

[MS-OXOABK]: Address Book Object Protocol Specification

Intellectual Property Rights Notice for Protocol Documentation

- **Copyrights.** This protocol documentation is covered by Microsoft copyrights. Regardless of any other terms that are contained in the terms of use for the Microsoft website that hosts this documentation, you may make copies of it in order to develop implementations of the protocols, and may distribute portions of it in your implementations of the protocols or your documentation as necessary to properly document the implementation. You may also distribute in your implementation, with or without modification, any schema, IDL's, or code samples that are included in the documentation. This permission also applies to any documents that are referenced in the protocol documentation.
- **No Trade Secrets.** Microsoft does not claim any trade secret rights in this documentation.
- **Patents.** Microsoft has patents that may cover your implementations of the protocols. Neither this notice nor Microsoft's delivery of the documentation grants any licenses under those or any other Microsoft patents. However, the protocols may be covered by Microsoft's Open Specification Promise (available here: <http://www.microsoft.com/interop/osp>). If you would prefer a written license, or if the protocols are not covered by the OSP, patent licenses are available by contacting protocol@microsoft.com.
- **Trademarks.** The names of companies and products contained in this documentation may be covered by trademarks or similar intellectual property rights. This notice does not grant any licenses under those rights.

Reservation of Rights. All other rights are reserved, and this notice does not grant any rights other than specifically described above, whether by implication, estoppel, or otherwise.

Tools. This protocol documentation is intended for use in conjunction with publicly available standard specifications and network programming art, and assumes that the reader either is familiar with the aforementioned material or has immediate access to it. A protocol specification does not require the use of Microsoft programming tools or programming environments in order for you to develop an implementation. If you have access to Microsoft programming tools and environments you are free to take advantage of them.

Revision Summary			
Author	Date	Version	Comments
Microsoft Corporation	April 4, 2008	0.1	Initial Availability.
Microsoft Corporation	April 25, 2008	0.2	Revised and updated property names and other technical content.
Microsoft Corporation	June 27, 2008	1.0	Initial Release.

Microsoft Corporation	August 6, 2008	1.01	Updated references to reflect date of initial release.
Microsoft Corporation	September 3, 2008	1.02	Revised and edited technical content.
Microsoft Corporation	December 3, 2008	1.03	Revised and edited technical content.

Table of Contents

1	Introduction.....	8
1.1	Glossary.....	8
1.2	References.....	10
1.2.1	Normative References.....	10
1.2.2	Informative References.....	11
1.3	Protocol Overview.....	11
1.4	Relationship to Other Protocols.....	12
1.5	Prerequisites/Preconditions.....	12
1.6	Applicability Statement.....	13
1.7	Versioning and Capability Negotiation.....	13
1.8	Vendor-Extensible Fields.....	13
1.9	Standards Assignments.....	13
2	Messages.....	13
2.1	Transport.....	13
2.2	Message Syntax.....	13
2.2.1	Definitions.....	14
2.2.1.1	Distinguished Names for Objects.....	14
2.2.2	Properties that Apply to Containers in the Address Book Hierarchy Table.....	16
2.2.2.1	PidTagContainerFlags.....	17
2.2.2.2	PidTagDepth.....	18
2.2.2.3	PidTagAddressBookContainerId.....	19
2.2.2.4	PidTagAddressBookIsMaster.....	19
2.2.2.5	PidTagAddressBookParentEntryId.....	19
2.2.3	Properties that Apply to All Address Book Objects.....	19
2.2.3.1	PidTagDisplayName.....	21
2.2.3.2	PidTagEntryId.....	21
2.2.3.3	PidTagTemplateid.....	22
2.2.3.4	PidTagRecordKey.....	22
2.2.3.5	PidTagSearchKey.....	22
2.2.3.6	PidTagInstanceKey.....	22
2.2.3.7	PidTag7BitDisplayName.....	22
2.2.3.8	PidTagTransmittableDisplayName.....	22
2.2.3.9	PidTagAddressBookPhoneticDisplayName.....	23
2.2.3.10	PidTagObjectType.....	23
2.2.3.11	PidTagDisplayType.....	23
2.2.3.12	PidTagDisplayTypeEx.....	23
2.2.3.13	PidTagAddressType.....	25
2.2.3.14	PidTagEmailAddress.....	25
2.2.3.15	PidTagAddressBookObjectDistinguishedName.....	25
2.2.3.16	PidTagCreationTime.....	25

2.2.3.17	PidTagLastModificationTime	25
2.2.3.18	PidTagSendRichInfo	26
2.2.3.19	PidTagSendInternetEncoding	26
2.2.3.20	PidTagAccount	26
2.2.3.21	PidTagSmtptAddress	26
2.2.3.22	PidTagAddressBookTargetAddress	26
2.2.3.23	PidTagAddressBookProxyAddresses	26
2.2.3.24	PidTagAddressBookSeniorityIndex	27
2.2.3.25	PidTagAddressBookObjectGuid	27
2.2.3.26	PidTagComment	27
2.2.3.27	PidTagMappingSignature	27
2.2.3.28	PidTagOriginalEntryId	27
2.2.3.29	PidTagOriginalDisplayName	27
2.2.3.30	PidTagOriginalSearchKey	27
2.2.3.31	PidTagInitialDetailsPane	27
2.2.3.32	PidTagAddressBookExtensionAttribute1...PidTagAddressBookExtensionAttribute15	28
2.2.4	Properties that Apply to Mail User Objects	28
2.2.4.1	PidTagSurname	28
2.2.4.2	PidTagGivenName	28
2.2.4.3	PidTagNickname	28
2.2.4.4	PidTagDisplayNamePrefix	28
2.2.4.5	PidTagInitials	28
2.2.4.6	PidTagGeneration	28
2.2.4.7	PidTagTitle	28
2.2.4.8	PidTagOfficeLocation	28
2.2.4.9	PidTagDepartmentName	28
2.2.4.10	PidTagCompanyName	29
2.2.4.11	PidTagAssistant	29
2.2.4.12	PidTagManagerName	29
2.2.4.13	PidTagAddressBookManagerDistinguishedName	29
2.2.4.14	PidTagAddressBookPhoneticGivenName	29
2.2.4.15	PidTagAddressBookPhoneticSurname	29
2.2.4.16	PidTagAddressBookPhoneticCompanyName	29
2.2.4.17	PidTagAddressBookPhoneticDepartmentName	29
2.2.4.18	PidTagPostalAddress	29
2.2.4.19	PidTagStreetAddress	29
2.2.4.20	PidTagPostOfficeBox	30
2.2.4.21	PidTagLocality	30
2.2.4.22	PidTagStateOrProvince	30
2.2.4.23	PidTagPostalCode	30

2.2.4.24	PidTagCountry.....	30
2.2.4.25	PidTagHomeAddressStreet.....	30
2.2.4.26	PidTagHomeAddressPostOfficeBox	30
2.2.4.27	PidTagHomeAddressCity	30
2.2.4.28	PidTagHomeAddressStateOrProvince.....	30
2.2.4.29	PidTagHomeAddressPostalCode.....	30
2.2.4.30	PidTagHomeAddressCountry.....	31
2.2.4.31	PidTagOtherAddressStreet	31
2.2.4.32	PidTagOtherAddressPostOfficeBox.....	31
2.2.4.33	PidTagOtherAddressCity.....	31
2.2.4.34	PidTagOtherAddressStateOrProvince	31
2.2.4.35	PidTagOtherAddressPostalCode	31
2.2.4.36	PidTagOtherAddressCountry.....	31
2.2.4.37	PidTagPrimaryTelephoneNumber	31
2.2.4.38	PidTagBusinessTelephoneNumber.....	31
2.2.4.39	PidTagHomeTelephoneNumber	31
2.2.4.40	PidTagBusiness2TelephoneNumber	32
2.2.4.41	PidTagBusiness2TelephoneNumbers	32
2.2.4.42	PidTagHome2TelephoneNumber	32
2.2.4.43	PidTagHome2TelephoneNumbers.....	32
2.2.4.44	PidTagCallbackTelephoneNumber.....	32
2.2.4.45	PidTagMobileTelephoneNumber.....	32
2.2.4.46	PidTagRadioTelephoneNumber.....	32
2.2.4.47	PidTagCarTelephoneNumber	32
2.2.4.48	PidTagOtherTelephoneNumber	32
2.2.4.49	PidTagPagerTelephoneNumber	32
2.2.4.50	PidTagPrimaryFaxNumber.....	33
2.2.4.51	PidTagBusinessFaxNumber	33
2.2.4.52	PidTagHomeFaxNumber	33
2.2.4.53	PidTagCompanyMainTelephoneNumber	33
2.2.4.54	PidTagTelecommunicationsDeviceForDeafTelephoneNumber	33
2.2.4.55	PidTagTelexNumber	33
2.2.4.56	PidTagIsdnNumber.....	33
2.2.4.57	PidTagAssistantTelephoneNumber	33
2.2.4.58	PidTagKeyword	33
2.2.4.59	PidTagGovernmentIdNumber	33
2.2.4.60	PidTagMessageHandlingSystemCommonName.....	34
2.2.4.61	PidTagLanguage	34
2.2.4.62	PidTagLocation.....	34
2.2.4.63	PidTagOrganizationalIdNumber.....	34
2.2.4.64	PidTagUserCertificate	34
2.2.4.65	PidTagAddressBookX509Certificate	34

2.2.4.66	PidTagUserX509Certificate.....	34
2.2.4.67	PidTagAddressBookHomeMessageDatabase.....	37
2.2.4.68	PidTagAddressBookNetworkAddress.....	38
2.2.4.69	PidTagHobbies.....	38
2.2.4.70	PidTagProfession.....	38
2.2.4.71	PidTagReferredByName.....	38
2.2.4.72	PidTagSpouseName.....	38
2.2.4.73	PidTagGender.....	38
2.2.4.74	PidTagComputerNetworkName.....	38
2.2.4.75	PidTagCustomerId.....	39
2.2.4.76	PidTagFtpSite.....	39
2.2.4.77	PidTagPersonalHomePage.....	39
2.2.4.78	PidTagBusinessHomePage.....	39
2.2.4.79	PidTagBirthday.....	39
2.2.4.80	PidTagWeddingAnniversary.....	39
2.2.5	Properties That Reference Other Address Book Objects.....	39
2.2.5.1	PidTagAddressBookManager.....	39
2.2.5.2	PidTagAddressBookReports.....	40
2.2.5.3	PidTagAddressBookIsMemberOfDistributionList.....	40
2.2.5.4	PidTagAddressBookOwnerBackLink.....	40
2.2.5.5	PidTagAddressBookPublicDelegates.....	40
2.2.5.6	PidTagAddressBookHierarchicalShowInDepartments.....	40
2.2.6	Properties That Apply to Distribution Lists.....	40
2.2.6.1	PidTagAddressBookMember.....	40
2.2.6.2	PidTagAddressBookOwner.....	40
2.2.6.3	PidTagContainerContents.....	40
2.2.6.4	PidTagAddressBookFolderPathname.....	40
2.2.7	Properties That Apply to Organization Objects.....	41
2.2.7.1	PidTagAddressBookRoomContainers.....	41
2.2.7.2	PidTagAddressBookHierarchicalRootDepartment.....	41
2.2.8	Properties That Apply to Department Objects.....	41
2.2.8.1	PidTagAddressBookHierarchicalChildDepartments.....	42
2.2.8.2	PidTagAddressBookHierarchicalParentDepartment.....	42
2.2.8.3	PidTagAddressBookHierarchicalDepartmentMembers.....	42
2.2.9	Properties That Apply to Resources.....	42
2.2.9.1	PidTagAddressBookRoomCapacity.....	42
2.2.9.2	PidTagAddressBookRoomDescription.....	42
2.2.10	Properties That Have Special Purposes.....	42
2.2.10.1	PidTagAnr.....	42
2.2.10.2	PidTagAddressBookManageDistributionList.....	43
2.2.11	Named Properties.....	43
3	<i>Protocol Details.....</i>	43

3.1	Client Details.....	43
3.1.1	Abstract Data Model	43
3.1.2	Timers	44
3.1.3	Initialization	44
3.1.3.1	Initialization Through NSPI connection.....	44
3.1.3.2	Initialization Through an Offline Address Book	44
3.1.4	Higher-Layer Triggered Events.....	44
3.1.4.1	Obtaining a Hierarchy of Address Book Containers	44
3.1.4.2	Browsing an Address Book	45
3.1.4.3	Obtaining Properties on an Address Book Object.....	45
3.1.4.4	Performing Ambiguous Name Resolution.....	46
3.1.5	Message Processing Events and Sequencing Rules	46
3.1.6	Timer Events	47
3.1.7	Other Local Events.....	47
3.2	Client and Server Details.....	47
4	<i>Protocol Examples</i>	48
5	<i>Security</i>	53
5.1	Security Considerations for Implementers	53
5.2	Index of Security Parameters	53
6	<i>Appendix A: Office/Exchange Behavior</i>	53
	<i>Index</i>	55

1 Introduction

An **address book** is a repository of information about **Address Book objects**, many of which have information that can be retrieved by messaging clients to display to messaging users, or to enable users to address e-mail messages to other e-mail-enabled users and entities that are represented by these objects. The objects in the address book are organized in a way that makes it possible for users to locate and look up information about these objects.

