

Network Working Group  
Request for Comments: 1491  
FYI: 21

C. Weider  
Merit Network, Inc.  
R. Wright  
Lawrence Berkeley Laboratory  
July 1993

## A Survey of Advanced Usages of X.500

### Status of this Memo

This memo provides information for the Internet community. It does not specify an Internet standard. Distribution of this memo is unlimited.

### Abstract

This document is the result of a survey asking people to detail their advanced usages of X.500. It is intended to show how various organizations are using X.500 in ways which extend the view of X.500 as a "White Pages" service. This RFC is a product of the Integrated Directory Services Working Group of the Application and User Services Areas of the IETF.

### 1. Introduction

As the use of X.500 spreads in the Internet, organizations are finding uses for it which go beyond the "white pages" paradigm which has been used to introduce it to new users. Consequently, to document those new uses and to encourage the wider use of X.500, we sent out a survey to obtain "advanced usages" of X.500.

#### 1.1 The survey

The survey we sent out is included here for two purposes:

- 1) completeness, and
- 2) we'd like to encourage anyone who retrieves this document to send us their advanced usage for inclusion in the next revision.

If you wish to fill this out, please send it to the working group list: IDS@merit.edu.

---

Application Name:

Author(s):

Company or Institution:

e-mail address for more information:

If this is a product for public distribution, please give us the

Type: FREE, COMMERCIAL PRODUCT, or PROTOTYPE/RESEARCH

FREE - Anyone may obtain this product at zero cost.

COMMERCIAL PRODUCT - One may purchase this product.

PROTOTYPE/RESEARCH - This product is not yet available, only a prototype.

If FREE, please give us:

\* FTP and/or FTAM address (if available via FTP and/or FTAM):

If COMMERCIAL, please give us:

\* Directions to obtain product:

Availability: (When will product be available?)

List of platforms product runs on:

[The platform list can be general - e.g. UNIX]

Short Description (< 100 words):

Full Description (< 1 page):

Fig. 1: Advanced Usages Survey Template

---

This survey went out to the following mailing lists: osi-  
ds@cs.ucl.ac.uk, disi@merit.edu (now ids@merit.edu), and  
dssig@ics.uci.edu.

## 1.2 Disclaimer

Descriptions of the advanced usages were written by the implementors, and not by the members of IDS. Although IDS has worked with the description authors to ensure readability, no guarantees can be made regarding the validity of descriptions. Caveat emptor.

## 2. The Survey Responses

### 2.1 Index to Responses

Application	Page
2.2.1 Global Time-table Information Service .....	3
2.2.2 Pre-Message Security Protocol .....	4
2.2.3 Electronic Data Interchange .....	5
2.2.4 Network Topology Information .....	7
2.2.4.1 Shared Whois Information Project .....	7
2.2.4.2 EARN's Network Directory .....	8
2.2.5 Soft Pages .....	9
2.2.6 X-Tel .....	10
2.2.7 Xerox Clearinghouse .....	12
2.2.8 X.500 Sendmail .....	13
2.2.9 Transparent ODA Conversion .....	14
2.2.10 X.500 and the whois protocol .....	16
2.2.11 X.400 table handling .....	17

### 2.2 Survey Responses

#### 2.2.1 Global Time-table Information Service

Application Name: Global Time-table Information Service based on X.500

Date Received: 7/1/1992

Date Last Validated: 7/1/1992

Author(s):

Jens Hofmann  
Cuno Lanz

Company or Institution:

Laboratory of Computer Engineering and Networks,  
Swiss Federal Institute of Technology (ETH Zurich)  
Switzerland

e-mail address for more information:

c=CH; a=ARCOM; p=SWITCH; o=ETHZ; ou=TIK; s=Lanz (lanz@tik.ethz.ch)

## Type:

experimental prototype; not public

FTP address: <none>

## Short Description:

This application aims at integrating the time-table information services offered by public transport providers of different scope (local, regional, national or international) into a homogeneous and unified user interface. X.500 is used to store the information in an autonomous and extensible way.

