Network Working Group
Request for Comments: 1802
Category: Informational

H. Alvestrand
UNINETT
K. Jordan
Control Data Systems
S. Langlois
Electricite de France
J. Romaguera
NetConsult

June 1995

Introducing Project Long Bud: Internet Pilot Project for the Deployment of X.500 Directory Information in Support of X.400 Routing

Status of this Memo

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

Abstract

The Internet X.400 community (i.e., GO-MHS) currently lacks a distributed mechanism providing dynamic updating and management of message routing information. The IETF MHS-DS Working Group has specified an approach for X.400 Message Handling Systems to perform message routing using OSI Directory Services. The MHS-DS approach has been successfully tested in a number of local environments.

This memo describes a proposed Internet Pilot Project that seeks to prove the MHS-DS approach on a larger scale. The results of this pilot will then be used to draw up recommendations for a global deployment.

1. Background

The 1988 edition of X.400 introduces, among other extensions or revisions, the concept of O/R Names which assumes the existence of a widely available Directory Service. This Directory Service is needed to support several MHS operations (support for names to identify senders and receivers of messages in a user-friendly fashion, support for distribution lists, authentication of MHS components, description of MHS components capabilities...).

The prime advantage of Directory Names, as perceived by many users, was to release users from the remembering of complex O/R Addresses for their correspondents.

In the MHS infrastructure, as compared to other protocols, a name by itself does not contain enough information to allow the Message Transfer Agents (MTAs) to route a message to the User Agent (UA) servicing this name. The routing process is based on information provided by different MHS Management Domains, whether they are public or private.

An MHS community combines several administrative MHS domains among which agreements for cooperative routing exist: the GO-MHS community is the set of MTA's taking care of X.400 mail operations on the Internet [RFC 1649].

In the absence of a distributed Directory Service, an interim technique has been developed within the GO-MHS community to collect and advertise routing information. This resulted in an experimental IETF protocol [RFC 1465].

2. Rationale

A number of routing problems are preventing the present Internet X.400 service from expanding its number of participating message transfer agents to a global scale. The two most critical problems are:

* The present mechanism of centrally maintained and advertized MTA routing tables has been optimized as far as possible. Increasing the number of directly connected MTAs increases also the workload on the MHS managers. The current solution does not scale. Routing must be a fully dynamic and distributed process.

* Manual propagation and installation of routing tables do not guarantee consistency of routing information (even in a loose fashion) when it is accessed by different MTAs scattered across the globe.

It is commonly accepted that a distributed mechanism providing for dynamic updating and management of X.400 routing information is highly desirable. The focus of the project is to establish X.500-based support of X.400 routing, at a very large scale.

3. Benefits

Using the Directory as a dynamic means of information storage and advertisement will guarantee participants in Project Long Bud that their updated data are globally available to the community. As a direct consequence of the above, a participating MHS manager will be released from configuring connections to the other participants.

Directory-capable MTAs will be able to discover more optimal and more direct routes to X.400 destinations than are practical today. This will enable faster delivery of messages.

The infrastructure reliability will be improved: the information stored in the Directory will allow automatic use of backup connections in case of remote MTA or network problems. X.400 mail managers in the GO-MHS Community should then be released from the need to know the complexity of the whole mail routing infrastructure. Providing a dynamic routing infrastructure will eliminate inconsistencies introduced by unsynchronized static tables and improve quality of service.

Furthermore, besides the robustness and the optimization of the new routing infrastructure, the Long Bud approach should bring to the participating organizations better control over how they establish and maintain their interconnection with the GO-MHS community.

Participants will share in building an X.400 network which can expand to a very large scale. They will develop experience using a global messaging architecture which scales well and requires minimal administrative overhead. They will be able to discuss experience with the MHS-DS experts and architects in the ongoing standards development cycle.

4. Definition of project LONG BUD

The Long Bud pilot wishes to demonstrate that the X.500 Directory is able to provide a global-scale service to messaging applications.

Although MHS-DS provides ways to use private routing trees, Long Bud will focus on the Open Community Routing Tree as used by the GO-MHS community.

