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## Representing the O/R Address hierarchy in the X.500 Directory Information Tree

### Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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### Abstract

This document defines a representation of the O/R Address hierarchy in the Directory Information Tree [6, 1]. This is useful for a range of purposes, including:

- o Support for MHS Routing [4].
- o Support for X.400/RFC 822 address mappings [2, 5].

Please send comments to the author or to the discussion group <mhs-ds@mercury.udev.cdc.com>.

| Object Class              | Mandatory |
|---------------------------|-----------|
| -----                     | -----     |
| mHSCountry                | M         |
| aDMD                      | M         |
| pRMD                      | O         |
| mHSX121                   | O         |
| mHSNumericUserIdentifier  | O         |
| mHSOrganization           | O         |
| mHSOrganizationalUnit     | O         |
| mHSPerson                 | O         |
| mHSNamedObject            | O         |
| mHSTerminalID             | O         |
| mHSDomainDefinedAttribute | O         |

Table 1: Order of O/R Address Directory Components

## 1 The O/R Address Hierarchy

An O/R Address hierarchy is represented in the X.500 directory by associating directory name components with O/R Address components. An example of this is given in Figure 1. The object classes and attributes required to support this representation are defined in Figure 2. The schema, which defines the hierarchy in which these objects are represented in the directory information tree is specified in Table 1. A given object class defined in the table will always be higher in the DIT than an object class defined lower down the table. Valid combinations of O/R Address components are defined in X.400.