The client retrieves data about a number of different Address Book objects from one of two possible data sources. The client retrieves data from the **Name Service Provider Interface (NSPI)** server by using the protocol as specified in [MS-NSPI]. Alternatively, the client retrieves data from an **offline address book (OAB)**, as specified in [MS-OXOAB]. These include properties on **mail users, distribution lists, resources, address book containers** and the **address book hierarchy table**. The client chooses the data source based on whatever source is available, or based on user settings.

The Address Book Object protocol specifies:

- Properties of various Address Book objects
- How these properties interrelate

1.1 Glossary

The following terms are defined in [MS-OXGLOS]:

address book
address book distinguished name (ABDN)
Address Book object
address book container
address book hierarchy table
address list
ambiguous name resolution (ANR)
alias
ASCII
Augmented Backus-Naur Form (ABNF)
binary large object (BLOB)
code page
Coordinated Universal Time (UTC)
display template
distinguished name (DN)
distribution list
GUID
little-endian
mail user

mailbox
message database
messaging object
MIME
Name Service Provider Interface (NSPI)
offline address book (OAB)
Permanent Entry ID
property
property ID
property type
recipient
Resource object
Remote Procedure Call (RPC)
Rich Text Format (RTF)
Simple Mail Transfer Protocol (SMTP)
template
Transport Neutral Encapsulation Format (TNEF)
Unicode
Unicode Transformation Format, 16-bits, Little-Endian (UTF-16LE)

The following terms are specific to this document:

Department object: An **Address Book object** that describes a department within an organization.

Global Address List (GAL): The address list that conceptually represents the default address list for an **address book** obtained from an **offline address book** or NSPI server.

Ephemeral Entry ID: A property of an **Address Book object** that can be used to uniquely identify the object.

Minimal Entry ID (Mid): A property of an address book object that can be used to uniquely identify the object.

Organization object: An **Address Book object** that describes an entire organization.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

1.2.1 Normative References

- [MS-NSPI] Microsoft Corporation, "Name Service Provider Interface (NSPI) Protocol Specification", June 2008.
- [MS-OXABREF] Microsoft Corporation, "Address Book Name Service Provider Interface (NSPI) Referral Protocol Specification", June 2008.
- [MS-OXCDATA] Microsoft Corporation, "Data Structures Protocol Specification", June 2008.
- [MS-OXCMail] Microsoft Corporation, "RFC2822 and MIME to E-Mail Object Conversion Protocol Specification", June 2008.
- [MS-OXGLOS] Microsoft Corporation, "Exchange Server Protocols Master Glossary", June 2008.
- [MS-OXOAB] Microsoft Corporation, "Offline Address Book (OAB) Format and Schema Protocol Specification", June 2008.
- [MS-OXOABKT] Microsoft Corporation, "Address Book User Interface Templates Protocol Specification", June 2008.
- [MS-XPFOAB] Microsoft Corporation, "Offline Address Book (OAB) Public Folder Retrieval Protocol Specification", June 2008.
- [MS-XPProps] Microsoft Corporation, "Exchange Server Protocols Master Property List Specification", June 2008.
- [MS-OXTNEF] Microsoft Corporation, "Transport Neutral Encapsulation Format (TNEF) Protocol Specification", June 2008.
- [MS-OXWOAB] Microsoft Corporation, "Offline Address Book (OAB) Retrieval Protocol Specification", June 2008.
- [MS-RPCE] Microsoft Corporation, "Remote Procedure Call Protocol Extensions", July 2006, <http://go.microsoft.com/fwlink/?LinkId=112246>.
- [RFC1034] Mockapetris, P., "Domain Names – Concepts and Facilities", RFC 1034, November 1987, <http://www.ietf.org/rfc/rfc1034.txt>.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.ietf.org/rfc/rfc2119.txt>.

[RFC2876] Pawling, J., "Use of the KEA and SKIPJACK Algorithms in CMS", RFC2876, July 2000, <http://www.ietf.org/rfc/rfc2876.txt>.

[RFC3174] Eastlake III, D. and Jones, P., "US Secure Hash Algorithm 1 (SHA1)", RFC 3174, September 2001, <http://www.ietf.org/rfc/rfc3174.txt>.

[RFC3280] Housley, R., Polk, W., Ford, W., and Solo, D., "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile", RFC 3280, April 2002, <http://www.ietf.org/rfc/rfc3280.txt>.

[RFC3851] Ramsdell, B., "Secure/Multipurpose Internet Mail Extensions (S/MIME) Version 3.1 Message Specification", RFC 3851, July 2004, <http://www.ietf.org/rfc/rfc3851.txt>.

[RFC3852] Housley, R. "Cryptographic Message Syntax (CMS)", RFC 3852, July 2004, <http://www.ietf.org/rfc/rfc3852.txt>.

[RFC4234] Crocker, D., Ed. and Overell, P., "Augmented BNF for Syntax Specifications: ABNF", RFC 4234, October 2005, <http://www.ietf.org/rfc/rfc4234.txt>.

[RFC959] Postel, J. and Reynolds, J., "File Transfer Protocol (FTP)", RFC 959, October 1985, <http://www.ietf.org/rfc/rfc959.txt>.

1.2.2 Informative References

[ISO/IEC 8825-1] "ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)", ISO/IEC 8825-1:1998, http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=32306.

1.3 Protocol Overview

An **address book** is a collection of **Address Book objects**. There are many types of objects in an address book, many of which can be added as an addressee to an outbound message to be the destination. Every object in the address book has various properties, and the values of these properties contain information that is used by messaging clients to route the message correctly or to display information about the Address Book object to a messaging user.

The address book also contains one or more **address book containers**, each of which describes an **address list**. An address list is a collection of Address Book objects that can be rendered in a table to be browsed by a messaging user. A collection of address book containers, each representing an address list, is arranged in an **address book hierarchy table**.

The address book can be stored remotely on a **Name Service Provider Interface (NSPI)** server and accessed through NSPI calls by using the NSPI protocol, as specified in [MS-

NSPI], or can be stored locally on the client computer as an **offline address book (OAB)** by using the OAB Format and Schema protocol, as specified in [MS-OXOAB].

The following are some Address Book object types:

- **Mail users**, each of which describes a person or entity that can receive e-mail messages.
- **Distribution lists**, each of which is a collection of other mail users, distribution lists, or other Address Book objects that can receive e-mail messages.
- **Resource objects**, which can be reserved, such as a room or equipment.
- **Organization objects**, each of which describes an organization.
- **Department objects**, each of which describes the departmental structure of an organization.
- Address book containers, each of which represents an address list that contains Address Book objects that can be viewed as a table.
- **Templates**, each of which describes a physical view that can be used to show details on other Address Book objects to a messaging user, and is specified in [MS-OXOABKT].

1.4 Relationship to Other Protocols

This specification relies on an understanding of how **NSPI** calls are transmitted to the server by using the underlying **RPC** transport, which uses the Name Service Provider Interface (NSPI) protocol, as specified in [MS-NSPI], and an understanding of the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB].

The specification also relies on an understanding of how to locate and establish a connection with an NSPI server by using the Name Service Provider Interface (NSPI) Referral protocol [MS-OXABREF], and an understanding of how to obtain an **offline address book** by using either the Offline Address Book Web Retrieval protocol [MS-OXWOAB] or the Offline Address Book Public Folder Retrieval protocol [MS-OXPFOAB]. The Address Book User Interface Templates protocol, as specified in [MS-OXOABKT], is needed to render information about an **Address Book object** to a messaging user, which relies on an understanding of this Address Book Object protocol specification.

1.5 Prerequisites/Preconditions

This Address Book Object protocol specification assumes that either the messaging client has been referred to an **NSPI** server by using the Name Service Provider Interface (NSPI) Referral protocol, as specified in [MS-OXABREF], and established a connection to a server that supports the Name Service Provider Interface (NSPI) protocol, as specified in [MS-NSPI], or

that the messaging client has access to an **offline address book (OAB)**, as specified in [MS-OXOAB].

1.6 Applicability Statement

This Address Book Object protocol is used to access information about **Address Book objects** in an **organization**. Messaging clients use this protocol to determine the destination for outbound messages that are addressed to these objects, and to display information about these objects to a messaging user.

1.7 Versioning and Capability Negotiation

None.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

The following sections specify the properties of **Address Book objects** and their formats.

Unless otherwise specified, all numeric values in this protocol are in **little-endian** format.

Unless otherwise specified, all **Unicode** string representations are in **UTF-16LE** format.

2.1 Transport

This protocol uses the Name Service Provider Interface (NSPI) protocol, as specified in [MS-NSPI], as the underlying transport protocol when handling **address books** online by using an **NSPI** server, or the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB], as the underlying structure when handling address books by using a local **OAB**.

2.2 Message Syntax

When messaging clients are using an **NSPI** server, the properties described in this specification are returned and given to various NSPI functions of the Name Service Provider Interface (NSPI) protocol, as specified in [MS-NSPI]. The use of NSPI calls depends on the object type and its associated **property** list. As a collection, the entire set of NSPI calls enables messaging clients to access and browse **address lists**, and manipulate or obtain data on **Address Book objects** in that list.

Alternatively, these structures are maintained in an **offline address book (OAB)** by using the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB]. The OAB is a collection of **address lists**, each of which contains Address Book objects and their properties. Messaging clients use the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB], to access and browse the address lists and to obtain data on the Address Book objects in those lists.

There are many types of Address Book objects, including **mail users**, **distribution lists**, **address book containers**, **Resource objects**, **Department objects**, **Organization objects**, **templates**, and other object types. This protocol does not require values for all properties that are defined for any object type, nor does it limit the properties to those of their own type or those listed in this specification. When a data source, such as an OAB or an NSPI server, includes properties that are not in this set, the format and meaning of the property is defined by the implementation of that data source.

In all the properties of type **PtypString** that are listed in this document, a request to an NSPI server of that property with type **PtypString8** or **PtypString** is permitted. If a conversion is required, the string will be converted to the type requested by the client, as specified in [MS-NSPI].

In all the properties of type **PtypString** that are listed in this document, an OAB that includes a value for that string property **MUST** contain exactly one string representation. The internal representation of strings in an OAB that use the Offline Address Book (OAB) Format and Schema protocol is specified in [MS-OXOAB]. A client that looks up the value for a string property **MUST** convert the value to the string type that is native to the client before it interprets the value of the property.

2.2.1 Definitions

The following sections describe structures that are used by various Address Book object properties.

2.2.1.1 Distinguished Names for Objects

Address book distinguished names (ABDNs) are used to uniquely identify objects in the **address book**. Throughout the rest of this specification, the term **distinguished name (DN)** is used to refer to an address book distinguished name. Each **Address Book object** **MUST** have a unique DN value, expressed as a NULL terminated **ASCII** string. The DN is stored in the **PidTagEmailAddress** property. The DN is also embedded in the Distinguished Name field of the **Permanent Entry ID**, as specified in [MS-NSPI]. DNs are structured as shown in the following **ABNF** definition. For more information about ABNF, see [RFC4234].

```
dn                = organization-dn /  
                  addresslist-dn /  
                  x500-dn  
  
organization-dn  = org-rdn
```

```

addresslist-dn      = "/guid=" container-guid /
                    gal-addresslist-dn

container-guid      = 32 (HEXDIG)

gal-addrlist-dn    = "/"

x500-dn             = x500-container-dn object-rdn
                    ; x500-dns are limited to 16 levels

x500-container-dn  = org-rdn org-unit-rdn 0*13(container-rdn)

org-rdn             = "/o=" rdn

org-unit-rdn       = "/ou=" rdn

container-rdn       = "/cn=" rdn

object-rdn          = "/cn=" rdn

rdn                 = ( non-space-teletex ) /
                    ( non-space-teletex *62(teletex-char)
                      non-space-teletex )
                    ; rdn values are limited to 64 characters
                    ; the number of rdns is limited to 16 but the
                    ; total cumulative length of rdn characters in
                    ; An x500-dn is limited to 256.

teletex-char        = SP / non-space-teletex

non-space-teletex   = "!" / DQUOTE / "%" / "&" / "\" / "(" / ")" /
                    "*" / "+" / "," / "-" / "." / "0" / "1" /
                    "2" / "3" / "4" / "5" / "6" / "7" / "8" /
                    "9" / ":" / "<" / "=" / ">" / "?" / "@" /
                    "A" / "B" / "C" / "D" / "E" / "F" / "G" /
                    "H" / "I" / "J" / "K" / "L" / "M" / "N" /
                    "O" / "P" / "Q" / "R" / "S" / "T" / "U" /
                    "V" / "W" / "X" / "Y" / "Z" / "[" / "]" /
                    "_" / "a" / "b" / "c" / "d" / "e" / "f" /
                    "g" / "h" / "i" / "j" / "k" / "l" / "m" /
                    "n" / "o" / "p" / "q" / "r" / "s" / "t" /
                    "u" / "v" / "w" / "x" / "y" / "z" / "|"

```

In general, the distinguished names for all Address Book objects **MUST** follow the *dn* format. The DNs for different types of objects **MUST** follow more strict *dn* formats, depending on their type, according to the following table.