## Full Description:

Most of the public transport providers offer some kind of time-table information service like printed directory, help-desk, telephone support or PC software. Unfortunately these services have some of the following drawbacks:

- no automatic update of data (information accuracy)
- no global availability (place independency)
- no permanent availability (time independency)
- no inter-provider service (service integration).

X.500 may serve as a vehicle to overcome these drawbacks as follows: The public transport providers store the time-table information in a standardized format on locally managed DSAs. There is some kind of special purpose DUA which (1) queries the user for the input parameters (date, time, source and destination station) then (2) searches for the relevant paths by querying the involved DSAs and (3) displays the resulting time-table to the user.

In a diploma thesis a student is developing a new data model which supports easy selection of source and destination station as well as fast exploring of the time-table information. He is implementing a prototype application onto an existing DUA interface (based on HyperCard and running on Apple Macintosh) which is connected to the world-wide X.500 pilot service over DIXIE protocol. In order to test the prototype application the time-table information of the Swiss national public transport company and of most of the regional providers around the city of Zurich is included under the branch: c=CH;o=ETH Zurich.

## 2.2.2 Pre-Message Security Protocol

## Application Name:

Defense Message System Directory

Date Recieved: 7/1/1992

Date Last Validated: 7/1/1992

Author:  
Bob Cooney

Company or Institution:  
The Naval Computer and Telecommunications Station, Washington  
and  
The Defense Information System Agency

E-mail address for more information:  
cooney@wnyose.nctsw.navy.mil

Type:  
experimental prototype, not public

FTP address: <none>

Short Description:  
The U.S. Navy will build a directory based on X.500 to support the distribution of Pre-Message Security Protocol security keys.

Long Description:  
The U.S. Navy has been asked to build a directory service to support the distribution of Pre-Message Security Protocol security keys. The Pre-Message Security Protocol will provide SMTP/X.400 security services for unclassified but sensitive mail on the Defense Data Network.

The directory will be based on QUIPU. Proof of concept is expected by October 1992, with initial operational capacity by October 1993.

### 2.2.3 Electronic Data Interchange

Application Name: An X.500 User Agent for Electronic Data Interchange

Date Received: 7/10/1992

Date Last Validated: 7/10/1992

Author:  
Neil Weldon

Company or Institution:  
Networks Group,  
Computer Science Dept.,  
Trinity College Dublin,  
Ireland

e-mail address for more information:

omahony@cs.tcd.ie

nmweldon@vax1.tcd.ie

Type:

Research product and not for public distribution

FTP address: <none>

Short Description:

The Directory is used to assist in solving the 'first order' problem associated with Electronic Data Interchange (EDI). EDI is the transfer of trade documents between application processes in a processable form. The 'first order' problem describes the agreements that two organizations must come to regarding capabilities and preferences, before using EDI.

To solve this problem we defined object types to allow the storage of product catalogues within the Directory, as well as information about the EDI readiness of trading partners: addresses, preferences and EDI capabilities.

Full Description:

Electronic Data Interchange (EDI) is the means by which organizations exchange trade related documents between application processes in an format which may be processed electronically.

Before using EDI an organization must establish a series of goals and objectives, to establish what type of documents they wish to be able to transmit (invoices, purchase orders etc.) and what their communication requirements are. Each of these time consuming and tedious steps is usually done in conjunction with trading partners where these agreements regarding EDI capabilities and preferences must be made.

To solve this 'first order' problem (the need to come to agreements with other organizations before trading using EDI takes place) we defined object types to allow the storage of product catalogues within the Directory. The Directory may also convey information regarding the EDI readiness of trading partners: addresses, preferences and EDI capabilities.

Using an experimental User Agent based on Pod which was developed at Brunel in the UK, trade documents may be built up by selecting products from the stored catalogues. These documents are then encoded as an EDI Interchange after the Directory has been queried about addresses, etc.

The current object types are very basic and may only convey the minimal amount of information necessary. We are now in the process of extending this further to a full product class hierarchy which is being based on information that may be sent within an EDI trade document using the EDI standard document syntax EDIFACT.