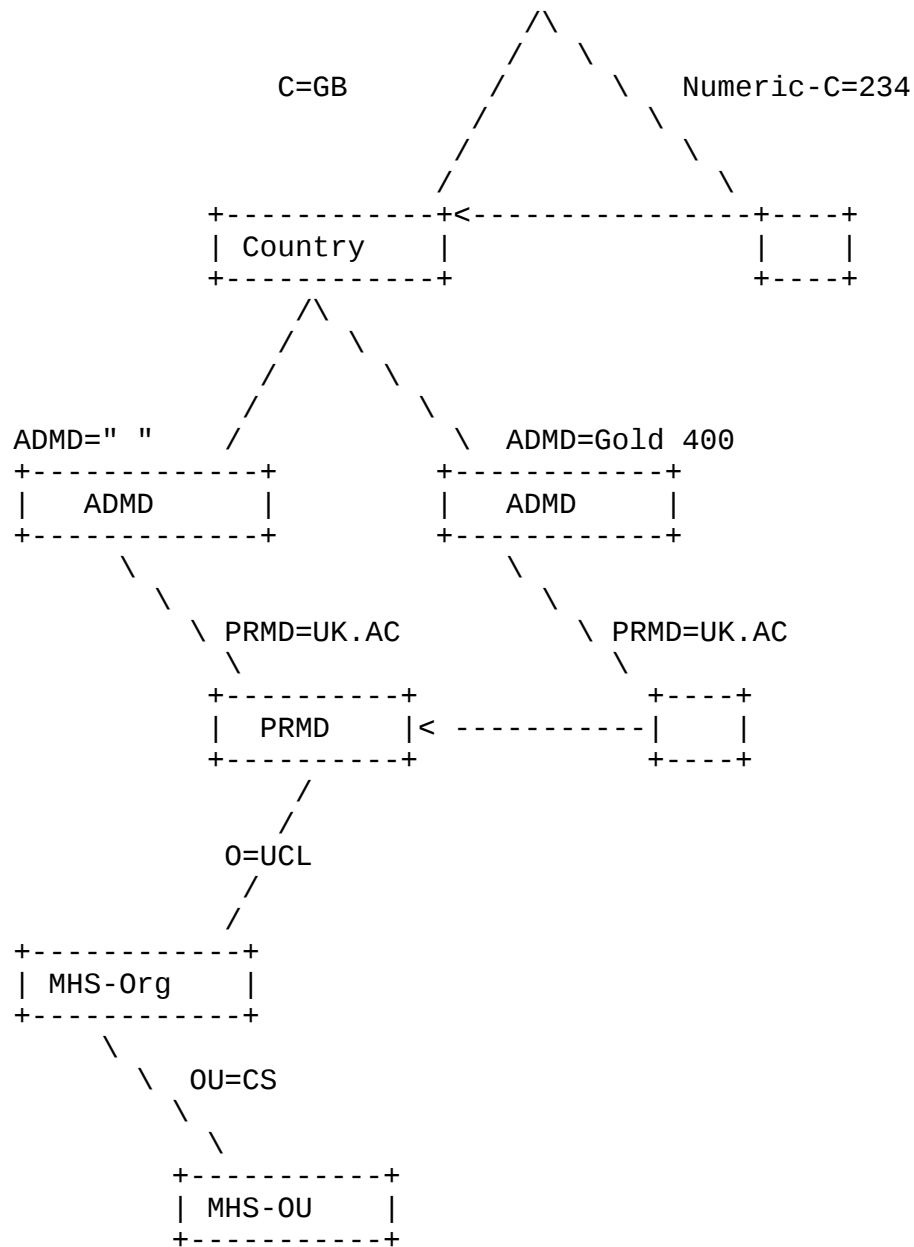


Figure 1: Example O/R Address Tree

## IMPORTS

```

ub-domain-name-length, ub-organization-name-length,
ub-organizational-unit-name-length, ub-common-name-length,
ub-x121-address-length, ub-domain-defined-attribute-type-length,
ub-domain-defined-attribute-value-length, ub-terminal-id-length,
ub-numeric-user-id-length, ub-country-name-numeric-length,
ub-surname-length, ub-given-name-length, ub-initials-length,
ub-generation-qualifier-length

```

```

FROM MTSUpperBounds {joint-iso-ccitt mhs-motis(6) mts(3)      10
modules(0) upper-bounds(3) };

```

```

mHSCountry OBJECT-CLASS ::= {
  SUBCLASS OF {country}
  MAY CONTAIN {mHSNumericCountryName}
  ID oc-mhs-country}

```

```

mHSNumericCountryName ATTRIBUTE ::= {
  WITH SYNTAX NumericString (SIZE (1..ub-country-name-numeric-length))
  SINGLE VALUE                                20
  ID at-mhs-numeric-country-name}

```

```

aDMD OBJECT-CLASS ::= {
  SUBCLASS OF {top}
  MUST CONTAIN {aDMDName}
  ID oc-admd}

```

```

aDMDName ATTRIBUTE ::= {
  SUBTYPE OF name
  WITH SYNTAX DirectoryString {ub-domain-name-length}      30
  ID at-admd-name}

```

```

pRMD OBJECT-CLASS ::= {
  SUBCLASS OF {top}
  MUST CONTAIN {pRMDName}
  ID oc-prmd}

```

```

pRMDName ATTRIBUTE ::= {
  SUBTYPE OF name
  WITH SYNTAX DirectoryString {ub-domain-name-length}      40
  ID at-prmd-name}

```

```

mHSOrganization OBJECT-CLASS ::= {
  SUBCLASS OF {top}
  MUST CONTAIN {mHSOrganizationName }
  ID oc-mhs-organization}