Object type	DN format	Notes
Address book container	<i>addresslist-dn</i>	
Global Address List container	<i>gal-addrlist-dn</i>	
Mail user	<i>x500-dn</i>	The org-rdn string is the mail user's organization.
Organization	<i>organization-dn</i>	
Message database	<i>x500-dn</i>	The x500-container-dn is the mailbox server.
Mailbox server	<i>x500-dn</i>	The rdn in the object-rdn is the name of the mailbox server.
Room container reference	x500-dn with no container-rdn	The rdn of the object-rdn matches the <i>container-guid</i> of the address book container.
All other Address Book objects	<i>dn</i>	

When the DN of an Address Book object that is obtained from an NSPI server matches the DN of an Address Book object that is obtained from an **offline address book**, the objects represent the same entity. For such an object to be visible on both data sources, the properties available in the offline address book SHOULD<1> be a subset of the properties in the NSPI server, MAY<2> include additional properties, and SHOULD<3><4> have the same value when present on both data sources.

2.2.2 Properties that Apply to Containers in the Address Book Hierarchy Table

An **address book** is a collection of **Address Book objects**, each of which are contained in any number of **address lists**. The address book is arranged as a hierarchy of **address book containers**. Each address book container, in turn, describes an address list that contains many Address Book objects.

When using an **offline address book (OAB)**, messaging clients obtain information about the address book hierarchy and its address book containers by using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB]. Because an OAB maintains its own structure for the hierarchy table, none of the properties of address book containers described in this document apply to the OAB.

When using an NSPI server, messaging clients call **NspiGetSpecialTable**, as specified in [MS-NSPI], to obtain the **address book hierarchy table**. The hierarchy table is a set of rows, each of which describes one address book container. The NSPI server **MUST** return the following properties for each container in the hierarchy, in the order listed:

- **PidTagEntryId**
- **PidTagContainerFlags**
- **PidTagDepth**
- **PidTagAddressBookContainerId**
- **PidTagDisplayName**
- **PidTagAddressBookIsMaster**
- **PidTagAddressBookParentEntryId** (optional, and **MUST** be the seventh column if it is included)

For every row returned, all of these properties except **PidTagAddressBookParentEntryId** **MUST** be present and have a value prescribed under its definition.

In addition, the **PidTagEntryId** **MUST** be in the form of a **Permanent Entry ID**, as specified in [MS-NSPI], with its **DisplayType** having the value **DT_CONTAINER**, as specified in [MS-NSPI], and its DN following the *addresslist-dn* format specification, as specified in section 2.2.1.1. When the object is the **Global Address List** container, its DN **MUST** follow the *gal-addrlist-dn* format specification.

2.2.2.1 PidTagContainerFlags

The **PidTagContainerFlags** property of type **PtypInteger32** contains a bitmask of flags that describe capabilities of an **address book container**.

The following flags are defined for the **PidTagContainerFlags** bitmask. The **PidTagContainerFlags** **MUST NOT** contain any other flags. These flags are listed in the following table.

Name	Value	Description
AB_RECIPIENTS	0x00000001	The container holds Address Book objects . This flag does not indicate whether any objects are actually present in the container. This flag MUST be set for all containers and distribution lists that are returned by the NSPI server.
AB_SUBCONTAINERS	0x00000002	The container holds child containers. This flag does not indicate whether any sub-containers are actually present in the container.
AB_UNMODIFIABLE	0x00000008	It is not possible to add or remove Address Book objects from the container. This flag MUST be set for containers that are returned by the NSPI server.

For distribution lists that are obtained from a NSPI server, this property **MUST** be present, and its value **MUST** be AB_RECIPIENTS.

Because this property applies to a container in the hierarchy table, it is not present on objects in the **offline address book (OAB)**. An OAB has its own structure for maintaining the hierarchy, using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB].

2.2.2.2 PidTagDepth

The **PidTagDepth** property of type **PtypInteger32** represents the relative level of depth of a container in a hierarchy table. Objects in the hierarchy table that share the same **PidTagDepth** value **SHOULD** be considered peer containers by clients if they are adjacent or if they are separated only by containers that have equivalent or larger depth values.

Because this **property** applies to a container in the hierarchy table, it is not present on objects in an **offline address book (OAB)**. An OAB has its own structure for maintaining the hierarchy, using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB].

2.2.2.3 PidTagAddressBookContainerId

The **PidTagAddressBookContainerId** property of type **PtypInteger32**, like the **PidTagEntryId** property, identifies a container on an **NSPI** server. It is a **Minimal Entry ID**. A value of zero represents the **Global Address List**. This value is used in other **NSPI** calls (such as **NspiResolveNamesW**) to identify which container the **NSPI** call applies. If the value is non-zero, it is only a valid representation of the specific container. This representation lasts for the time that the connection to the **NSPI** server lasts, or, after disconnection and reconnection to the same or another **NSPI** server that is using **NspiBind**, as long as the new server identifies itself as having the same **GUID** in its return value for **pServerGuid**, as specified in [MS-NSPI].

Because this property applies to a container in the hierarchy table, it is not present on objects in an **offline address book (OAB)**. An OAB has its own structure for maintaining the hierarchy, using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB].

2.2.2.4 PidTagAddressBookIsMaster

The **PidTagAddressBookIsMaster** property of type **PtypBoolean** is **TRUE** if it is possible to create **Address Book objects** in that container, and **FALSE** otherwise. The value does not pertain to parent containers or sub-containers of this container.

Because this property applies to a container in the hierarchy table, it is not present on objects in an **offline address book (OAB)**. An OAB has its own structure for maintaining the hierarchy, using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB].

2.2.2.5 PidTagAddressBookParentEntryId

The **PidTagAddressBookParentEntryId** property of type **PtypBinary** is the **Entry ID** of the parent container in a hierarchy of **address book containers**. This property is not present if no parent container exists. Messaging clients use this to expand and collapse a hierarchy of address book containers in an **address book hierarchy table**.

Because this property applies to a container in the hierarchy table, it is not present on objects in an **offline address book (OAB)**. An OAB has its own structure for maintaining the hierarchy, using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB].

2.2.3 Properties that Apply to All Address Book Objects

Address Book objects are listed in an **offline address book (OAB)** by the Offline Address Book (OAB) Format and Schema protocol [MS -OXOAB] or accessed on an **NSPI** server by using various Name Service Provider Interface (NSPI) protocol [MS-NSPI] calls. Each object represents any addressable entity, such as a **mail user**, **distribution list**, **Department object**, **Organization object**, **address book container**, **Resource object**, or other object.

It is possible to set any Address Book object as an addressee of an outbound message to be sent by a messaging client. A mail user is an example, and generally contains an e-mail address to be used for messaging. A distribution list is a special type of Address Book object that represents a collection of other Address Book objects, can be an addressee of an outbound message, and MAY<5> have additional properties and operations, such as the ability to determine the distribution list membership. Mail user objects are further broken down into other subtypes, such as rooms, equipment, messaging forums, or other types.

The Department object and the Organization object are types of Address Book objects that are required to support a hierarchical address book view that messaging clients need.

All Address Book objects that are obtained from an offline address book or an NSPI server MUST define values for the following properties:

- **PidTagDisplayName**
- **PidTagEmailAddress**
- **PidTagObjectType**
- **PidTagDisplayType**

In addition, all Address Book objects that are obtained from an NSPI server MUST define values for the following property:

- **PidTag7BitDisplayName**

In addition, , all Address Book objects that are obtained from an NSPI server MUST define values for the following properties, which MUST NOT be defined for any objects in an offline address book:

- **PidTagEntryId**
- **PidTagTemplateid**
- **PidTagRecordKey**
- **PidTagSearchKey**
- **PidTagInstanceKey**
- **PidTagAddressBookContainerId**
- **PidTagInitialDetailsPane**
- **PidTagTransmittableDisplayName**
- **PidTagAddressType**
- **PidTagAddressBookObjectDistinguishedName**

In addition, an offline address book MUST NOT define values for the following properties:

- **PidTagDepth**
- **PidTagContainerFlags**

An NSPI server MUST define values for the following properties for distribution lists and define no values for other object types:

- **PidTagContainerContents**
- **PidTagContainerFlags**

If either an NSPI server or offline address book does not conform to these rules, and to the descriptions of the properties in the following sections, client behavior is undefined.

2.2.3.1 PidTagDisplayName

The **PidTagDisplayName** property of type **PtypString** represents a displayable form of the **Address Book object**. When the Address Book object is a **mail user**, the **PidTagDisplayName** string property is the name of the mail user, usually the mail user's full name. When the object is a **distribution list**, **PidTagDisplayName** is the name of the distribution list that would be displayed when addressing messages to that distribution list. When the object is a department object, **PidTagDisplayName** is the name of that department. When the object is any other Address Book object, **PidTagDisplayName** is the displayable name of that object.

PidTagDisplayName is also one of the columns that are returned for the set of **address book containers** in the **address book hierarchy table**. The **PidTagDisplayName** value for each row in the hierarchy table represents the name of the address book container of that row.

2.2.3.2 PidTagEntryId

The **PidTagEntryId** property of type **PtypBinary** is used to identify many different types of **messaging objects**, including objects that are not in an **address book**. The formats of the **PidTagEntryId** property for non-addressing messaging objects are specified in [MS-OXCADATA]. These other formats do not apply to any objects in an **offline address book (OAB)** or NSPI server.

The **PidTagEntryId** property of type **PtypBinary** identifies an **Address Book object** on an NSPI server, and represents either the **Permanent Entry ID** or the **Ephemeral Entry ID**, as specified in [MS-NSPI]. Messaging clients use it to open the object and to perform operations on it, such as obtaining other properties. The types of operations that can be performed is specified in [MS-NSPI]. When the object is in Permanent Entry ID format, its DN MUST match the value for **PidTagEmailAddress** and MUST follow the *dn* format specification that is particular to the type of object, as described in section 2.2.1.1.

The Offline Address Book (OAB) Format and Schema protocol specification [MS-OXOAB] does not include values for **PidTagEntryId** for Address Book objects in its data structure. Instead, the **PidTagEmailAddress** property identifies objects in an OAB.

2.2.3.3 PidTagTemplateid

The **PidTagTemplateid** property of type **PtypBinary** contains the **PidTagEntryId**, expressed as a **Permanent Entry ID** format. This value **MUST** be present for all **Address Book objects** on an **NSPI** server, its DN **MUST** match the value for **PidTagEmailAddress**, and its DN **MUST** follow the *dn* format specification particular to the type of object, as described in section 2.2.1.1.

The **PidTagTemplateid** property is not present on objects in an **offline address book**.

2.2.3.4 PidTagRecordKey

The **PidTagRecordKey** property of type **PtypBinary** contains a unique binary-comparable identifier for a specific **Address Book object**. It **MUST** be present on all objects on a **NSPI** server and **MUST** match **PidTagTemplateid**.

The **PidTagRecordKey** property is not present on objects in an **offline address book**.

2.2.3.5 PidTagSearchKey

The **PidTagSearchKey** property of type **PtypBinary** is a binary value formed by concatenating the ASCII string "EX: " followed by the DN for the object converted to all upper case, followed by a zero byte value. This value **MUST** be present for all **Address Book objects** on an **NSPI** server and **MUST** follow this form.

The **PidTagSearchKey** property is not present on objects in an **offline address book**.

2.2.3.6 PidTagInstanceKey

The **PidTagInstanceKey** property of type **PtypBinary**, like the **PidTagEntryId** property, identifies an object on an **NSPI** server. It is a **Minimal Entry ID**, represented as a 4 byte binary value, in **little-endian** byte order.

The **PidTagInstanceKey** property is not present on objects in an **offline address book**.

2.2.3.7 PidTag7BitDisplayName

The **PidTag7BitDisplayName** property of type **PtypString** contains a displayable form of the **Address Book object** that can be rendered in the client user's own **code page**.