By using the Directory as a repository for product information to aid in EDI the catalogues become available worldwide. They may be replicated at various nodes, and the updating and propagation of changes to slave copies becomes trivial.

#### 2.2.4 Network Topology Information

There are two projects in this area; Merit Network's Shared Whois Information Project, and EARN's Network Directory.

##### 2.2.4.1 Shared Whois Information Project

Application Name: Shared Whois Project

Date Received: 6/1/1993

Date Last Validated: 6/1/1993

Author(s): Sheri Repucci

Company or Institution: Merit Network, Inc.

e-mail address for more information: swip@merit.edu

Availability: June 1993

Type:  
experimental prototype, not public

List of platforms product runs on: UNIX

##### Short Description:

The Shared Whois Project merges network data held by various organizations. The principal purpose of merging this data is to find and resolve conflicting network information between the databases. The longterm goal of this project is to move away from the current model of storing similar and/or duplicate network information in multiple databases and to move to a X.500 distributed database model. To this end, we are working on loading the NSFNET network information into X.500 in anticipation of participating in a distributed database trial.

**Full Description:**

The Shared Whois Project is a collection of programs and shell scripts which collectively merges the network data held by each of the participating organizations. Currently this includes Merit, the RIPE-NCC and the InterNIC. The principal purpose of merging this vast quantity of data is to find and resolve conflicting network information between the various databases. It is our intent to merge this data bi-weekly and thus rapidly reach, and thereafter maintain, a stable set of commonly held network information.

While there is a common set of information all three of the participants hold in their various databases, additional information unique to the function of each organization is also held. Furthermore, the resulting set of data created by the merger holds only one entry per network without attempting to combine the variations. Thus, each entry includes a listing of all databases found to contain information for that network as well as all databases found to be in conflict with the entry held in the resultant set.

The longterm goal of this project is to move away from the current model of storing similar and/or duplicate network information in multiple databases and to move to a X.500 distributed database model. To this end, Merit is working to load the NSFNET network information into X.500 in anticipation of participating in a trial with the InterNIC and others on the road to a globally distributed database model.

**2.2.4.2 EARN's Network Directory**

Application Name: Ditnet/EARN Network Directory

Date Received: 7/7/1992

Date Last Verified: 7/7/1992

Author(s):

Peter Sylvester

Company or Institution:

Inria Rocquencourt - France

e-mail address for more information:

peter.sylvester@inria.fr

Type: FREE (data owned by EARN/Bitnet)



**Short Description:**

The EARN/Bitnet Network database consists of descriptions of all participating members, network nodes, administrators, and topology information. This database commonly known as BITEARN NODES is being made available through x.500.

**Full Description:**

A full description of the contents of the EARN/Bitnet database can be found in some EARN internal document which is available as a file BITEARN NODES from any NETSERV in EARN/Bitnet. The contents of this file is mapped into an X.500 subtree containing descriptions of network nodes, administrative personnel, and topology information.

The first version of the directory subtree will be created using a simple textual mapping to a flat directory tree using private attributes.

**2.2.5 Soft Pages**

Application Name: Soft Pages

Date Received: 9/25/1992

Date Last Validated: 9/25/1992

**Author(s):**

Thomas Johannsen  
Glenn Mansfield

**Company or Institution:**

AIC Systems Laboratory,  
Tohoku University Sendai

**e-mail address for more information:**

spp-support@aic.co.jp

**Type:**

Intended for public distribution, not yet public

FTP address: <none>

**Short Description:**

A file name look-up services for anonymous FTP servers, provides ls -lR information and FTP server address. Additionally, the nearest FTP site (from user's site) which holds the requested file is chosen.

#### Full Description:

With the growing of number and size of electronic archives for documents, programs and the like, the problem of finding and retrieving a specific file becomes more and more complex. Furthermore, bandwidth in the Internet is still limited. Users should be encouraged and supported to do local FTP sessions as often as possible instead of getting everything from the other end of the world (i.e., the net).

The Soft Pages Project combines an Archie-like file look-up service with network configuration knowledge. A dedicated User Agent gives a suggestion how to retrieve a document in a network traffic optimized manner.