```

```
mHSOrganizationName ATTRIBUTE ::= {  
    SUBTYPE OF organizationName  
    WITH SYNTAX DirectoryString {ub-organization-name-length}      50  
    ID at-mhs-organization-name}  
  
mHSOrganizationalUnit OBJECT-CLASS ::= {  
    SUBCLASS OF {top}  
    MUST CONTAIN {mHSOrganizationalUnitName}  
    ID oc-mhs-organizational-unit}  
  
mHSOrganizationalUnitName ATTRIBUTE ::= {  
    SUBTYPE OF organizationalUnitName                                60  
    WITH SYNTAX DirectoryString {ub-organizational-unit-name-length}  
    ID at-mhs-organizational-unit-name}  
  
mHSPerson OBJECT-CLASS ::= {  
    SUBCLASS OF {top}  
    MUST CONTAIN {mHSSurname}  
    MAY CONTAIN {mHSGivenName|  
                 mHSInitials|  
                 mHSGenerationalQualifier}  
    ID oc-mhs-person}                                              70  
  
mHSSurname ATTRIBUTE ::= {  
    SUBTYPE OF surname  
    WITH SYNTAX DirectoryString {ub-surname-length}  
    ID at-mhs-surname}  
  
mHSGivenName ATTRIBUTE ::= {  
    SUBTYPE OF givenName  
    WITH SYNTAX DirectoryString {ub-given-name-length}            80  
    ID at-mhs-given-name}  
  
mHSInitials ATTRIBUTE ::= {  
    SUBTYPE OF initials  
    WITH SYNTAX DirectoryString {ub-initials-length}  
    ID at-mhs-initials}  
  
mHSGenerationalQualifier ATTRIBUTE ::= {  
    SUBTYPE OF generationQualifier  
    WITH SYNTAX DirectoryString {ub-generation-qualifier-length}  90  
    ID at-mhs-generation-qualifier}  
  
mHSNamedObject OBJECT-CLASS ::= {  
    SUBCLASS OF {top}  
    MUST CONTAIN {mHSCommonName}  
    ID oc-mhs-named-object}
```

```
mHSCommonName ATTRIBUTE ::= {  
    SUBTYPE OF commonName  
    WITH SYNTAX DirectoryString {ub-common-name-length}  
    ID at-mhs-common-name}                                100  
  
mHSX121 OBJECT-CLASS ::= {  
    SUBCLASS OF {top}  
    MUST CONTAIN {mHSX121Address}  
    ID oc-mhs-x121}  
  
mHSX121Address ATTRIBUTE ::= {  
    SUBTYPE OF name  
    WITH SYNTAX DirectoryString {ub-x121-address-length}  
    ID at-x121-address}                                    110  
  
mHSDomainDefinedAttribute OBJECT-CLASS ::= {  
    SUBCLASS OF {top}  
    MUST CONTAIN {  
        mHSDomainDefinedAttributeType|  
        mHSDomainDefinedAttributeValue}  
    ID oc-mhs-domain-defined-attribute}  
  
mHSDomainDefinedAttributeType ATTRIBUTE ::= {  
    SUBTYPE OF name                                        120  
    WITH SYNTAX DirectoryString {ub-domain-defined-attribute-type-length}  
    SINGLE VALUE  
    ID at-mhs-domain-defined-attribute-type}  
  
mHSDomainDefinedAttributeValue ATTRIBUTE ::= {  
    SUBTYPE OF name  
    WITH SYNTAX DirectoryString {ub-domain-defined-attribute-value-length}  
    SINGLE VALUE  
    ID at-mhs-domain-defined-attribute-value}              130  
  
mHSTerminalID OBJECT-CLASS ::= {  
    SUBCLASS OF {top}  
    MUST CONTAIN {mHSTerminalIDName}  
    ID oc-mhs-terminal-id}  
  
mHSTerminalIDName ATTRIBUTE ::= {  
    SUBTYPE OF name  
    WITH SYNTAX DirectoryString {ub-terminal-id-length}  
    ID at-mhs-terminal-id-name}                            140
```

```
mHSNumericUserIdentifier OBJECT-CLASS ::= {  
    SUBCLASS OF {top}  
    MUST CONTAIN {mHSNumericUserIdentifierName}  
    ID oc-mhs-numeric-user-id}  
  
mHSNumericUserIdentifierName ATTRIBUTE ::= {  
    SUBTYPE OF name  
    WITH SYNTAX DirectoryString {ub-numeric-user-id-length}      150  
    ID at-mhs-numeric-user-id-name}
```

Figure 2: O/R Address Hierarchy

The hierarchy is defined so that:

1. The representation is defined so that it is straightforward to make a mechanical transformation in either direction. This requires that each node is named by an attribute whose type can determine the mapping.
2. Where there are multiple domain defined attributes, the first in the sequence is the most significant.
3. Physical Delivery (postal) addresses are not represented in this hierarchy. This is primarily because physical delivery can be handled by the Access Unit routing mechanisms defined in [4], and there is no need for this representation.
4. Terminal and network forms of address are not handled, except for X.121 form, which is useful for addressing faxes.
5. MHSCountry is defined as a subclass of Country, and so the same entry will be used for MHS Routing as for the rest of the DIT.
6. The numeric country code will be an alias.
7. ADMD will always be present in the hierarchy. This is true in the case of " " and of "0". This facilitates an easy mechanical transformation between the two forms of address.
8. Each node is named by the relevant part of the O/R Address.
9. Aliases may be used in other parts of the tree, in order to normalize alternate values. Where an alias is used, the value of the alias should be present as an alternate value in the node aliased to. Aliases may not be used for domain defined attributes.