2.2.3.8 PidTagTransmittableDisplayName

The **PidTagTransmittableDisplayName** property of type **PtypString** contains an **Address Book object's** display name that is transmitted with the message. It **MUST** be present on all objects on an **NSPI** server, and its value **MUST** match the value for **PidTagDisplayName**.

The **PidTagTransmittableDisplayName** property is not present on objects in an **offline address book**.

2.2.3.9 PidTagAddressBookPhoneticDisplayName

The **PidTagAddressBookPhoneticDisplayName** property of type **PtypString** is the phonetic representation of the **PidTagDisplayName** property.

2.2.3.10 PidTagObjectType

The **PidTagObjectType** property of type **PtypInteger32** contains a value that specifies the type of an object.

The **PidTagObjectType** property **MUST** be present for all **Address Book objects** and **MUST** have one of the values listed in the following table.

Name	Value	Description
MAILUSER	0x00000006	A mail user , or any Address Book object that is not a distribution list or forum.
DISTLIST	0x00000008	A distribution list .
FOLDER	0x00000003	A messaging forum, such as a bulletin board service or a public or shared folder.

2.2.3.11 PidTagDisplayType

The **PidTagDisplayType** property of type **PtypInteger32** contains a value that indicates how to display an **Address Book object** in a table or as an addressee on a message. Messaging clients use this to display an icon, bold the item, or apply some other display element to make it easy for a user who is viewing the object to distinguish its type. In addition, the property **PidTagDisplayTypeEx** provides a means to further refine the display.

PidTagDisplayType **MUST** have one of the following values of Display Type, as specified in [MS-NSPI], according to the object's type: DT_MAILUSER, DT_DISTLIST, DT_FORUM, DT_AGENT, DT_ORGANIZATION, DT_PRIVATE_DISTLIST, or DT_REMOTE_MAILUSER. If the object is not one of these types, its **PidTagDisplayType** has the value DT_MAILUSER.

2.2.3.12 PidTagDisplayTypeEx

The **PidTagDisplayTypeEx** property of type **PtypInteger32** contains a value that indicates how to display an **Address Book object** in a table or as a **recipient** on a message. Messaging clients use this to display an icon, bold the item, or apply some other display element to make

it easy for a user who is viewing the object to distinguish its type. This property contains more detailed information about the object's display information than **PidTagDisplayType**. In addition to the display information contained in **PidTagDisplayType**, it distinguishes between additional object types. When the object comes from a remote server, it also includes information about the type of object on that remote server, as well as the type on the local server.

The **PidTagDisplayTypeEx** property of type **PtypInteger32** also includes information that indicates whether it is possible to share information from the user's own **mailbox** to the entity represented by this Address Book object.

The **PidTagDisplayTypeEx** is a bitmask of flags and values, and has the following structure:

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
r	s	reserved														dtRemote					dtLocal										

r (1 bit): 1 indicates that the value in dtRemote is the remote display type. The number 0 (zero) means that dtRemote is undefined.

s (1 bit): 1 indicates that the **mailbox** server supports sharing to the entity that this Address Book object represents. The number 0 (zero) means it does not.

reserved (14 bits): Undefined. It MUST contain all zeroes and MUST be ignored by clients.

dtRemote (1 byte): Display type of the Address Book object in the remote forest. This is undefined if r is 0 (zero). If r is 1, it contains one of the values listed in the following table.

dtLocal (1 byte): Display type of the Address Book object in the messaging user's local forest. It contains one of the values listed in the following table.

dtLocal and/or dtRemote MUST have one of the following values of Display Type, as defined in [MS-NSPI], according to the object's type: DT_MAILUSER, DT_DISTLIST, DT_FORUM, DT_AGENT, DT_ORGANIZATION, DT_PRIVATE_DISTLIST, DT_REMOTE_MAILUSER, or one of the values listed in the following table.

Name	Value	Description
DT_ROOM	0x00000007	A conference room. It is possible for messaging clients to send meeting requests to this Address Book object to book the room.

Name	Value	Description
DT_EQUIPMENT	0x00000008	Equipment. It is possible for messaging clients to send meeting requests to this Address Book object to reserve the equipment.
DT_SEC_DISTLIST	0x00000009	A distribution list.

2.2.3.13 PidTagAddressType

The **PidTagAddressType** property of type **PtypString** contains the **Address Book object's** e-mail address type. It **MUST** have the value "EX" for all objects on an **NSPI** server.

The **PidTagAddressType** property is not present on objects in an **offline address book**.

2.2.3.14 PidTagEmailAddress

The **PidTagEmailAddress** property of type **PtypString** contains the **Address Book object's** e-mail address, expressed in X500 format, using the *dn* format specification that is particular to the type of object, as defined in section 2.2.1.1. This property **MUST** be present for every Address Book object. Its value **MUST** match the DN of the **Permanent Entry ID** for the object if the object is present on an **NSPI** server. Its DN **MUST** follow the *dn* format specification particular to the type of object, as defined in section 2.2.1.1.

2.2.3.15 PidTagAddressBookObjectDistinguishedName

The **PidTagAddressBookObjectDistinguishedName** property of type **PtypString** contains the **distinguished name (DN)** of the **Address Book object** in DN format, as specified in section 2.2.1.1. If present, its DN **MUST** follow the *dn* format specification that is particular to the type of object, as specified in section 2.2.1.1. Its value, if present, **MUST** match the value for **PidTagEmailAddress**. This value **MUST** be present on all **Address Book objects** on an **NSPI** server.

2.2.3.16 PidTagCreationTime

The **PidTagCreationTime** property of type **PtypTime** contains the creation date and time for the **Address Book object** in **Coordinated Universal Time (UTC)**.

2.2.3.17 PidTagLastModificationTime

The **PidTagLastModificationTime** property of type **PtypTime** contains the date and time that the **Address Book object** was last modified in **UTC**.

2.2.3.18 PidTagSendRichInfo

The **PidTagSendRichInfo** property of type **PtypBoolean** contains **TRUE** if the e-mail-enabled entity represented by the **Address Book object** can receive all message content, including **Rich Text Format (RTF)** and other embedded objects. When sending mail by using the RFC2822 and **MIME** to the E-mail Object Conversion protocol, as specified in [MS-OXCMAIL], the **PidTagSendRichInfo** property specifies whether to encode the message in **MIME** or in **TNEF**, as specified in [MS-OXCMAIL].

2.2.3.19 PidTagSendInternetEncoding

The **PidTagSendInternetEncoding** property of type **PtypInteger32** contains a bitmask of message encoding preferences for mail sent to an e-mail-enabled entity that is represented by this **Address Book object**. When sending mail by using the RFC2822 and **MIME** to the E-mail Object Conversion protocol, as specified in [MS-OXCMAIL], the **PidTagSendInternetEncoding** property specifies the format of the MIME body, as specified in [MS-OXCMAIL].

2.2.3.20 PidTagAccount

The **PidTagAccount** property of type **PtypString** contains the **Address Book object's** alias, which is an alternative name by which the object can be identified.

2.2.3.21 PidTagSmtpAddress

The **PidTagSmtpAddress** property of type **PtypString** is the **Address Book object's** **SMTP** address.

2.2.3.22 PidTagAddressBookTargetAddress

The **PidTagAddressBookTargetAddress** property of type **PtypString** contains the foreign system e-mail address of an **Address Book object**. If present, it **MUST** be prefixed with the address type of the foreign address, followed by a colon (":"), followed by the foreign e-mail address expressed in that address type. For **SMTP** addresses, it is "SMTP: " followed by the foreign SMTP address.

2.2.3.23 PidTagAddressBookProxyAddresses

The **PidTagAddressBookProxyAddresses** property of type **PtypMultipleString** contains alternate e-mail addresses for the **Address Book object**. Each string **MUST** be prefixed by an e-mail type, followed by a colon (":"), followed by the e-mail address in a format for that e-mail type. For an **SMTP** address, the string **MUST** start with the string "smtp: " or "SMTP: " followed by an SMTP address. The first string starting with the uppercase string "SMTP: " **MUST** match the **PidTagSmtpAddress** property for the Address Book object.

2.2.3.24 **PidTagAddressBookSeniorityIndex**

The **PidTagAddressBookSeniorityIndex** property of type **PtypInteger32** contains a signed integer that specifies the seniority order of **Address Book objects** in a department, with larger values specifying members that are more senior, and specifies the sort order of **Department objects**, in descending order.

2.2.3.25 **PidTagAddressBookObjectGuid**

The **PidTagAddressBookObjectGuid** property of type **PtypBinary** is a **GUID** that uniquely identifies an **Address Book object**.

2.2.3.26 **PidTagComment**

The **PidTagComment** property of type **PtypString** contains a comment about the purpose or content of the **Address Book object**.

2.2.3.27 **PidTagMappingSignature**

The **PidTagMappingSignature** property of type **PtypBinary** **MUST** be present on all **Address Book objects** on an **NSPI** server and **MUST** contain the following 16 bytes:

0xDC, 0xA7, 0x40, 0xC8, 0xC0, 0x42, 0x10, 0x1A, 0xB4, 0xB9, 0x08, 0x00,
0x2B, 0x2F, 0xE1, 0x82

The **PidTagMappingSignature** property is not present on objects in an **offline address book**.

2.2.3.28 **PidTagOriginalEntryId**

The **PidTagOriginalEntryId** property of type **PtypBinary** **MUST NOT** be present on objects on an **NSPI** server or an **offline address book**.

2.2.3.29 **PidTagOriginalDisplayName**

The **PidTagOriginalDisplayName** property of type **PtypString** **MUST NOT** be present on objects on an **NSPI** server or an **offline address book**.

2.2.3.30 **PidTagOriginalSearchKey**

The **PidTagOriginalSearchKey** property of type **PtypBinary** **MUST NOT** be present on objects on an **NSPI** server or an **offline address book**.

2.2.3.31 **PidTagInitialDetailsPane**

The **PidTagInitialDetailsPane** property of type **PtypInteger32** indicates which page of a **display template** to display first. It **MUST** be present on all **Address Book objects** on an **NSPI** server, and **MUST** have the value 0 (zero).

2.2.3.32 PidTagAddressBookExtensionAttribute1...PidTagAddressBookExtensionAttribute15

These properties of type **PtypString** are defined and populated by the organization that is to be added to **display templates**.

2.2.4 Properties that Apply to Mail User Objects

2.2.4.1 PidTagSurname

The **PidTagSurname** property of type **PtypString** contains the **mail user's** family name.

2.2.4.2 PidTagGivenName

The **PidTagGivenName** property of type **PtypString** contains the **mail user's** given name.

2.2.4.3 PidTagNickname

The **PidTagNickname** property of type **PtypString** contains the **mail user's** nickname.

2.2.4.4 PidTagDisplayNamePrefix

The **PidTagDisplayNamePrefix** property of type **PtypString** contains the **mail user's** honorific title.

2.2.4.5 PidTagInitials

The **PidTagInitials** property of type **PtypString** contains the initials for parts of the full name of the **mail user**.

2.2.4.6 PidTagGeneration

The **PidTagGeneration** property of type **PtypString** contains a generational abbreviation that follows the full name of the **mail user**.

2.2.4.7 PidTagTitle

The **PidTagTitle** property of type **PtypString** contains the **mail user's** job title.

2.2.4.8 PidTagOfficeLocation

The **PidTagOfficeLocation** property of type **PtypString** contains the **mail user's** office location.

2.2.4.9 PidTagDepartmentName

The **PidTagDepartmentName** property of type **PtypString** contains a name for the department in which the **mail user** works.

2.2.4.10 PidTagCompanyName

The **PidTagCompanyName** property of type **PtypString** contains the **mail user's** company name.

2.2.4.11 PidTagAssistant

The **PidTagAssistant** property of type **PtypString** contains the name of the **mail user's** administrative assistant.

2.2.4.12 PidTagManagerName

The **PidTagManagerName** property of type **PtypString** contains the name of the **mail user's** manager.

2.2.4.13 PidTagAddressBookManagerDistinguishedName

The **PidTagAddressBookManagerDistinguishedName** property of type **PtypString** contains the **distinguished name (DN)** of the **mail user's** manager.

2.2.4.14 PidTagAddressBookPhoneticGivenName

The **PidTagAddressBookPhoneticGivenName** property of type **PtypString** is the phonetic representation of the **PidTagGivenName** property.

2.2.4.15 PidTagAddressBookPhoneticSurname

The **PidTagAddressBookPhoneticSurname** property of type **PtypString** is the phonetic representation of the **PidTagSurname** property.

2.2.4.16 PidTagAddressBookPhoneticCompanyName

The **PidTagAddressBookPhoneticCompanyName** property of type **PtypString** is the phonetic representation of the **PidTagCompanyName** property.