Basically, Directory information introduced by Soft Pages falls into two parts: A file information part and a network configuration part.

The file information part describes objects and attributes for file servers and their contents. For each file server, names and attributes of its files are stored and updated periodically. This provides global access to Archie-like information for all registered file servers and, furthermore, opens the way to store document description together with the file name. Thus, document search is not restricted to file name matches but might be run for keywords as well.

The network configuration part provides information on networks (subnetworks), nodes and lines in the Internet. Furthermore, IP numbers can be mapped to network and node objects. In order to evaluate file server sites, Internet (site to site) connections are given a cost index and then alternatives are compared by their cost index. Cost index is a calculated parameter representing properties of a connection like speed, average traffic, charges etc. where values for the latter are hold as attributes to line objects.

If a document is stored at two or more sites, the site with the lowest cost index (which naturally will be the "nearest" in network terms) will be chosen for retrieval. A Soft Pages User Agent basically interacts with the Directory for finding a pointer to the "best" copy of a file wanted by a user.

#### 2.2.6 X-Tel

Application Name: X-Tel's advanced applications

Date received: 7/1/1992

Date last verified: 7/1/1992

Author(s):

Colin Robbins  
Julian Onions  
Graeme Lunt

Company or Institution: X-Tel Services Ltd.

e-mail address for more information:  
x500@xtel.co.uk

Type:

Commercial Products / Ideas

Short Description:

1) Product Information. Products that have DUA facilities built in have a "latest info" button or other request method. When "pressed" a well known node below the X-Tel part of the tree is read. The attributes contain descriptions of the latest version of the software, new features etc. If you decide you would like the new version, a second read obtains the information required for a template order form.

2) BUG Status. As above, but obtains details of known bugs in the version of software you are running. (If only we could find a way of putting fixes in, and automatically updating the software itself!)

3) X-Terms. We have a conferencing product, allowing X users to "talk" and share windows. The problem is identifying which X Terminal device a particular user is currently on. One solution we are using is modify a users directory entry during login to say which X display they have logged into. The conference can then query the directory, and open windows on the appropriate device. The directory is also used to store details of current conferences, so new delegates can join the conference easily.

4) Organisation browsing. There are a rich set of attributes about people and their roles stored in the directory. We have a special purpose DUA that exploits this information, and presents information on who manages who, who is secretary for who etc. This is very useful when combined with the search ACL mechanism defined in OSI-DS 21 as different views can be given to different categories of users.

5) MHS use of directory. The directory is used to store MHS routing information (as per the MHS DS working group documents)

6) Mail Lists. Details of mailing lists are stored in the directory. With careful use of access control, users can be given access so that they can subscribe and unsubscribe themselves to/from a list.

7) Details of restaurants in the Nottingham area are stored in the directory!

8) We plan to use the directory as a rendezvous for a multi-user adventure game. Each "room" will be a different entry, and modify operations will be used to pick up and put down objects!

The next two are "advanced" features of our DUA, they may not be considered relevant to this document!

9) Templates. The directory is used to store template entries. Our DUA then uses this template when adding new users. Very useful, as a number of default attributes can be set.

10) Editors. Special purpose editors for a number of complex attribute syntaxes are built in to our DUAs. This includes QUIPU ACLs, and X.400 OR Addresses.

#### 2.2.7 Xerox Clearinghouse

Application Name: Clearinghouse Interface

Date Received: 7/1/1992

Date Last Validated: 7/1/1992

Author(s):

Margaret Avino

Company or Institution:

Xerox Corporation

e-mail address for more information

mavin.cin\_ops@xerox.com

Type:

Early Design/Implementation stages

Short Description:

X.500 DSA interface to XNS (Xerox Network Services) Clearinghouse directory to provide access to Xerox Corporation's Clearinghouse via X.500 DUAs.