10. Domain Defined Attributes are named by a multi-valued RDN (Relative Distinguished Name), consisting of the type and value. This is done so that standard attribute syntaxes can be used.
11. Where an O/R Address has a valid Printable String and T.61 form, both must be present, with one as an alias for the other. This is so that direct lookup of the name will work, independent of the variant used. When both are present in an O/R Address being looked up, either may be used to construct the distinguished name.
12. Personal name is handled by use of the mHSPerson object class. Each of the components of the personal name will be present in the relative distinguished name, which will usually be multi-valued.

The relationship between X.400 O/R Addresses and the X.400 Entries (Attribute Type and Object Class) are given in Table 2. Where there are multiple Organizational Units or Domain Defined Attributes, each component is mapped onto a single X.500 entry.

Note: When an X.121 address is used for addressing fax transmission, this may only be done relative to the PRMD or ADMD. This is in line with the current X.400 standards position. This means that it is not possible to use this form of addressing for an organizational or departmental fax gateway service.

| O/R Address           | Object Class              | Naming Attribute                                                       |
|-----------------------|---------------------------|------------------------------------------------------------------------|
| -----                 | -----                     | -----                                                                  |
| C                     | mHSCountry                | countryName<br>or<br>mHSNumericCountryName                             |
| A                     | aDMD                      | aDMDName                                                               |
| P                     | pRMD                      | pRMDName                                                               |
| O                     | mHSOrganization           | mHSOrganizationName                                                    |
| OU/OU1/OU2<br>OU3/OU4 | mHSOrganizationalUnit     | mHSOrganizationalUnitName                                              |
| PN                    | mHSPerson                 | personName                                                             |
| CN                    | mHSNamedObject            | mHSCommonName                                                          |
| X121                  | mHSX121                   | mHSX121Address                                                         |
| T-ID                  | mHSTerminalID             | mHSTerminalIDName                                                      |
| UA-ID                 | mHSNumericUserIdentifier  | mHSNumericUserIdentifierName                                           |
| DDA                   | mHSDomainDefinedAttribute | mHSDomainDefinedAttributeType<br>and<br>mHSDomainDefinedAttributeValue |

Table 2: O/R Address relationship to Directory Name

## 2 Notation

O/R Addresses are written in the standard X.400 Notation. Distinguished Names use the string representation of distinguished names defined in [3]. The keywords used for the attributes defined in this specification are given in Table 3.

## 3 Example Representation

The O/R Address:

I=S; S=Kille; OU1=CS; O=UCL,  
P=UK.AC; A=Gold 400; C=GB;

would be represented in the directory as:

MHS-I=S + MHS-S=Kille, MHS-OU=CS, MHS-O=UCL,

| Attribute<br>-----             | Keyword<br>-----    |
|--------------------------------|---------------------|
| mHSNumericCountryName          | MHS-Numeric-Country |
| aDMDName                       | ADMD                |
| pRMDName                       | PRMD                |
| mHSOrganizationName            | MHS-O               |
| mHSOrganizationalUnitName      | MHS-OU              |
| mHSSurname                     | MHS-S               |
| mHSGivenName                   | MHS-G               |
| mHSInitials                    | MHS-I               |
| mHSGenerationalQualifier       | MHS-GQ              |
| mHSCommonName                  | MHS-CN              |
| mHSX121Address                 | MHS-X121            |
| mHSDomainDefinedAttributeType  | MHS-DDA-Type        |
| mHSDomainDefinedAttributeValue | MHS-DDA-Value       |
| mHSTerminalIDName              | MHS-T-ID            |
| mHSNumericUserIdentifierName   | MHS-UA-ID           |

Table 3: Keywords for String DN Representation

PRMD=UK.AC, ADMD=Gold 400, C=GB

## 4 Mapping from O/R Address to Directory Name

The primary application of this mapping is to take an X.400 encoded O/R Address and to generate an equivalent directory name. This mapping is only used for selected types of O/R Address:

- o Mnemonic form
- o Numeric form
- o Terminal form, where country is present and X121 addressing is used

Other forms of O/R address are handled by Access Unit mechanisms. The O/R Address is treated as an ordered list, with the order as defined in Table 1. For each O/R Address attribute, generate the equivalent directory naming attribute. In most cases, the mapping is mechanical. Printable String or Teletex encodings are chosen as appropriate. Where both forms are present in the O/R Address, either form may be used to generate the distinguished name. Both will be represented in the DIT. There are two special cases:

1. A DDA generates a multi-valued RDN
2. The Personal Name is mapped to a multi-valued RDN

In many cases, an O/R Address will be provided, and only the higher components of the address will be represented in the DIT. In this case, the "longest possible match" should be returned.