2.2.4.17 PidTagAddressBookPhoneticDepartmentName

The **PidTagAddressBookPhoneticDepartmentName** property of type **PtypString** is the phonetic representation of the **PidTagDepartmentName** property.

2.2.4.18 PidTagPostalAddress

The **PidTagPostalAddress** property of type **PtypString** contains the **mail user's** postal address.

2.2.4.19 PidTagStreetAddress

The **PidTagStreetAddress** property of type **PtypString** contains the **mail user's** street address.

2.2.4.20 PidTagPostOfficeBox

The **PidTagPostOfficeBox** property of type **PtypString** contains the number or identifier of the **mail user's** post office box.

2.2.4.21 PidTagLocality

The **PidTagLocality** property of type **PtypString** contains the name of the **mail user's** locality, such as the town or city.

2.2.4.22 PidTagStateOrProvince

The **PidTagStateOrProvince** property of type **PtypString** contains the name of the **mail user's** state or province.

2.2.4.23 PidTagPostalCode

The **PidTagPostalCode** property of type **PtypString** contains the postal code for the **mail user's** postal address.

2.2.4.24 PidTagCountry

The **PidTagCountry** property of type **PtypString** contains the name of the **mail user's** country/region.

2.2.4.25 PidTagHomeAddressStreet

The **PidTagHomeAddressStreet** property of type **PtypString** contains the **mail user's** home street address.

2.2.4.26 PidTagHomeAddressPostOfficeBox

The **PidTagHomeAddressPostOfficeBox** property of type **PtypString** contains the number or identifier of the **mail user's** home post office box.

2.2.4.27 PidTagHomeAddressCity

The **PidTagHomeAddressCity** property of type **PtypString** contains the name of the **mail user's** home locality, such as the town or city.

2.2.4.28 PidTagHomeAddressStateOrProvince

The **PidTagHomeAddressStateOrProvince** property of type **PtypString** contains the name of the **mail user's** home state or province.

2.2.4.29 PidTagHomeAddressPostalCode

The **PidTagHomeAddressPostalCode** property of type **PtypString** contains the postal code for the **mail user's** home postal address.

2.2.4.30 PidTagHomeAddressCountry

The **PidTagHomeAddressCountry** property of type **PtypString** contains the name of the **mail user's** home country/region.

2.2.4.31 PidTagOtherAddressStreet

The **PidTagOtherAddressStreet** property of type **PtypString** contains the **mail user's** other street address.

2.2.4.32 PidTagOtherAddressPostOfficeBox

The **PidTagOtherAddressPostOfficeBox** property of type **PtypString** contains the number or identifier of the **mail user's** other post office box.

2.2.4.33 PidTagOtherAddressCity

The **PidTagOtherAddressCity** property of type **PtypString** contains the name of the **mail user's** other locality, such as the town or city.

2.2.4.34 PidTagOtherAddressStateOrProvince

The **PidTagOtherAddressStateOrProvince** property of type **PtypString** contains the name of the **mail user's** other state or province.

2.2.4.35 PidTagOtherAddressPostalCode

The **PidTagOtherAddressPostalCode** property of type **PtypString** contains the postal code for the **mail user's** other postal address.

2.2.4.36 PidTagOtherAddressCountry

The **PidTagOtherAddressCountry** property of type **PtypString** contains the name of the **mail user's** other country/region.

2.2.4.37 PidTagPrimaryTelephoneNumber

The **PidTagPrimaryTelephoneNumber** property of type **PtypString** contains the **mail user's** primary telephone number.

2.2.4.38 PidTagBusinessTelephoneNumber

The **PidTagBusinessTelephoneNumber** property of type **PtypString** contains the primary telephone number of the **mail user's** place of business.

2.2.4.39 PidTagHomeTelephoneNumber

The **PidTagHomeTelephoneNumber** property of type **PtypString** contains the primary telephone number of the **mail user's** home.

2.2.4.40 PidTagBusiness2TelephoneNumber

The **PidTagBusiness2TelephoneNumber** property of type **PtypString** contains a secondary telephone number at the **mail user's** place of business.

2.2.4.41 PidTagBusiness2TelephoneNumbers

The **PidTagBusiness2TelephoneNumbers** property of type **PtypMultipleString** contains secondary telephone numbers at the **mail user's** place of business.

2.2.4.42 PidTagHome2TelephoneNumber

The PR **PidTagHome2TelephoneNumber** property of type **PtypString** contains a secondary telephone number at the **mail user's** home.

2.2.4.43 PidTagHome2TelephoneNumbers

The PR **PidTagHome2TelephoneNumbers** property of type **PtypMultipleString** contains secondary telephone numbers at the **mail user's** home.

2.2.4.44 PidTagCallbackTelephoneNumber

The **PidTagCallbackTelephoneNumber** property of type **PtypString** contains a telephone number to reach the **mail user**.

2.2.4.45 PidTagMobileTelephoneNumber

The **PidTagMobileTelephoneNumber** property of type **PtypString** contains the **mail user's** cellular telephone number.

2.2.4.46 PidTagRadioTelephoneNumber

The **PidTagRadioTelephoneNumber** property of type **PtypString** contains the **mail user's** radio telephone number.

2.2.4.47 PidTagCarTelephoneNumber

The **PidTagCarTelephoneNumber** property of type **PtypString** contains the **mail user's** car telephone number.

2.2.4.48 PidTagOtherTelephoneNumber

The **PidTagOtherTelephoneNumber** property of type **PtypString** contains an alternate telephone number for the **mail user**.

2.2.4.49 PidTagPagerTelephoneNumber

The **PidTagPagerTelephoneNumber** property of type **PtypString** contains the **mail user's** pager telephone number.

2.2.4.50 PidTagPrimaryFaxNumber

The **PidTagPrimaryFaxNumber** property of type **PtypString** contains the telephone number of the **mail user's** primary fax machine.

2.2.4.51 PidTagBusinessFaxNumber

The **PidTagBusinessFaxNumber** property of type **PtypString** contains the telephone number of the **mail user's** business fax machine.

2.2.4.52 PidTagHomeFaxNumber

The **PidTagHomeFaxNumber** property of type **PtypString** contains the telephone number of the **mail user's** home fax machine.

2.2.4.53 PidTagCompanyMainTelephoneNumber

The **PidTagCompanyMainTelephoneNumber** property of type **PtypString** contains the main telephone number of the **mail user's** company.

2.2.4.54 PidTagTelecommunicationsDeviceForDeafTelephoneNumber

The **PidTagTelecommunicationsDeviceForDeafTelephoneNumber** property of type **PtypString** contains the **mail user's** telecommunication device for the deaf (TTYTDD) telephone number.

2.2.4.55 PidTagTelexNumber

The **PidTagTelexNumber** property of type **PtypString** contains the **mail user's** telex number.

2.2.4.56 PidTagIsdnNumber

The **PidTagIsdnNumber** property of type **PtypString** contains the **mail user's** ISDN-capable telephone number.

2.2.4.57 PidTagAssistantTelephoneNumber

The **PidTagAssistantTelephoneNumber** property of type **PtypString** contains the telephone number of the **mail user's** administrative assistant.

2.2.4.58 PidTagKeyword

The **PidTagKeyword** property of type **PtypString** contains a keyword that identifies the **mail user** to the mail user's system administrator.

2.2.4.59 PidTagGovernmentIdNumber

The **PidTagGovernmentIdNumber** property of type **PtypString** contains a government identifier for the **mail user**.

2.2.4.60 **PidTagMessageHandlingSystemCommonName**

The **PidTagMessageHandlingSystemCommonName** property of type **PtypString** contains the common name of a messaging user for use in a message header.

2.2.4.61 **PidTagLanguage**

The **PidTagLanguage** property of type **PtypString** contains a value that indicates the language in which the messaging user is writing messages.

2.2.4.62 **PidTagLocation**

The **PidTagLocation** property of type **PtypString** contains the location of the **mail user** in a format that is useful to the **mail user's** organization.

2.2.4.63 **PidTagOrganizationalIdNumber**

The **PidTagOrganizationalIdNumber** property of type **PtypString** contains an identifier for the **mail user** used within the mail user's organization.

2.2.4.64 **PidTagUserCertificate**

The **PidTagUserCertificate** property of type **PtypBinary** has been deprecated. This property MUST be ignored by clients.

2.2.4.65 **PidTagAddressBookX509Certificate**

The **PidTagAddressBookX509Certificate** property of type **PtypMultipleBinary** specifies ASN.1 DER encoded X.509 certificates for the **mail user**. Each binary value MUST be an ASN.1 DER encoded X.509 certificate, as specified in [RFC3280].

2.2.4.66 **PidTagUserX509Certificate**

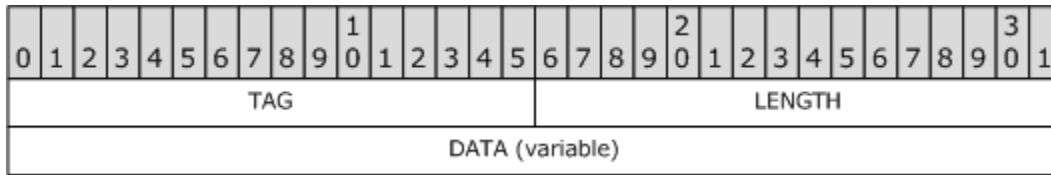
The **PidTagUserX509Certificate** property of type **PtypMultipleBinary** specifies a list certificates for the **mail user**. Each binary value MUST be either an ASN.1 DER encoded SignedData Type **BLOB** which contains the user's certificates and is signed with the user's certificate, as specified in [RFC3852], or a binary property as specified in the following paragraph.

To determine which of these choices each binary value is, the application MUST examine the first byte of each binary value. If the first byte has the value 0x30, it is an ASN.1 DER encoded SignedData Type **BLOB**. Otherwise, the binary value MUST be interpreted according to the format specified in this section. Whenever possible, the client and the server SHOULD use the **PidTagUserX509Certificate** instead of **PidTagAddressBookX509Certificate** when looking for certificates.

Non-ASN.1 Binary Value Format

If the binary value is not an ASN.1 DER encoded SignedData Type **BLOB**, then it MUST be a **BLOB** containing a set of security settings as specified in sections 2.2.4.66.1.1 through

2.2.4.66.1.12, one after another, in a continuous block of data. All settings in these sections **MUST** appear at most once in the binary value unless stated otherwise. Each security setting has the following format:



TAG (PtypInteger16): An unsigned value that identifies this particular security setting. If the **TAG** found in a security setting is not among the ones listed in sections 2.2.4.66.1.1 through 2.2.4.66.1.12, the client and the server **MUST** ignore these settings.

LENGTH (PtypInteger16): The total length of the security setting, including the **TAG** field, the **LENGTH** field, and the **DATA** field.

DATA (variable structure): Contains the data associated with this security setting. Its length, in bytes, can be computed from the value of the **LENGTH** field.

The following sections specify the security settings that appear in a non-ASN.1 certificate.

2.2.4.66.1.1 Property Version

The **TAG** for this setting is 0x0001. The **LENGTH** for this setting **MUST** be 0x0008. The **DATA** specifies the version of the certificate. The unsigned **PtypInteger32 DATA** **MUST** be 0x00000001. This setting **MUST** be part of each **PtypBinary** value.

2.2.4.66.1.2 Encryption Type

The **TAG** for this setting is 0x0006. The **LENGTH** for this setting **MUST** be 0x0008. The unsigned **PtypInteger32 DATA** specifies the type of encryption to be used with this certificate. A value of 0x00000001 specifies that the encryption type is S/MIME, as specified in [RFC3852]. A **DATA** value of 0x00000006 specifies that the encryption type is Fortezza, as specified in [RFC2876]. All other values do not have any defined meaning and **MUST** be ignored by both the server and the client. This setting **MUST** be part of each **PtypBinary** value.

2.2.4.66.1.3 Defaults

The **TAG** for this setting is 0x0020. The **LENGTH** for this setting **MUST** be 0x0008. The **DATA** is a 4-byte bit field, which can contain any combination of the following bit values:

Bit	Meaning
0x00000001	This is the default certificate for S/MIME.
0x00000002	This is the default certificate for all formats. If this bit is set,

	then 0x00000001 MUST be set.
--	------------------------------

Any other bit flags set on this setting MUST be ignored. This setting MUST be part of each **PtypBinary** value.

2.2.4.66.1.4 ASCII Display Name

The **TAG** for this setting is 0x000B. The **LENGTH** for this setting MUST be larger than 4. The **DATA** field contains the user-readable name, as a NULL terminated **ASCII** string. Either the ASCII display name or the **Unicode** display name (as specified in section 2.2.4.66.1.5) SHOULD be part of the binary value, but not both <6>.

