[MS-OXNSPI]:

Exchange Server Name Service Provider Interface (NSPI) Protocol

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Revision Summary

Date	Revision History	Revision Class	Comments
6/10/2011	0.1	New	Released new document.
8/5/2011	1.0	Major	Significantly changed the technical content.
10/7/2011	1.0	None	No changes to the meaning, language, or formatting of the technical content.
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1 Introduction

The Exchange Server Name Service Provider Interface (NSPI) Protocol provides a way for messaging clients to access and manipulate address data that is stored by a server. This protocol enables the client to use a single **remote procedure call (RPC)** interface and several interface methods to manipulate **Address Book object** data stored on the server.

Sections 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

address book: A collection of **Address Book objects**, each of which are contained in any number of **address lists**.

address book container: An **Address Book object** that describes an **address list**.

address book hierarchy table: A collection of **address book containers** arranged in a hierarchy.

Address Book object: An entity in an **address book** that contains a set of attributes, each attribute with a set of associated values.

address creation table: A table containing information about the templates that an address book server supports for creating new email addresses.

address creation template: A template that describes how to present a dialog to a messaging user along with a script describing how to construct a new email address from the user's response.

address list: A collection of distinct **Address Book objects**.

ambiguous name resolution (ANR): A search algorithm that permits a client to search multiple naming-related attributes (2) on objects by way of a single clause of the form "(anr=value)" in a **Lightweight Directory Access Protocol (LDAP)** search filter. This permits a client to query for an object when the client possesses some identifying material related to the object but does not know which attribute of the object contains that identifying material.

Augmented Backus-Naur Form (ABNF): A modified version of Backus-Naur Form (BNF), commonly used by Internet specifications. ABNF notation balances compactness and simplicity with reasonable representational power. ABNF differs from standard BNF in its definitions and uses of naming rules, repetition, alternatives, order-independence, and value ranges. For more information, see [RFC5234].

code page: An ordered set of characters of a specific script in which a numerical index (code-point value) is associated with each character. Code pages are a means of providing support for character sets and keyboard layouts used in different countries. Devices such as the display and keyboard can be configured to use a specific code page and to switch from one code page (such as the United States) to another (such as Portugal) at the user's request.

display template: A template that describes how to display or allow a user to modify information about an **Address Book object**.

distinguished name (DN): A name that uniquely identifies an object by using the relative distinguished name (RDN) for the object, and the names of container objects and domains that contain the object. The distinguished name (DN) identifies the object and its location in a tree.

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distribution list: A collection of users, computers, contacts, or other groups that is used only for email distribution, and addressed as a single recipient.

endpoint: (1) A client that is on a network and is requesting access to a network access server (NAS).

(2) A network-specific address of a remote procedure call (RPC) server process for remote procedure calls. The actual name and type of the endpoint depends on the **RPC** protocol sequence that is being used. For example, for RPC over TCP (RPC Protocol Sequence ncacn_ip_tcp), an endpoint might be TCP port 1025. For RPC over Server Message Block (RPC Protocol Sequence ncacn_np), an endpoint might be the name of a named pipe. For more information, see [C706].

entry ID: See **EntryID**.

EntryID: A sequence of bytes that is used to identify and access an object.

Global Address List (GAL): An **address list** that conceptually represents the default address list for an **address book**.

globally unique identifier (GUID): A term used interchangeably with **universally unique identifier (UUID)** in Microsoft protocol technical documents (TDs). Interchanging the usage of these terms does not imply or require a specific algorithm or mechanism to generate the value. Specifically, the use of this term does not imply or require that the algorithms described in [RFC4122] or [C706] must be used for generating the **GUID**. See also **universally unique identifier (UUID)**.

Hypertext Transfer Protocol Secure (HTTPS): An extension of HTTP that securely encrypts and decrypts web page requests. In some older protocols, "Hypertext Transfer Protocol over Secure Sockets Layer" is still used (Secure Sockets Layer has been deprecated). For more information, see [SSL3] and [RFC5246].

Kerberos: An authentication system that enables two parties to exchange private information across an otherwise open network by assigning a unique key (called a ticket) to each user that logs on to the network and then embedding these tickets into messages sent by the users. For more information, see [MS-KILE].

language code identifier (LCID): A 32-bit number that identifies the user interface human language dialect or variation that is supported by an application or a client computer.

Lightweight Directory Access Protocol (LDAP): The primary access protocol for Active Directory. Lightweight Directory Access Protocol (LDAP) is an industry-standard protocol, established by the Internet Engineering Task Force (IETF), which allows users to query and update information in a directory service (DS), as described in [MS-ADTS]. The Lightweight Directory Access Protocol can be either version 2 [RFC1777] or version 3 [RFC3377].

little-endian: Multiple-byte values that are byte-ordered with the least significant byte stored in the memory location with the lowest address.