4.1 Project Goals

Project Long Bud has the following goals:

* Gather pilot experience of the defined framework for X.500 support of MTA routing, as defined by the IETF MHS-DS Working Group [Kille 94].

* Actively investigate migration of the existing operational X.400 service from a routing method based upon distribution of centrally maintained static tables, as specified in [RFC 1465], to a method based instead upon X.500:

- -- Deploy X.400 MTAs which are directly capable of reading routing information from the X.500 Directory, in compliance with the specifications of the MHS-DS Working Group. This type of MTA is called a directory-capable MTA.

- -- Deploy tools which read routing information from the X.500 Directory and use it to generate static routing tables for MTAs which are not directory-capable.

* specify a set of minimal operational requirements needed before X.500-based routing of X.400 messages can be widely deployed.

4.2 Phasing

The first phase of Project Long Bud consists in deploying a small number of directory-capable MTAs operated by members of the MHS-DS Working Group and GO-MHS community. These MTAs must be capable of using information in the X.500 directory to route messages to all other members of the project as well as to the existing GO-MHS community. As of this writing, an initial set of MTAs is already operational.

At the end of this phase, the following goals should be achieved:

* The X.500 DIT must be populated with enough routing information to allow the participating MTAs to route reliably messages to each other and to the existing GO-MHS community.

* The X.500 DSAs holding the routing information must operate at a quality of service that is acceptable for an operational X.400 service.

As a prerequisite, a sufficient number of MTA managers must be willing to participate in Project Long Bud for the first set of results to be significant. Support for a protocol stack conforming to [RFC 1006] is mandatory. All MTAs participating in the Long Bud pilot need to register in the Open Tree and must be prepared to accept connections from anyone.

Note that in the first phase, default routes will be established in the DIT such that messages addressed to destinations outside of the Long Bud community will be routed to designated MTAs in the GO-MHS community. This will allow for full connectivity between the Long Bud community and the GO-MHS community which are related, but distinct communities. Interworking between these two must be established and coordinated.

In the second phase of Project Long Bud, a greater number of MTAs should be added to the experiment. Cooperation with non directory-capable communities must be addressed.

4.3 General Approach

No large scale resources have been committed to this project. Yet, expedient deployment is desirable. Therefore, the pilot project needs to be focused and relatively short-lived. The general approach for satisfying these requirements includes:

* Use as many existing MHS-DS tools as possible. Also, continue to track the progress of tools being developed by project members and facilitate their deployment as soon as they are ready.

* Coordinate efforts with existing GO-MHS community service.

* Establish a core infrastructure: 4 DSAs (two in the United States and two in Europe) are set up to serve MHS-DS information.

* Wherever it is technically feasable, DSA managers will establish bilateral agreements with one (or more) of the core DSAs in order to duplicate their routing information. For example, the core DSAs support the replication protocol specified in [RFC 1275] as a duplication technique.

* the Long Bud pilot needs to cooperate actively with DANTE NameFlow (the continuation of the PARADISE Pilot) and other directory providers in order to promote stability and consistency of informations.

4.4 Tools Needed

To facilitate widespread deployment of MHS-DS routing technology and to foster interworking between directory-capable MTAs and MTAs which are not directory-capable, tools providing the following functionalities need to be developed:

populate the Directory with routing information: such a tool must accept routing information specified in the standard syntax used by the GO-MHS community (see [RFC 1465]) as input, and it will load or update entries which convey the same information in the X.500 Directory.

downloading of routing information from the Directory: in order to provide a migration path for organizations not using directory-capable MTAs, a tool is needed which will read X.400 routing information from the X.500 Directory and generate static routing information from it. The syntax of the static information generated will conform to the syntax defined by the GO-MHS community, so that "classical" MTAs run as they currently do.

displaying route taken by a message between two end-points: this tool should accept two parameters as input: the X.500 distinguished name of an MTA, and an X.400 O/R name. It will display the possible routes which may be taken in order to deliver a message from the specified MTA to the specified X.400 destination. This tool looks very much the same as the traceroute facility used at the IP level.

