:

- **Administrative Directory Management Domains (ADDMDs):** Directory services managed by a registered private agency that provide public directory services. Examples of ADDMDs are Four11 and Bigfoot, which provide public X.500 directory services over the Internet.
- **Private Directory Management Domains (PRDMDs):** Directory services that provide private directory access. An example is a domain controller hosting Active Directory on a network running Microsoft Windows Server.

Three main components are involved in maintaining and accessing X.500 directory services:

- **Directory Information Base (DIB):** The actual hierarchical database that contains all the information in the directory. X.500 uses a distributed directory hierarchy in which different subsets of the DIB are found on different servers at different locations. From the user's point of view, however, the entire global X.500 directory appears to be accessible from the local directory server that the Directory User Agent (DUA) connects to. A schema is used to define the various classes of objects and their attributes, which can be stored in the directory. The Directory Information Tree (DIT) is the naming hierarchy that describes the hierarchical structure of the DIB.
- **Directory System Agent (DSA):** A particular server that maintains a subset of the DIB and provides an access point to the directory for DUAs to connect. Each DSA is responsible for a subset of the DIB and includes a set of naming contexts that define objects that are near each other in the DIT. DSAs also communicate with each other for directory replication purposes to ensure that each DSA's subset of the DIB is current and complete and to maintain the integrity of the whole X.500 directory system.
- **Directory User Agents (DUAs):** The client software that accesses the X.500 directory on behalf of the user. DUAs can perform such actions as searching, reading, updating, and deleting information in the directory, depending on the level of functionality of the client and the level of access granted to the user. The functionality of a DUA can be built into any type of software, including e-mail clients, Web browsers, or even the operating system itself.

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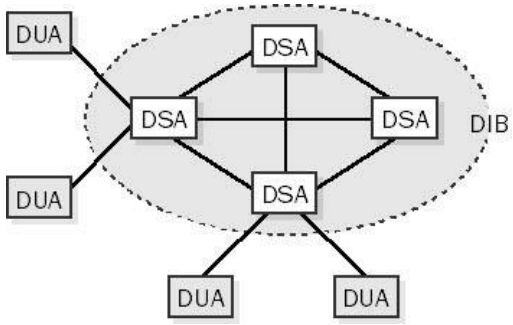

To access information in the directory, a DUA connects to a local DSA and queries the directory by using the Directory Access Protocol (DAP), the standard X.500 protocol for locating, accessing, and modifying information in an X.500 directory.

MailBox

A mailbox is the storage location of electronic mail messages that is found either on a remote server or downloaded to the user's hard drive. In e-mail systems, each user has a private mailbox. When the user receives e-mail, the mail system automatically puts it in the mailbox.

The mail system allows you to scan mail that is in your mailbox, copy it to a file, delete it, print it, or forward it to another user.

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