



Advances in Communications: Implementing the X.400 Standard

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In 1984, the Consultative Committee on International Telegraphy and Telephony (CCITT) released the X.400 Series recommendation for interconnection standards for computer-based message systems. These standards will have a strong impact on the nature of global communications in the future. Two members of the Computer & Information Science Department at the New Jersey Institute of Technology have received state and industrial funding to implement a portion of the CCITT X.400 standard during the 1985-1986 academic year. This paper summarizes the work being carried on at NJIT.

Scope of the X.400 Standard

Figure 1 gives a perspective of a typical computer based messaging system that is addressed by the X.400 standard.

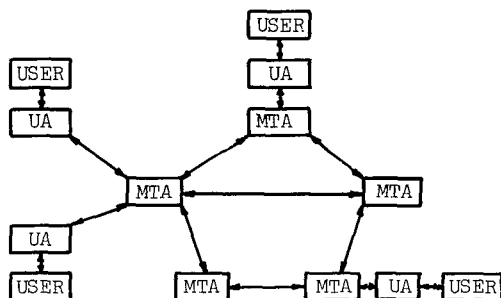


Figure 1 Structure of an X.400 system

USERS are typically people but a USER could also be a computer process. USERS wish to exchange messages with other USERS. In order to exchange messages, USERS need a means of preparing messages, storing them, designating recipients and retrieving messages. These services are provided by User Agents (UAs). The scope of the possible functions that can be performed by UAs is not addressed by the X.400 standard. However, there are a large

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number of independently developed UAs already in existence both within organizations and geographically dispersed (e.g., Dialcom, Tymeshare, EIES, Telenet). In order to allow UAs to communicate with each other, therefore permitting USERS within different messaging environments to communicate with each other, additional entities have been defined by the X.400 standard called Message Transfer Agents (MTAs). It is the job of the MTAs to interact with UAs and other MTAs so that messages prepared by a USER can be forwarded to a USER at another destination. Consequently, not only must MTAs provide an interface to UAs, they must also provide store-and-forward services in the event that they act as a relay point when messages are passed through a network.

Scope of Research

The first phase of this project, supported by the state of New Jersey, AT&T Corp. and the Computer Sciences Corp., involves implementing a minimal MTA. The MTA will operate in a UNIX environment and is written in the "C" programming language. The MTA must capture the X.400 protocol data units produced by UAs and then provide the following services:

- transfer messages (store and forward)
- provide delivery notification
- recognize priorities
- record routing trace information
- defer and/or hold for delivery
- provide alternative delivery
- possibly convert data between character sets
- provide UA probe services

The MTA being developed is a minimal MTA in the sense that many of the X.400 features listed as options will not be included in the initial MTA. Future work will involve: expanding the minimal MTA to include more optional features, building "gateways" for interfacing already existing message-systems to MTAs, creating operating system independent MTAs and building "Test and Validation Criteria" to verify whether an organization's version of X.400 actually conforms to the standard.

The impact of the X.400 standard on computer-based messaging systems is recognized by industry, government and others interested in communications. The implementation of an MTA is a major contribution towards the universal adoption of the X.400 standard.