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

name service provider interface (NSPI): A method of performing address-book-related operations on Active Directory.

Network Data Representation (NDR): A specification that defines a mapping from Interface Definition Language (IDL) data types onto octet streams. **NDR** also refers to the runtime environment that implements the mapping facilities (for example, data provided to **NDR**). For more information, see [MS-RPCE] and [C706] section 14.

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NT LAN Manager (NTLM) Authentication Protocol: A protocol using a challenge-response mechanism for authentication (2) in which clients are able to verify their identities without sending a password to the server. It consists of three messages, commonly referred to as Type 1 (negotiation), Type 2 (challenge) and Type 3 (authentication). For more information, see [MS-NLMP].

opnum: An operation number or numeric identifier that is used to identify a specific **remote procedure call (RPC)** method or a method in an interface. For more information, see [C706] section 12.5.2.12 or [MS-RPCE].

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

property type: A 16-bit quantity that specifies the data type of a property value.

remote procedure call (RPC): A context-dependent term commonly overloaded with three meanings. Note that much of the industry literature concerning RPC technologies uses this term interchangeably for any of the three meanings. Following are the three definitions: (*) The runtime environment providing remote procedure call facilities. The preferred usage for this meaning is "RPC runtime". (*) The pattern of request and response message exchange between two parties (typically, a client and a server). The preferred usage for this meaning is "RPC exchange". (*) A single message from an exchange as defined in the previous definition. The preferred usage for this term is "RPC message". For more information about RPC, see [C706].

RPC protocol sequence: A character string that represents a valid combination of a **remote procedure call (RPC)** protocol, a network layer protocol, and a transport layer protocol, as described in [C706] and [MS-RPCE].

RPC transport: The underlying network services used by the remote procedure call (RPC) runtime for communications between network nodes. For more information, see [C706] section 2.

security provider: A pluggable security module that is specified by the protocol layer above the **remote procedure call (RPC)** layer, and will cause the **RPC** layer to use this module to secure messages in a communication session with the server. The security provider is sometimes referred to as an authentication service. For more information, see [C706] and [MS-RPCE].

shared folder: A folder for which a sharing relationship has been created to share items in the folder between two servers.

Transmission Control Protocol (TCP): A protocol used with the Internet Protocol (IP) to send data in the form of message units between computers over the Internet. TCP handles keeping track of the individual units of data (called packets) that a message is divided into for efficient routing through the Internet.

Unicode: A character encoding standard developed by the Unicode Consortium that represents almost all of the written languages of the world. The **Unicode** standard [UNICODE5.0.0/2007] provides three forms (UTF-8, UTF-16, and UTF-32) and seven schemes (UTF-8, UTF-16, UTF-16 BE, UTF-16 LE, UTF-32, UTF-32 LE, and UTF-32 BE).

universally unique identifier (UUID): A 128-bit value. UUIDs can be used for multiple purposes, from tagging objects with an extremely short lifetime, to reliably identifying very persistent objects in cross-process communication such as client and server interfaces, manager entry-point vectors, and **RPC** objects. UUIDs are highly likely to be unique. UUIDs are also known as **globally unique identifiers (GUIDs)** and these terms are used interchangeably in the Microsoft protocol technical documents (TDs). Interchanging the usage of these terms does not imply or require a specific algorithm or mechanism to generate the UUID. Specifically, the use of this term does not imply or require that the algorithms described in [RFC4122] or [C706] must be used for generating the UUID.

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UTF-16LE: The Unicode Transformation Format - 16-bit, Little Endian encoding scheme. It is used to encode **Unicode** characters as a sequence of 16-bit codes, each encoded as two 8-bit bytes with the least-significant byte first.

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

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.

[C706] The Open Group, "DCE 1.1: Remote Procedure Call", C706, August 1997, https://www2.opengroup.org/ogsys/catalog/c706

[MS-DTYP] Microsoft Corporation, "Windows Data Types".

[MS-LCID] Microsoft Corporation, "Windows Language Code Identifier (LCID) Reference".

[MS-OXCDATA] Microsoft Corporation, "Data Structures".

[MS-OXCFOLD] Microsoft Corporation, "Folder Object Protocol".

[MS-OXOABKT] Microsoft Corporation, "Address Book User Interface Templates Protocol".

[MS-OXOABK] Microsoft Corporation, "Address Book Object Protocol".

[MS-OXOCNTC] Microsoft Corporation, "Contact Object Protocol".

[MS-OXPROPS] Microsoft Corporation, "Exchange Server Protocols Master Property List".

[MS-RPCE] Microsoft Corporation, "Remote Procedure Call Protocol Extensions".