These tools must use standard protocols to access the Directory (such as DAP [CCITT 88] or LDAP [RFC 1487]). Portability is encouraged.

A note on quality

Pilot use of this Directory information depends heavily on data quality and availability. Although the administration of DSA availability and global Directory data accuracy are not in the scope of Long Bud, care must be taken that Directory resources used by Long Bud participants are administrated well.

If they have the technical ability to do so, Long Bud participants are encouraged to replicate routing information in their Directory to improve data availability.

Directory data used by the pilot must be accurate: solutions to this problem will be recommanded as the project matures.

5. Participation Guide

The existing operational X.400 service, the GO-MHS service, uses the following method to distribute and manage X.400 routing information: A group of MTAs is organized into a routing community. The community keeps its routing information up to date by assigning to each MTA manager the responsibility of determining the routing information for his/her MTA, formalizing this routing information in the syntax defined by the community and sending the result to the GO-MHS coordination service. Once the information has been validated against the other data provided by all managers in the community, the coordination service will advertise it to the whole community. Each manager will then have to update his/her MTA configuration with the verified information.

The purpose of Project Long Bud is to allow a manager to operate an MTA without having to perform ANY manual steps when another MTA manager adds new or changes existing routing information. This will facilitate efficient, dynamic, and manageable interconnection of very large communities of MTAs. It will allow the Internet X.400 community to overcome the limitations in scalability which it is currently encountering.

5.1 Prerequisites for participation

The prerequisites for joining Project Long Bud are:

Step 1: Participants in the pilot must have a good knowledge of the IETF MHS-DS Working Group activities and documents:

1. Participants must join the MHS-DS distribution list:

   RFC-822: mhs-ds@mercury.udev.cdc.com

   X.400: PN=mhs-ds; OU=mercury; OU=OSS; OU=ARH; O=CPG; P=CDC; A=ATTMail; C=US

   Requests to join the MHS-DS distribution list may be sent to the following email address:

   RFC-822: mhs-ds-request@mercury.udev.cdc.com

   X.400: PN=mhs-ds-request; OU=mercury; OU=OSS; OU=ARH; O=CPG; P=CDC; A=ATTMail; C=US

2. Participants must retrieve and become familiar with all relevant tools and documents stored on the Project Long Bud anonymous FTP server

   Host name: ftp.css.cdc.com

   Directory: pub/mhs-ds/long-bud

   In particular, openly available software related to Long Bud activities will be kept up-to-date at this location.

3. If not already done, participants must do one of the following:

   * Upgrade their X.400 and X.500 software such that it supports the MHS-DS specifications as in [Kille 94].

   * Use the tools which extract MHS-DS information from the directory and generate whatever local configuration files are necessary to allow local MTA's to use the information. This should be done frequently (at least once per day).

Step 2: Participants must register required entries in the Directory so that their MTA(s) is (are) known to the Directory.

1. Arrange with the appropriate DSA Manager (who can be a local manager if the DSA is run by the participating organization, or a manager who is in charge of running the organization's DSA) to create an entry for the local MTA(s) involved in the pilot. At this stage, only connection information is required.

2. Check, test and verify the connection information with at least one other participant. The mhs-ds distribution list should be used for announcing the new registration and asking volunteers for testing.

3. Participants must establish sensible default X.400 routes to existing GO-MHS destinations for which X.500-based routing information will not exist initially.

Step 3: Participants can then enter their routing information in the Directory.

1. Before any routing is entered in the DIT, participants must check with the GO-MHS Coordination Service that the routes they want to register can be properly handled by the GO-MHS community (contact information is mailflow@mailflow.dante.net). It is crucial for the Pilot that any routing information entered in the Directory is kept carefully accurate if the experiment is to be meaningful. Participants may also consider the need for mapping rules (see [RFC 1465] for details).