**Full Description:**

Xerox uses the XNS network protocol suite to provide Mail, Filing, Directory, Authentication, etc. network services for the installed based of 45,000+ Xerox workstations. The Directory is based on the XNS Clearinghouse protocol which is similar to X.500 in that it contains objects which have properties (attributes) and is a fully distributed, replicatable directory. The searching capabilities of the Clearinghouse protocol are not as robust as the X.500 search operation and the physical structure of the original database is not amenable to complex searches as it could be if it were stored in a relational database.

The first piece of this project is to transfer the data into an Oracle relational database and create a new Clearinghouse server which accesses the oracle database and is a full fledged member of the Clearinghouse, sending and receiving updates to other servers using the XNS Clearinghouse protocol. This will allow powerful SQL queries to be performed on the data which will provide some very desired functionality such as: list all of the Distribution Lists of which this name is a member.

To build on the new database, we are probing the implementation of an X.500 DSA interface to the Oracle Clearinghouse Directory. This would allow X.500 DUAs to access the data and utilize the powerful search operations. It will require the definition of one or more new object classes and several new attributes and some thought about the appropriate schema.

**2.2.8 X.500 Sendmail**

Application Name: X.500 Sendmail

Date Received: 9/25/1992

Date Last Verified: 9/25/1992

Author(s):  
Tim Howes

Company or Institution:  
University of Michigan

e-mail address for more information:  
x500@umich.edu

Type:  
FREE

FTP address: terminator.cc.umich.edu

Directions to obtain product:

get x500/sendmail-5.65.x500.tar.Z

Short Description:

Modifications to sendmail-5.65 to do X.500 lookups.

Full Description:

We have modified sendmail-5.65 so that it does X.500 lookups, returning the value of a user's rfc822Mailbox attribute. It handles multiple matches by sending a message containing the choices back to the sender. If the user has no email address in X.500, the sender is sent a message containing postal and phone information on the user. Both exact and approximate matching is supported.

#### 2.2.9 Transparent ODA Conversion

Application Name: Transparent ODA Conversion

Date Received: 7/16/1992

Date Last Verified: 7/16/1992

Author(s):

MacFarland Hale (MITRE Open Systems Group)

Company or Institution:

The MITRE Corporation

e-mail address for more information:

machale@mitre.org

Type:

Not Yet Available

Short Description:

Plan to use X.500 in conjunction with X.400 and Open Document Architecture (ODA) to provide transparent translation of compound documents between a sender and one or more recipients.

Full Description:

In the future, MITRE would like to combine X.500, X.400 and Open Document Architecture (ODA) to automate the conversion of compound documents in such a way that the users need not know about ODA or even that the conversion is taking place. This will require new and/or updated X.400 products.

A preferred compound document format (e.g., Microsoft Word, FrameMaker, etc.) for each user is stored in the X.500 directory. Each X.400 Message Transfer Agent (MTA) host also houses converters between each such format and the Open Document Interchange Format (ODIF).

A user (sender) creates a document with his or her preferred compound document editor. Ideally, the editor software will have a link (e.g., button or pull-down menu) to the X.400 User Agent (UA). The user invokes the X.400 UA (either using this link, or outside of the editor software) to send the document as an X.400 message to one or more recipients. Next, the document may need to be converted to ODIF, and this may be done in one of two ways.

Preferably, the X.400 MTA will be responsible for the ODIF conversion. The UA must somehow be told what format the original document is in. This may be done via the UA invocation from inside the editor, via a UA configuration file, by examining the filename extension, etc. It then tags the document to indicate the document's original format using one of the body parts: "Bilaterally Defined" (body part 14), "Nationally Defined" (body part 7) or "Externally Defined" (body part 15). The UA then sends the message, and the MTA interprets the tag to determine the document's format.

For messages internal to MITRE, the MTA will look up the recipient's preferred document format. If it is different than the sender's format, the MTA calls the appropriate ODIF converter and sends the message. If the recipient's preferred format is the same as that of the document being sent, then no conversion is performed. For messages going outside MITRE, the document is always converted to ODIF. The user may prevent this by specifying that the enclosed document is not to be converted, in which case the UA simply sends the document in binary form with no special tag.