## 5 Mapping from Directory Name to O/R Address

The reverse mapping is also needed in some cases. All of the naming attributes are unique, so the mapping is mechanically reversible.

## 6 Acknowledgments

Acknowledgments for work on this document are given in [4].

## References

- [1] The Directory --- overview of concepts, models and services, 1993. CCITT X.500 Series Recommendations.
- [2] Kille, S., "MIXER (Mime Internet X.400 Enhanced Relay): Mapping between X.400 and RFC 822/MIME", RFC 2156, January 1998.
- [3] Kille, S., "A String Representation of Distinguished Names", RFC 1779, March 1995.
- [4] Kille, S., "Use of an X.500/LDAP directory to support MIXER address mapping", RFC 2164, January 1998.

- [5] Kille, S., "X.400-MHS use of the X.500 directory to support X.400-MHS routing", RFC 1801, June 1995.
- [6] CCITT recommendations X.400 / ISO 10021, April 1988. CCITT SG 5/VII / ISO/IEC JTC1, Message Handling: System and Service Overview.

## 7 Security Considerations

This protocol introduces no known security risks.

## 8 Author's Address

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X.400: I=S; S=Kille; P=ISODE; A=Mailnet; C=FI;

## A Object Identifier Assignment

mhs-ds OBJECT IDENTIFIER ::= {iso(1) org(3) dod(6) internet(1) private(4)  
enterprises(1) isode-consortium (453) mhs-ds (7)}

tree OBJECT IDENTIFIER ::= {mhs-ds 2}

oc OBJECT IDENTIFIER ::= {tree 1}

at OBJECT IDENTIFIER ::= {tree 2}

oc-admd OBJECT IDENTIFIER ::= {oc 1} 10

oc-mhs-country OBJECT IDENTIFIER ::= {oc 2}

oc-mhs-domain-defined-attribute OBJECT IDENTIFIER ::= {oc 3}

oc-mhs-named-object OBJECT IDENTIFIER ::= {oc 4}

oc-mhs-organization OBJECT IDENTIFIER ::= {oc 5}

oc-mhs-organizational-unit OBJECT IDENTIFIER ::= {oc 6}

oc-mhs-person OBJECT IDENTIFIER ::= {oc 7}

oc-mhs-x121 OBJECT IDENTIFIER ::= {oc 8}

oc-prmd OBJECT IDENTIFIER ::= {oc 9}

oc-mhs-terminal-id OBJECT IDENTIFIER ::= {oc 10}

oc-mhs-numeric-user-id OBJECT IDENTIFIER ::= {oc 11} 20

at-admd-name OBJECT IDENTIFIER ::= {at 1}

at-mhs-common-name OBJECT IDENTIFIER ::= {at 2}

at-mhs-domain-defined-attribute-type OBJECT IDENTIFIER ::= {at 3}

at-mhs-domain-defined-attribute-value OBJECT IDENTIFIER ::= {at 4}

at-mhs-numeric-country-name OBJECT IDENTIFIER ::= {at 5}

at-mhs-organization-name OBJECT IDENTIFIER ::= {at 6}

at-mhs-organizational-unit-name OBJECT IDENTIFIER ::= {at 7}

at-prmd-name OBJECT IDENTIFIER ::= {at 10}

at-x121-address OBJECT IDENTIFIER ::= {at 12} 30

at-mhs-terminal-id-name OBJECT IDENTIFIER ::= {at 13}

at-mhs-numeric-user-id-name OBJECT IDENTIFIER ::= {at 14}

at-mhs-surname OBJECT IDENTIFIER ::= {at 15}

at-mhs-given-name OBJECT IDENTIFIER ::= {at 16}

at-mhs-initials OBJECT IDENTIFIER ::= {at 17}

at-mhs-generation-qualifier OBJECT IDENTIFIER ::= {at 18}

Figure 3: Object Identifier Assignment

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