[MS-UCODEREF] Microsoft Corporation, "Windows Protocols Unicode Reference".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, http://www.rfc-editor.org/rfc/rfc2119.txt

1.2.2 Informative References

[MS-KILE] Microsoft Corporation, "Kerberos Protocol Extensions".

[MS-NLMP] Microsoft Corporation, "NT LAN Manager (NTLM) Authentication Protocol".

[MS-NSPI] Microsoft Corporation, "Name Service Provider Interface (NSPI) Protocol".

[RFC1510] Kohl, J., and Neuman, C., "The Kerberos Network Authentication Service (V5)", RFC 1510, September 1993, http://www.ietf.org/rfc/rfc1510.txt

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[RFC4120] Neuman, C., Yu, T., Hartman, S., and Raeburn, K., "The Kerberos Network Authentication Service (V5)", RFC 4120, July 2005, http://www.rfc-editor.org/rfc/rfc4120.txt

[RFC4511] Sermersheim, J., "Lightweight Directory Access Protocol (LDAP): The Protocol", RFC 4511, June 2006, http://www.rfc-editor.org/rfc/rfc4511.txt

1.3 Overview

Messaging clients that implement a browsable **address book** need a way to communicate with an address data store in order to access and manipulate that data. This protocol enables communication between a messaging client and a data store.

This protocol is a protocol layer that uses the remote procedure call (RPC) protocol as a transport, with a series of interface methods as described in this document, that clients can use to communicate with a server. The server will use **Lightweight Directory Access Protocol (LDAP)** and **NSPI** to retrieve data that is returned to the client.

The following figure shows a graphical representation of a typical communication sequence between a messaging client and a server.

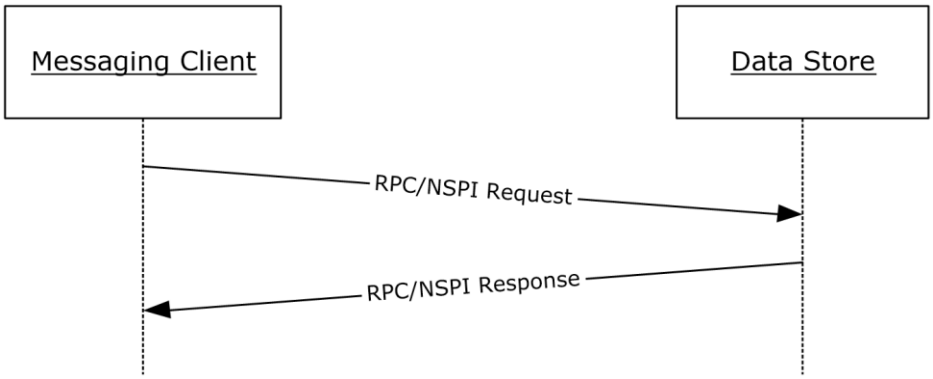

Figure 1: Exchange Server NSPI Protocol message sequence

1.4 Relationship to Other Protocols

The Exchange Server NSPI Protocol depends on the following protocols:

- The Remote Procedure Call (RPC) Protocol, as described in [C706] and [MS-RPCE], as a transport.
- The Kerberos Network Authentication Service (V5), as described in [MS-KILE], [RFC1510], and [RFC4120] for client authentication.
- The **NT LAN Manager (NTLM) Authentication Protocol**, as described in [MS-NLMP], for client authentication.
- The Address Book Object Protocol, as described in [MS-OXOABK], for property definitions.
- The Address Book User Interface Templates Protocol, as described in [MS-OXOABKT], for the definition of address book templates.
- The Lightweight Directory Access Protocol (LDAP), as described in [RFC4511].
- The Name Service Provider Interface (NSPI) Protocol, as described in [MS-NSPI].

For conceptual background information and overviews of the relationships and interactions between this and other protocols, see [MS-OXPROTO].

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1.5 Prerequisites/Preconditions

The client implementation has to have the network address of the server. This network address satisfies the requirements of a network address for the underlying transport of remote procedure call (RPC). This allows the client to initiate communication with the server by using the RPC Protocol.

This protocol uses security information as specified in [MS-RPCE]. The client and Exchange NSPI server are required to share one or both of the NT LAN Manager (NTLM) Authentication Protocol or **Kerberos security providers** in common for the **RPC transport**. Additionally, the server is required to register the negotiation security provider.

The protocol does not require mutual authentication. The client and Exchange NSPI server use an authentication mechanism that is capable of authenticating the client to the server. The protocol does not require that the client be capable of authenticating the server.

The credentials of the client have to be recognized by the server. These credentials are obtained from the shared security provider. The mechanism for obtaining these credentials is specific to the protocol of the security provider that is used.

The server has to have determined any local policies as described in sections 2, 3, and 5. This allows the server to provide consistent behavior for all communications in the protocol.