2.2.4.66.1.5 Unicode Display Name

The **TAG** for this setting is 0x0051. The **LENGTH** for this setting MUST be larger than 4. The **DATA** field contains the user-readable name, as a NULL-terminated **Unicode** string. Either the Unicode display name or the **ASCII** display name SHOULD be part of the certificate, but not both <6>.

2.2.4.66.1.6 KeyExSHA1Hash

The **TAG** for this setting is 0x0022. The **LENGTH** for this setting MUST be larger than 4. The **DATA** field contains the SHA1 Hash, as specified in [RFC3174], to look up the encryption certificate in the certificate store on the user's computer. The certificate that matches this hash SHOULD be used when sending encrypted mail to the contact.

For a given **PtypBinary** value in **PidTagUserX509Certificate**, if the KeyExSHA1Hash setting is present, then KeyExchangeCertificate MUST NOT be present.

Whenever possible, the client and the server SHOULD use the KeyExchangeCertificate setting instead of the KeyExSHA1Hash setting.

2.2.4.66.1.7 SignSHA1Hash

The **TAG** for this optional setting is 0x0009. The **LENGTH** for this setting MUST be larger than 4. The **DATA** field contains the SHA1 Hash, as specified in [RFC3174], to look up the signing certificate in the certificate store on the user's computer<6>.

For a given **PtypBinary** value in **PidTagUserX509Certificate**, if the SignSHA1Hash setting is present, then SignCertificate MUST NOT be present.

Whenever possible, the client and the server SHOULD use the SignCertificate setting instead of the SignSHA1Hash setting.

2.2.4.66.1.8 KeyExchangeCertificate

The **TAG** for this setting is 0x0003. The **LENGTH** for this setting MUST be larger than 4. The **DATA** field contains an ASN.1 DER encoded X.509 certificate, as specified in

[RFC3280]. This certificate SHOULD be used when sending encrypted S/MIME mail to the contact.

For a given **PtypBinary** value in **PidTagUserX509Certificate**, if the **KeyExchangeCertificate** setting is present, then **KeyExSHA1Hash** MUST NOT be present. If **KeyExSHA1Hash** is not present, then **KeyExchangeCertificate** MUST be present.

Whenever possible, the client and the server SHOULD use the **KeyExchangeCertificate** setting instead of the **KeyExSHA1Hash** setting.

2.2.4.66.1.9 SignCertificate

The **TAG** for this optional setting is 0x0008. The **LENGTH** for this setting MUST be larger than 4. The **DATA** field contains an ASN.1 DER encoded X.509 certificate, as specified in [RFC3280] <6>.

For a given **PtypBinary** value in **PidTagUserX509Certificate**, if the **SignCertificate** setting is present, then **SignSHA1Hash** MUST NOT be present.

Whenever possible, the client and the server SHOULD use the **SignCertificate** setting instead of the **SignSHA1Hash** setting.

2.2.4.66.1.10 ChainCertificate

The **TAG** for this optional setting is 0x0004. The **LENGTH** for this setting MUST be larger than 4. This setting can appear multiple times in the **PtypBinary** value to provide multiple certificates to use in the building of chains. The **DATA** field contains an ASN.1 DER encoded X.509 certificate, as specified in [RFC3280]. If present, these optional certificates SHOULD be used to build the chain of trust for the certificate specified by **KeyExchangeCertificate**.

2.2.4.66.1.11 AsymmetricCapabilities

The **TAG** for this setting is 0x0002. The **LENGTH** for this setting MUST be larger than 4. The **DATA** field contains the ASN.1 DER encoded **sMIMECapabilities** type, as specified in [RFC3851]. This setting MUST be part of the **PtypBinary** value.

2.2.4.66.1.12 SavedTime

The **TAG** for this optional setting is 0x000D. The **LENGTH** for this setting MUST be 0x000C. The **DATA** MUST be a **PtypFloatingTime** that specifies the time (in UTC) when the certificate was added to the contact.

2.2.4.67 PidTagAddressBookHomeMessageDatabase

The **PidTagAddressBookHomeMessageDatabase** property of type **PtypString** of a **mail user** is the DN, expressed in the x500-dn format specification described in section 2.2.1.1, of an **Address Book object** that represents the **mail user's message database**. The x500-container-dn portion of the DN is an x500-dn string that references an **Address Book object** that represents the mail user's **mailbox** server. The rdn in the object-rdn of the x500-dn for the

mailbox server's Address Book object is the host-name, as described in [RFC1034], of the server that contains the mail user's message database.

2.2.4.68 **PidTagAddressBookNetworkAddress**

The **PidTagAddressBookNetworkAddress** property of type **PtypMultipleString** of an **Address Book** object of a **mailbox** server contains a list of names by which a server is known to the various transports in use by the network. Each **PtypString** is an **RPC** protocol sequence, as specified in [MS-RPCE], followed by a colon (":"), followed by the host-name of the server under that **RPC** protocol sequence.

2.2.4.69 **PidTagHobbies**

The **PidTagHobbies** property of type **PtypString** contains the names of the **mail user's** hobbies.

2.2.4.70 **PidTagProfession**

The **PidTagProfession** property of type **PtypString** contains the name of the **mail user's** line of business.

2.2.4.71 **PidTagReferredByName**

The **PidTagReferredByName** property of type **PtypString** contains the name of the **mail user's** referral.

2.2.4.72 **PidTagSpouseName**

The **PidTagSpouseName** property of type **PtypString** contains the name of the **mail user's** spouse/partner.

2.2.4.73 **PidTagGender**

The **PidTagGender** short property contains a value that represents the **mail user's** gender. If present, it **MUST** contain one of the following values:

Value	Description
0x00000000	No gender is specified.
0x00000001	Specifies a gender of female.
0x00000002	Specifies a gender of male.

2.2.4.74 **PidTagComputerNetworkName**

The **PidTagComputerNetworkName** property of type **PtypString** contains the name of the **mail user's** computer network.

2.2.4.75 PidTagCustomerId

The **PidTagCustomerId** property of type **PtypString** contains the **mail user's** customer identification number.

2.2.4.76 PidTagFtpSite

The **PidTagFtpSite** property of type **PtypString** contains the **mail user's** File Transfer Protocol (FTP) site address.

2.2.4.77 PidTagPersonalHomePage

The **PidTagPersonalHomePage** property of type **PtypString** contains the Web address (URL) of the **mail user's** personal home page.

2.2.4.78 PidTagBusinessHomePage

The **PidTagBusinessHomePage** property of type **PtypString** contains the Web address (URL) of the **mail user's** business home page.

2.2.4.79 PidTagBirthday

The **PidTagBirthday** property of type **PtypTime** contains the date of the **mail user's** birthday at 12:00 A.M. UTC.

2.2.4.80 PidTagWeddingAnniversary

The **PidTagWeddingAnniversary** property of type **PtypTime** contains the date of the **mail user's** wedding anniversary at 12:00 A.M. UTC.

2.2.5 Properties That Reference Other Address Book Objects

Some **Address Book** objects contain references to other Address Book objects, in the form of a table, through various properties. For details about these tables, see [MS-NSPI] section 3.1.1.3.2.2. Each of these properties is of type **PtypEmbeddedTable**, as specified in [MS-NSPI]. For example, a **mail user** in an organization reports to a manager, who is also listed in that **address book** as another mail user. In this case, a **property** of type **PtypEmbeddedTable** and **PidTagAddressBookManager** references the manager. In general, a property of type **PtypEmbeddedTable** references any number of other Address Book objects. Properties of type **PtypEmbeddedTable** are made available on an NSPI server by using a property value-based explicit table, through the call **NspiGetMatches**, and modified through **NspiModLinkAtt**, as specified in [MS-NSPI]. The structure for an **offline address book** does not specify any way to store properties of type **PtypEmbeddedTable**.

2.2.5.1 PidTagAddressBookManager

The **PidTagAddressBookManager** property of type **PtypEmbeddedTable** of a **mail user** contains one row that references the mail user's manager.

2.2.5.2 PidTagAddressBookReports

The **PidTagAddressBookReports** property of type **PtypEmbeddedTable** of a **mail user** lists all the mail user's direct reports.

2.2.5.3 PidTagAddressBookIsMemberOfDistributionList

The **PidTagAddressBookIsMemberOfDistributionList** property of type **PtypEmbeddedTable** of an **Address Book object** lists all the **distribution lists** for which this object is a member.

2.2.5.4 PidTagAddressBookOwnerBackLink

The **PidTagAddressBookOwnerBackLink** property of type **PtypEmbeddedTable** of a **mail user** lists the **distribution lists** that this mail user owns.

2.2.5.5 PidTagAddressBookPublicDelegates

The **PidTagAddressBookPublicDelegates** property of type **PtypEmbeddedTable** contains a list of **mail users** who are allowed to send mail on behalf of the **mailbox** owner.

2.2.5.6 PidTagAddressBookHierarchicalShowInDepartments

The **PidTagAddressBookHierarchicalShowInDepartments** property of type **PtypEmbeddedTable** of a **mail user** lists all the **Department objects** of which this mail user is a member.

2.2.6 Properties That Apply to Distribution Lists

2.2.6.1 PidTagAddressBookMember

The **PidTagAddressBookMember** property of type **PtypEmbeddedTable** is a **distribution list** that shows the members of the distribution list.

2.2.6.2 PidTagAddressBookOwner

The **PidTagAddressBookOwner** property of type **PtypEmbeddedTable** of a **distribution list** contains one row that references the distribution list's owner.

2.2.6.3 PidTagContainerContents

The **PidTagContainerContents** property of type **PtypEmbeddedTable** of a **distribution list** is always empty. An **NSPI** server **MUST** define this value for **distribution lists**. It is not present for all other objects.

2.2.6.4 PidTagAddressBookFolderPathname

The **PidTagAddressBookFolderPathname** property of type **PtypString** has been deprecated and **MUST** be ignored by clients.

2.2.7 Properties That Apply to Organization Objects

An **Organization object** is an **Address Book object** that represents an organization, and contains properties that are specific to an organization. Messaging clients access the Organization object of a **mail user** by extracting the *org-rdn* string from the mail user's **DN**, which is in the format of an X500 address and the *x500-dn* format specification as specified in section 2.2.1.1. Messaging clients use the resulting *org-rdn* string as a DN of the mail user's organization, which is in the *organization-dn* format specification. After the Organization object is obtained, if present, messaging clients are able to perform operations as they would on any other Address Book object.

2.2.7.1 PidTagAddressBookRoomContainers

The **PidTagAddressBookRoomContainers** property of type **PtypMultipleString** contains a list of **DNs** that represent the **address book containers** that hold **Resource objects**, such as conference rooms and equipment. Messaging clients use this list to determine which containers contain mainly Resource objects in order to do special handling on these containers, such as displaying a different column set when browsing **address lists** that are represented by these containers, or for features that require selecting from a set of rooms or equipment.

The **DNs** in the **PidTagAddressBookRoomContainers** property each use the *x500-dn* format specification as specified in section 2.2.1.1, with the additional requirement that there is no *container-rdn* in its *x500-dn* and that the *rdn* of the object-*rdn* follows the *container-guid* format specification. When the *rdn* is extracted from the **DN**, it represents the **GUID** of the address book container that this is referencing. Messaging clients compare this **GUID** to the **GUID** of another address book container by extracting that **GUID** from the *container-guid* of the other container's **DN**, which follows the *addresslist-dn* format specification. If the **GUIDs** are the same, then the other address book container is a room container.

2.2.7.2 PidTagAddressBookHierarchicalRootDepartment

The **PidTagAddressBookHierarchicalRootDepartment** property of type **PtypEmbeddedTable** is a reference to the root **Department object** in the department hierarchy for the organization. The table has either zero or one row, which references a **Department object**. If either the **Organization object** is missing, or this property is missing or the property value is empty, then the **NSPI** server does not have a department hierarchy for that organization.

2.2.8 Properties That Apply to Department Objects

A **Department object** is an **Address Book object** that represents a department within an organization, and contains properties that are specific to a **Department object**.

Messaging clients obtain the root of the department hierarchy by using the **property** **PidTagAddressBookHierarchicalRootDepartment** of the **Organization object**, or by obtaining the root department that is not specific to any organization, which has a **DN** that is

specified by using the organization-dn format specification as specified in section 2.2.1.1 with a value of “/o=FF46312B-D8AE-406C-B8E6-BC1A22A4C69E”.

2.2.8.1 PidTagAddressBookHierarchicalChildDepartments

The **PidTagAddressBookHierarchicalChildDepartments** property of type **PtypEmbeddedTable** on a **Department** object references the child departments in a hierarchy of departments.