2. Once the above step is validated by the GO-MHS Coordination Service, participants must record routing information for their MTA(s) in the Internet X.500

directory service. This requires that a participant does the following:

* Arrange with the appropriate DSA Manager (who can be either a local manager if the DSA is run by the participating organization or a manager which is in charge of running the organization's DSA) to enter X.400 routing information in a routing tree held by the participating organization. This routing tree should contain all necessary information for the local mail domain.

* Check, test and verify the registered routing information with at least one other participant. The mhs-ds distribution list should be used for announcing the new registration and asking volunteers for testing.

3. If a participant adds new nonleaf entries to the Open Community Routing Tree, then s/he must find at least one other participant who will maintain a slave copy of the children of the nonleaf entry. Send email to the mhs-ds distribution list in order to find a partner who is willing to do this.

4. If a participant adds new nonleaf ADMD or PRMD entries to the directory, then s/he must contact the managers of the Long Bud core DSA's and arrange to provide slave copies of the children of the ADMD and/or PRMD entries to all of the core DSA's. Send email to the mhs-ds distribution list in order to contact the core DSA managers.

5. Once the above testing is completed, send email to the mhs-ds distribution list announcing the establishment of new X.500-based routes.

6. Notes on side effects

The Long Bud Pilot Project, with its specific scope, is investigating a new direction in X.500 service usage. This should facilitate and expedite the global deployment of X.500 on the Internet.

Once the routing infrastructure illustrated by the Long Bud experiment is in place, the routing process will be able to take into account additional information to improve quality of service (minimizing messages conversions, enforcing various security policies established by MHS domains, taking advantage of recipients's capabilities stored in the Directory, ...). While the Open Tree provides global connectivity, multiple private routing trees allow the use of various routing trees.

7. Acknowledgements

The authors would like to thank Urs Eppenberger (SWITCH) and Allan Cargille (University of Wisconsin) for their constructive comments on earlier drafts of this document.

References

[CCITT 88] International Telegraph and Telephone Consultative Committee. X.500 Recommendations series. December 1988.

[RFC 1649] Hagens, R., and A. Hansen, "Operational Requirements for X.400 Management Domains in the GO-MHS Community", RFC 1649, ANS, UNINETT, July 1994.

[Kille 94] Kille, S., "MHS Use of the X.500 Directory to Support MHS Routing", RFC 1801, ISODE Consortium, June 1995.

[RFC 1006] Rose, M., and D. Cass, "ISO Transport Service on top of the TCP Version: 3", STD 35, RFC 1006, Northrop Research and Technology Center, May 1987.

[RFC 1275] Hardcastle-Kille, S., "Replication Requirements to provide an Internet Directory using X.500", RFC 1275, University College London, November 1991.

[RFC 1465] Eppenberger, U., "Routing Coordination for X.400 MHS Services Within a Multi Protocol / Multi Network Environment Table Format V3 for Static Routing", RFC 1465, SWITCH, May 1993.

[RFC 1487] Yeong, W., Howes, T., and S. Kille, "X.500 Lightweight Directory Access Protocol", RFC 1487, Performance Systems International, University of Michigan, ISODE Consortium, July 1993.

8. Security Considerations

Security issues are not discussed in this memo.

Authors' Addresses

Harald T. Alvestrand
UNINETT
P.O. box 6883 Elgeseter
N-7002 Trondheim, Norway

Phone: +47-73-59-70-94
EMail: Harald.T.Alvestrand@uninett.no

Kevin E. Jordan
Control Data Systems, Inc.
4201 Lexington Avenue North
Arden Hills, MN 55126, USA

Phone: +1-612-482-6835
EMail: Kevin.E.Jordan@cdc.com

Sylvain Langlois
Electricite de France
Direction des Etudes et Recherches
1, avenue du General de Gaulle
92141 Clamart Cedex, France

Phone: +33-1-47-65-44-02
EMail: Sylvain.Langlois@der.edf.fr

James A. Romaguera
NetConsult AG
Morgenstrasse 129 3018 Bern, Switzerland

Phone: +41-31-9984141
EMail: Romaguera@NetConsult.ch
X.400: S=Romaguera;O=NetConsult;P=switch;A=arcom;C=ch