Alternatively, the UA may do the conversion. As above, the UA must be told the document's original format. The UA may then call the appropriate local ODIF converter, and then send the message. There are some disadvantages to this approach:

- 1) ODIF converters must be purchased for and maintained on many more hosts;
- 2) the document is always converted to ODIF (unless the UA accesses the directory, but...);
- 3) conversion overhead could be traumatic on a small PC.

At each recipient host, the X.400 MTA catches the incoming message, recognizing the contents as ODIF. It then looks up the recipients' preferred compound document formats, calls the appropriate converters to translate the contents, and then delivers the messages to the recipients. If the incoming message contains one of the format tags described above, then no conversion is performed (since the document is not in ODIF).

Please note that MITRE is a not-for-profit organization. We will not produce commercial products to support this scenario, but we are anxious to encourage and work with companies interested in doing so.

#### 2.2.10 X.500 and the WHOIS protocol

Application Name: Phone Book

Date Received: 7/15/1992

Date Last Verified: 7/15/1992

Author(s):  
Steven Schoch

Company or Institution:  
NASA Ames Research Center

e-mail address for more information:  
schoch@sheba.arc.nasa.gov

Type:  
FREE, see Steve

Short Description:  
On-line edition of our phone book, using X.500 for storage and retrieval.

Full Description:  
Phone Book is a user application which communicates using the Internet WHOIS protocol. It is listed in the Internet Resources Guide as such. The latest incarnation, however, does not make use of a flat file -- it gets information from a DUA that performs conversions between information received via DAP and the format that users expect to get back from our Phone Book queries. The change to X.500 has allowed us to supply additional data such as E-mail address which do not normally appear in the phone book. The fields supplied in response to a query include:



Name  
 Telephone Number  
 Mail Stop  
 Office Number  
 Organizational Affiliation (either a NASA organization code  
 or a contractor name)  
 E-mail address

Queries may be made on any of the fields specified, with the office being divided into building and room components. A sample lookup might be:

trident:297-->phbook yee

Name	Phone	M/S	Office	Organization
Arnold M. Yee	4-4315	258-6	N258/134	COMPSCICOR
Cindy Yee		226-3	N226/105	CALSPAN
				cyee@ames.arc.nasa.gov
David H. Yee	4-4106	213-8	N213/256	EEF
				david_yee@qmgate.arc.nasa.gov
Dr. Helen M C. Yee	4-4769	202A-1	N202A/216	RF
Harry Yee	4-6557	213-2	N213/101F	EES
Peter Edmond Yee	4-3812	233-18	N233/240	EDC
				yee@atlas.arc.nasa.gov
Robert Yee	4-4122	T041-3	TA20/155	SFA
				robert_yee@qmgate.arc.nasa.gov

#### 2.2.11 X.400 table handling

Application Name: X.400 table handling

Date Received: 7/15/1992

Date Last Verified: 7/15/1992

Author(s):

Julian Onions  
 Colin Robbins

Company or Institution:

X-Tel Service Limited,  
 Nottingham, England

e-mail address for more information:

jpo@xtel.co.uk

Type:

FREE, not yet available to the general public

**Short Description:**

Implementation of the work of the IETF MHS-DS group. The goal is to put X.400 tables into X.500 in order to facilitate gateway and routing functions.

**Full Description:**

See the Internet drafts for MHS-DS. NASA Ames Research Center is participating in the testing and development of the next release of the PP message handling software. The latest update (alpha test) contains usage of X.500 by X.400 for RFC 822<->X.400 gatewaying, as well as hooks for X.400 intelligent routing. Use of X.500 to eliminate static tables will greatly improve the ability to maintain the information necessary for mail gatewaying and routing, while making it easier to keep this data current and well distributed.

**3. Security Considerations**

Security issues are not discussed in this memo.

**4. Authors' Addresses**

Chris Weider  
2901 Hubbard, Pod G  
Ann Arbor, MI 48105

Phone: (313) 747-2730  
EMail: clw@merit.edu

Russ Wright  
Lawrence Berkeley Laboratory  
1 Cyclotron Road  
Berkeley, CA 94720

Phone: (415) 486-6965  
EMail: wright@lbl.gov