2.2.8.2 PidTagAddressBookHierarchicalParentDepartment

The **PidTagAddressBookHierarchicalParentDepartment** property of type **PtypEmbeddedTable** on a **Department** object references all the departments to which this department is a child.

2.2.8.3 PidTagAddressBookHierarchicalDepartmentMembers

The **PidTagAddressBookHierarchicalDepartmentMembers** property of type **PtypEmbeddedTable** of a **Department** object lists all the **mail users** that belong to this department.

2.2.9 Properties That Apply to Resources

2.2.9.1 PidTagAddressBookRoomCapacity

The **PidTagAddressBookRoomCapacity** property of type **PtypInteger32** represents the maximum occupancy of the room.

2.2.9.2 PidTagAddressBookRoomDescription

The **PidTagAddressBookRoomDescription** property of type **PtypString** represents a description of the **Resource** object.

2.2.10 Properties That Have Special Purposes

2.2.10.1 PidTagAnr

The **PidTagAnr** property of type **PtypString** is a special property that is not actually a property on the **Address Book** objects themselves. Rather, this property is used by messaging clients as a property value to a Filter to the **NSPI** call **NspiGetMatches** (see [MS-NSPI])<7>. Messaging clients pass this property as a target string to **NspiGetMatches** to identify objects in an **address list** that are a possible match for the target string. This operation is known as **ambiguous name resolution (ANR)**. **NSPI** servers respond by returning the **Minimal Entry IDs** of all **Address Book** objects that are possible matches against the target string. This protocol does not prescribe the choice of **ANR** results of an **NSPI** server<8>. For more information about **ANR**, see [MS-NSPI].

An **offline address book (OAB)** does not contain this property for any Address Book objects. It is up to messaging clients to determine how to perform name matching among the objects in an OAB.

2.2.10.2 PidTagAddressBookManageDistributionList

The **PidTagAddressBookManageDistributionList** object **property** is a property tag for use in **display templates** for **distribution lists**. When **PidTagAddressBookManageDistributionList** is the **dwType** property tag in a Button control to a **CNTRL** structure of a display template, it tells messaging clients to include a button to enable UI to edit the members of a distribution list. See [MS-OXOABKT] for details about the Button control for a template. This is not a property of objects in an **address book**.

2.2.11 Named Properties

This document does not specify any named properties. **offline address books** and **NSPI** servers are free to expose any named properties in their implementation.

3 Protocol Details

3.1 Client Details

3.1.1 Abstract Data Model

The **address book** contains one or more **address book containers**. The collection of address book containers is arranged in an **address book hierarchy table**. An address book container represents an **address list**, which is a collection of **Address Book objects** that are rendered in a table and browsed by a messaging user. Among other things, messaging users are able to scroll through this table of objects, set positioning based on a name typed by a messaging user, perform searches, and perform **ambiguous name resolution (ANR)** against the names in that address list. ANR means that the user types part of a name, and the address book identifies potential matches for that name.

Messaging users are able to display information about an Address Book object from the table, an object obtained through ANR, or a **recipient** on a message. The information displayed is obtained from a **display template** that is supplied in the address book, and depends on the type of Address Book object being displayed.

Among the many types of objects, an address book typically includes the following object types:

- **mail users**, each of which describes a person or entity that can receive e-mail
- **distribution lists**, each of which is a collection of other mail users, distribution lists, or other Address Book objects that can receive e-mail
- **Resource objectss**, which can be reserved such as a room or equipment

- **Organization objects**, each of which describes an organization
- **Department objects**, which describe the departmental structure of an organization
- **address book containers**, each of which represents an address list that contains Address Book objects that can be viewed as a table
- **templates**, each of which describes a physical view that can be used to show details on other Address Book objects to a messaging user, as specified in [MS-OXOABKT]

3.1.2 Timers

None.

3.1.3 Initialization

Initialization is accomplished in one of three ways: through an **NSPI** connection to a server via NSPI, through the contents of an **offline address book**, or both.

3.1.3.1 Initialization Through NSPI connection

Initialization is accomplished via **NspiBind**, as specified in [MS-NSPI], and **MUST** occur before any **Address Book objects** can be accessed through **NSPI** calls.

3.1.3.2 Initialization Through an Offline Address Book

Messaging clients obtain **address lists** in an **offline address book** by using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB]. Each address list, in turn, contains information about objects in that address list, using the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB]. After one or more address lists from an OAB are obtained, messaging clients navigate any of the address lists to perform the lookups that are required to perform these operations, as specified in [MS-OXOAB].

3.1.4 Higher-Layer Triggered Events

It is possible for messaging clients to obtain a hierarchy of **address book containers**, browse the **Address Book objects** in an address list that is represented by an address book container, obtain information about an Address Book object, and perform **ambiguous name resolution (ANR)** to find Address Book objects that match a target string.

3.1.4.1 Obtaining a Hierarchy of Address Book Containers

When using an **NSPI** server, messaging clients obtain the hierarchy by using **NspiGetSpecialTable**, as specified in [MS-NSPI]. The table returns several rows of containers, and for each row, returns the properties **PidTagDisplayName**, **PidTagEntryId**, **PidTagContainerFlags**, **PidTagDepth**, **PidTagAddressBookContainerId**,

PidTagAddressBookIsMaster, and **PidTagAddressBookParentEntryId**, which are needed to determine the hierarchy of containers.

The hierarchy table in an **offline address book** is obtained by using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB].

3.1.4.2 Browsing an Address Book

After the hierarchy of containers is obtained, and a single container is chosen by a messaging user, it is possible for the messaging user to browse the **address list** that is represented by the container.

When browsing an address list for an **offline address book**, it is up to the messaging client to perform the lookups that are necessary to present a browsable view of the address list, by using the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB].

When browsing an address list from an **NSPI** server, messaging clients use the call **NspiQueryRows** to obtain a set of rows to display to the messaging user. Messaging clients choose the properties they want to render, but would ordinarily request **PidTagEntryId**, **PidTagDisplayName**, **PidTagSmtpAddress**, and **PidTagTitle**, among other properties that the messaging client deems useful for displaying to the user.

It is possible to scroll to certain approximate positions in the **address book** view. When using NSPI, this is accomplished by modifying the **STAT** structure, which describes a table position, as specified in [MS-NSPI], and calling **NspiUpdateStat**. Messaging clients usually follow up by calling **NspiQueryRows** to display rows starting at the new position.

It is possible for the user to type a certain name, and have the address list view scroll to the first display name typed, like a rolodex. When using NSPI, this is accomplished through the call **NspiSeekEntries**, as specified in [MS-NSPI]. The result updates positioning information in the **STAT** structure, as specified in [MS-NSPI], and returns a screen full of **Address Book objects**.

3.1.4.3 Obtaining Properties on an Address Book Object

In order to obtain properties for an **Address Book object** from an **offline address book (OAB)**, the messaging client needs to have a **distinguished name (DN)** for the object, or the object's **SMTP** address. This means that the messaging client will need to keep track of the DN after any lookup in the OAB, and will need to make sure that the DN or SMTP address is maintained for the addressee of a message when messages are sent or received through a messaging server. Generally, incoming messages contain either the SMTP address or the DN of message addressees. The messaging server provides the SMTP address or the DN of the addressee. The Offline Address Book (OAB) Format and Schema protocol specification [MS-OXOAB] describes how this information is organized and structured. After the information for the Address Book object is located, it is possible for the client to retrieve the value of any

property in that record. For example, to obtain properties such as the business telephone number and SMTP address, the client looks up **PidTagBusinessTelephoneNumber** and **PidTagSmtpAddress** in the record.

In order to obtain properties for an Address Book object on an **NSPI** server, the messaging client needs to either have a DN, a **Minimal Entry ID**, or the object's SMTP address. Certain NSPI calls that return Address Book object information, such as **NspiQueryRows**, **NspiSeekEntries**, or **NspiGetMatches**, and so on, include the DN or Minimal Entry ID in its **PidTagEntryId**, or as a return value of the call. Clients call **NspiDNToMid** to obtain the Minimal Entry ID from a DN. To obtain a DN from an SMTP address, messaging clients construct a string that starts with "SMTP: " followed by the SMTP address as the *paStr* or *paWStr* parameter to the call **NspiResolveNames** or **NspiResolveNamesW**, as specified in [MS-NSPI], and extract it from the **PidTagEntryId** property that is returned, as specified in the **Permanent Entry ID** structure, as specified in [MS-NSPI].

After the Minimal Entry ID is known, clients use it as the **CurrentRec** member of the **STAT** structure passed to **NspiGetProps**, as specified in [MS-NSPI]. It is possible for clients to specify any number of properties in the *pPropTags* parameter to **NspiGetProps** that the client wants to request. For example, to request properties such as the business phone number and SMTP address, the client includes the **property IDs** **PidTagBusinessTelephoneNumber** and **PidTagSmtpAddress** in the *pPropTags* parameter.

3.1.4.4 Performing Ambiguous Name Resolution

Messaging clients perform **ambiguous name resolution (ANR)** when a user is addressing a message and types only part of a name. The role of the **address book** in this case is to identify the best possible matches for the name entered, and if there is more than one good match, present the list of possible **Address Book objects** to the user.

When performing ANR by using an **offline address book**, it is up to the messaging client to decide the best method for name matching among Address Book objects. The client is free to use whatever means to decide on good matches on any choice of properties by using the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB].

When performing ANR by using an **NSPI** server, the client calls **NspiResolveNames** or **NspiResolveNamesW** and passes the target string in the parameter *paStr* or *paWStr*, as specified in [MS-NSPI]. If there is exactly one match, the row that corresponds to the target string will contain the properties that were requested for that match. If there is more than one match, it is possible to obtain the set of possible matches by calling **NspiGetMatches**, as specified in [MS-NSPI], by using a Filter with the **property PidTagAnr**, and the value for **PidTagAnr** as the target string for ANR<7>. The set of matches, along with the requested properties for the matches, will be returned. Messaging clients usually display the returned results in a dialog to the user, so the user is able to select the best match from the list of results.

3.1.5 Message Processing Events and Sequencing Rules

None.

3.1.6 Timer Events

None.

3.1.7 Other Local Events

None.

3.2 Client and Server Details

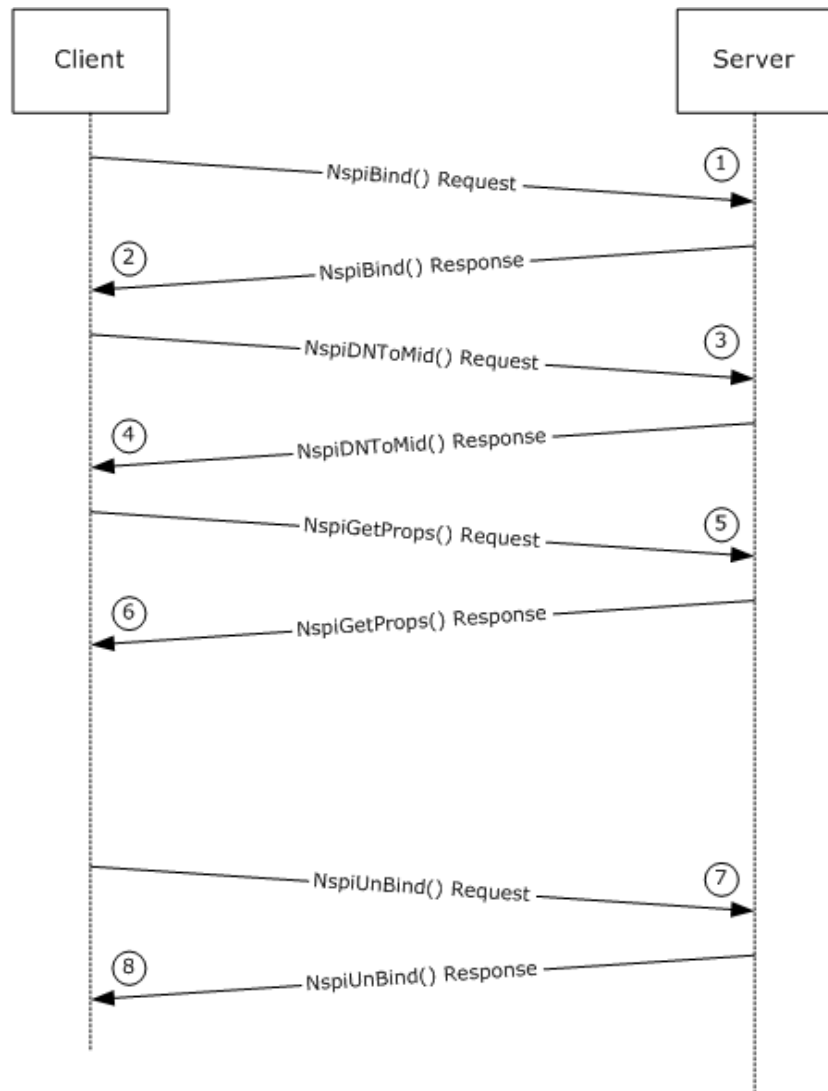
A messaging client uses an **offline address book**, an **NSPI** server, or both, to access an **address book**. A client obtains one or more **address lists** from an OAB by using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and in [MS-OXPFOAB]. Usually, the client downloads the contents of address lists from the OAB onto the local computer into one or more files. Messaging clients access information about the **Address Book objects** that are contained in an address list from an OAB by using the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB]. Alternatively, the client accesses information about objects in an address book by using an NSPI server, using the Name Service Provider Interface (NSPI) protocol, as specified in [MS-NSPI]. Because both data sources represent the same address book, information about an Address Book object that is contained on both an NSPI server and in an OAB SHOULD be identical, with the OAB containing a subset of the information that is available on the NSPI server. Because the **PidTagEmailAddress**, which matches the DN for an Address Book object, is used to identify that object, the value for **PidTagEmailAddress** MUST match for an object that is contained in both data sources.

The role of the server that contains an OAB is to supply all the necessary information about the Address Book objects by using the Offline Address Book (OAB) Format and Schema protocol, as specified in [MS-OXOAB], and deliver that information to the client by using the Offline Address Book Web and Public Folder Retrieval protocols, as specified in [MS-OXWOAB] and [MS-OXPFOAB]. The server provides periodic updates to the OAB, as necessary. The updating mechanism is specified in [MS-OXOAB]. After the information is delivered to the client, the server plays no role.

The role of the NSPI server is to service the requests of the client, by using the Name Service Provider Interface (NSPI) protocol, as specified in [MS-NSPI]. The NSPI server does not initiate any requests, but MAY drop a client connection that has remained idle for too long or has become disconnected due to a transient network error, or when the server needs to drop the connection to make other resources available. If a connection is dropped, the server MUST return an error when the messaging client requests information by using an NSPI call that uses the dropped connection. Clients respond to the error by reestablishing that connection by using **NspiBind**, as specified in [MS-NSPI].

4 Protocol Examples

This section describes the call sequence for obtaining two string properties, **PidTagDisplayName** and **PidTagGivenName**, for a **mail user** whose **distinguished name (DN)** is `"/o=First Organization/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user1."` Figure 1 shows the call sequence between the client and the server.



NspiGetSpecialTable() Request

Figure 1: Call sequence

Note: Only relevant information, and not all parameters, is shown in this figure. For more details about the parameter information, see [MS-NSPI].

1. Client initiates a session to the **NSPI** server by calling **NspiBind()**. The messaging client sends in the following values to the server:

dwFlags	0x00000000	DWORD	
pStat			
	hIndex	0x00000000	unsigned long
	ContainerID	0x00000000	unsigned long
	CurrentRec	0x00000000	unsigned long
	Delta	0x00000000	long
	NumPos	0x00000000	unsigned long
	TotalRecs	0x00000000	unsigned long
	CodePage	0x000004e4	unsigned long
	TemplateLocale	0x00000409	unsigned long
	SortLocale	0x00000409	unsigned long
pServerGuid			pointer to an array of 16 unsigned char to be returned by the server

2. The server responds to the **NspiBind** call with return code Success and a valid server **GUID**.

Typical parameters are as follows:

pServerGuid			
	[0x0]	0xab 0xbc 0x8b 0x86 0x79 0x33 0xc4	0x48 0xa1 0xef
	[0xa]	0x1b 0x53 0xe6 0x3b 0xdc 0x46	
contextHandle			< a token which will be used by the NspiUnbind call >

3. The client requests the **Minimal Entry Id (MId)** for the distinguished name “/o=First Organization/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user1” by calling **NspiDNToMId()** with parameters that typically are as follows:

m_pNames			
	Count	0x00000001	DWORD
	Strings		char **
		[0x0]	char *

"/o=First Organization/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user1"

ppMlds

<a pointer a valid memory location of type PropertyTagArray_r ** for server to return Mid>

4. The server responds with return code Success with a value of 0x00001927 for a Mld that typically is as follows:

m_pNames

Count	0x00000001	DWORD
Strings		char **
	[0x0]	char *

"/o=First Organization/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user1"

ppMlds

cValues	0x00000001	DWORD
aulPropTag		DWORD[]
	[0x0]	
	0x00001927	DWORD

5. The client requests two string properties, **PidTagDisplayName** and **PidTagGivenName**, by calling **NspiGetProps** with parameters that typically are as follows:

Note: The Mld 0x00001927 value that was obtained in step 4 is used as the **CurrentRec** field of *pStat*.

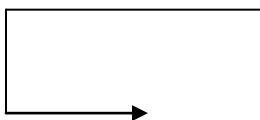
hRpc	<a valid RPC handle>	void *	
dwFlags	0x00000000	DWORD	
pStat			
	hIndex	0x00000000	unsigned long
	ContainerID	0x00000000	unsigned long
	CurrentRec	0x00001927	unsigned long
	Delta	0x00000000	long
	NumPos	0x00000000	unsigned long
	TotalRecs	0x00000000	unsigned long
	CodePage	0x000004b0	unsigned long
	TemplateLocale	0x00000409	unsigned long
	SortLocale	0x00000409	unsigned long

pPropTags _SPropTagArray_r *

{

cValues 0x00000002 DWORD

aulPropTag=<a pointer to an array of proptags>



```

    }
    aulPropTag unsigned long []
        [0x0] PidTagDisplayName unsigned long
        [0x1] PidTagGivenName unsigned long
ppRow _SRow_r * *
    < memory location for server return values >

```

6. The server responds to **NspiGetProps** with return code Success. In this example, the server has returned the string value "user1" for both the **properties** requested and the return values typically are as follows:

```

dwFlags 0x00000000    DWORD
pStat
{
    hIndex      0x00000000    unsigned long
    ContainerID 0x00000000    unsigned long
    CurrentRec  0x00001927    unsigned long
    Delta       0x00000000    long
    NumPos      0x00000000    unsigned long
    TotalRecs   0x00000000    unsigned long
    CodePage    0x000004b0    unsigned long
    TemplateLocale 0x00000409    unsigned long
    SortLocale  0x00000409    unsigned long
}
pPropTags _SPropTagArray_r *
{
    cValues 0x00000002    DWORD
    aulPropTag=<a pointer to an array of proptags>
}
    aulPropTag unsigned long []
        [0x0] PidTagDisplayName unsigned long
        [0x1] PidTagGivenName unsigned long

ppRows _SRowSet_r * *
{
    cRows 0x00000001    DWORD
    aRow=<a pointer to an array of rows>

```

The diagram consists of two L-shaped arrows. The first arrow starts from the closing curly brace of the pPropTags block and points to the aulPropTag field of the first block. The second arrow starts from the closing curly brace of the ppRows block and points to the aRow field of the second block.

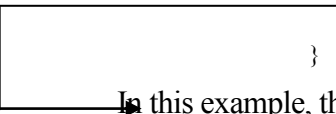
```
}
```

→ In this example, the server has returned a total of 0x1 row denoted as [0x0] that typically is as follows:

```

aRow [0x0] _SRow_r *
{
    cValues 0x00000002    DWORD
    lpProps=<a pointer to an array of columns>
}

```



In this example, the server has returned a column set of 2 properties and each column will be as follows:

```

[0x0] _SPropValue_r
{
    [0x0]
        ulPropTag    PidTagDisplayName    unsigned long
        Value
        lpszA = "user1"    char *
    [0x1]
        ulPropTag    PidTagGivenName    unsigned long
        Value
        lpszA = "user1"    char *
}

```

Note: The client MAY invoke additional **NSPI** calls to access other information from the server before calling **NSPIUnbind()**.

7. The client terminates the connection by calling **NspiUnbind** with a token that the server returned in response to **NspiBind** call.

```

contextHandle    NSPI_HANDLE *
    <a token which was sent by the server in the NspiBind call >

dwFlags
    0x00000000    unsigned long

```

8. The server responds with return code 0x00000001 and destroys the token that the client passed in.

5 Security

5.1 Security Considerations for Implementers

There are no special security considerations specific to the Address Book Object protocol. General security considerations pertaining to the underlying **NSPI RPC**-based transport apply [MS-NSPI].

5.2 Index of Security Parameters

None.

6 Appendix A: Office/Exchange Behavior

The information in this specification is applicable to the following versions of Office/Exchange:

- Office 2003 with Service Pack 3 applied
- Exchange 2003 with Service Pack 2 applied
- Office 2007 with Service Pack 1 applied
- Exchange 2007 with Service Pack 1 applied

Exceptions, if any, are noted below. Unless otherwise specified, any statement of optional behavior in this specification prescribed using the terms **SHOULD** or **SHOULD NOT** implies Office/Exchange behavior in accordance with the **SHOULD** or **SHOULD NOT** prescription. Unless otherwise specified, the term **MAY** implies Office/Exchange does not follow the prescription.

<1> The **offline address book** that is implemented in Exchange 2003 SP2 and Exchange 2007 SP1 contains all the **properties** listed in the appendixes of [MS-OXOAB]. This **MAY** include some properties that are not present on some implementations of an **NSPI** server.

<2> The offline address book version 4 implementation in Exchange 2003 SP2 and Exchange 2007 SP1 includes a property **PidTagOabTruncatedProps** that is not included in objects in a **NSPI** server. This property is specified in [MS-OXOAB].

<3> The values for string and binary properties may be truncated in an offline address book according to the limitations specified in [MS-OXOAB].

<4> The properties in an offline address book might have a different value if the value on a **NSPI** server has changed since the offline address book was created, or if the **NSPI** server was restored from a backup after the offline address book was created. In such a case, the **NSPI** server and the offline address book are said to be "out of sync." That is, the data in each source reflects a different time period.

<5> The Exchange 2003 SP2 and Exchange 2007 SP1 **NSPI** server includes the additional properties specified in section 2.2.6. Certain properties MAY be restricted from access by clients, such as a **distribution lists** where the members are hidden.

<6> Sections 2.2.4.66.1.4, 2.2.4.66.1.5, 2.2.4.66.1.7, and 2.2.4.66.1.9: These settings are not used by either Outlook or Exchange. [LG: Please specify which versions here.]

<7> Outlook 2003 SP3 and Outlook 2007 SP1 specify an ambiguous name resolution search by setting up a Filter to **NspiGetMatches**, as specified in [MS-NSPI]. The Filter is a Restriction_r structure, whose members are set up according to the following table.

Member	Value
Filter.rt	0x00000004 (same as RES_PROPERTY as specified in [MS-OXCADATA])
Filter.res.resProperty.relop	0x00000004 (same as RELOP_EQ as specified in [MS-OXCADATA])
Filter.res.resProperty.ulPropTag	PidTagAnr (PtypString8 or PtypString)
Filter.res.resProperty.lpProp.ulPropTag	Same as Filter.res.resProperty.ulPropTag
Filter.res.resProperty.lpProp.Value.lpszA	Target string in code page of pStat.CodePage, if PtypString8 specified.
Filter.res.resProperty.lpProp.Value.lpszW	Target string in Unicode, if PtypString specified.

<8> Outlook 2003 SP3 and Outlook 2007 SP1 perform a lookup of **SMTP** addresses by constructing a specific target string for ambiguous name resolution that is understood by Exchange 2003 SP2 and Exchange 2007 SP1 **NSPI** servers. When the target string starts with "=SMTP: " and is followed by a valid SMTP address, the NSPI server returns exactly one match, if any are found. The match will be an **address book** entry that has the target string as a valid SMTP address. Such a target string can be specified as a **PidTagAnr** property restriction to **NspiGetMatches**, described in <7>. Such a target string is also understood by the *paStr* parameter to **NspiResolveNames** or the *paWStr* parameter to **NspiResolveNamesW**.

Index

- Applicability statement, 13
- Client and server details, 47
- Client details, 43
- Glossary, 8
- Index of security parameters, 53
- Informative references, 11
- Introduction, 8
- Message syntax, 13
- Messages, 13
 - Message syntax, 13
 - Transport, 13
- Normative references, 10
- Office/Exchange behavior, 53
- Prerequisites/preconditions, 12
- Protocol details, 43
 - Client and server details, 47
 - Client details, 43
- Protocol examples, 48
- Protocol Overview, 11
- References, 10
 - Informative references, 11
 - Normative references, 10
- Relationship to other protocols, 12
- Security, 53
 - Index of security parameters, 53
 - Security considerations for implementers, 53
- Security considerations for implementers, 53
- Standards assignments, 13
- Transport, 13
- Vendor-extensible fields, 13
- Versioning and capability negotiation, 13