The server has to be configured to support the required **code pages** and **language code identifiers (LCIDs)**, as described in sections 2.2.1.4 and 2.2.1.5. This allows the server to provide the minimal required string conversions and sort orders.

The server has to be started and fully initialized before the protocol can start.

1.6 Applicability Statement

The Exchange Server NSPI Protocol is appropriate for messaging clients that implement online access to address books for browsing and viewing of Address Book objects that are stored in a data store.

1.7 Versioning and Capability Negotiation

This document covers versioning issues in the following areas:

- **Supported Transports:** This protocol uses multiple **RPC protocol sequences**, as specified in section 2.1.
- **Protocol Versions:** This protocol has a single interface version. This version is defined in section 2.1.
- **Security and Authentication Methods:** This protocol supports the NTLM and Kerberos authentication methods.
- **Localization:** This protocol passes text strings in various methods. Localization considerations for such strings are specified in section 3.1.4.3).
- **Capability Negotiation:** The Exchange Server NSPI Protocol does not support negotiation. There is only one interface version.

1.8 Vendor-Extensible Fields

None.

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1.9 Standards Assignments

Parameter	Value	Reference
Interface **UUID**	F5CC5A18-4264-101A-8C59-08002B2F8426	[C706] section A.2.5

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2 Messages

The following sections specify transport methods of Exchange Server NSPI Protocol messages and common Exchange Server NSPI Protocol data types.

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

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

2.1 Transport

All remote procedure call (RPC) protocols use RPC dynamic **endpoints (2)** and well-known endpoints (2), as specified in [C706].

The Exchange Server NSPI Protocol uses the following RPC protocol sequences:

- RPC over **HTTPS**
- RPC over **TCP**<1>

The protocol allows a server to be configured to use a specific port for RPC over TCP. The mechanism for configuring a server to use a specific port is not constrained by the Exchange Server NSPI Protocol. The mechanism for a client to discover this configured TCP port is not constrained by the Exchange Server NSPI Protocol.

For the network protocol sequence RPC over HTTPS, this protocol MUST use the well-known endpoint 6004. For RPC over TCP, this protocol can use RPC dynamic endpoints, as defined in Part 4 of [C706].

This protocol MUST use the UUID F5CC5A18-4264-101A-8C59-08002B2F8426. The protocol MUST use the RPC version number 56.0.

The protocol uses the underlying RPC protocol to retrieve the identity of the client that made the method call, as specified in [MS-RPCE]. The server MAY use this identity to perform access checks, as described in section 5 of this document.

The server MAY enforce limits on the maximum RPC packet size that it will accept.

2.2 Common Data Types

This protocol enables the **ms_union** extension, as specified in [MS-RPCE].

This protocol requests that the RPC runtime, via the **strict_context_handle** attribute, rejects the use of context handles created by a method of a different RPC interface than this one, as specified in [MS-RPCE].

In addition to the RPC base types and definitions specified in [C706] and [MS-RPCE], the Exchange Server NSPI Protocol uses additional data types.

The following table summarizes the types that are defined in this specification.

Data type name	Description
FlatUID_r	Byte order specified **GUIDs**
PropertyTagArray_r	Property value structure
Binary_r	Property value structure
ShortArray_r	Property value structure

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Data type name	Description
LongArray_r	Property value structure
StringArray_r	Property value structure
BinaryArray_r	Property value structure
FlatUIDArray_r	Property value structure
WStringArray_r	Property value structure
DateTimeArray_r	Property value structure
PROP_VAL_UNION	Property value structure
PropertyValue_r	Property value structure
PropertyRow_r	Table row structure
PropertyRowSet_r	Table rows structure
AndRestriction_r	Table restriction structure
OrRestriction_r	Table restriction structure
NotRestriction_r	Table restriction structure
ContentRestriction_r	Table restriction structure
PropertyRestriction_r	Table restriction structure
ExistRestriction_r	Table restriction structure
RestrictionUnion_r	Table restriction structure
Restriction_r	Table restriction structure
PropertyName_r	Address book property specifier
StringsArray_r	Collection of 8-bit character strings
WStringsArray_r	Collection of Unicode strings
STAT	Table status structure
MinimalEntryID	Address Book object identification
EphemeralEntryID	Address Book object identification
PermanentEntryID	Address Book object identification
NSPI_HANDLE	RPC context handle

2.2.1 Constant Value Definitions

This section defines common values that are used in multiple messages.

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2.2.1.1 Permitted Property Type Values

The **property type** values specified in this section are used to specify property types. They appear in various places in the Exchange Server NSPI Protocol. All Exchange NSPI servers and clients MUST recognize and be capable of accepting and returning these property types. Values that represent property types are defined in [MS-OXCDATA].

The values specified in [MS-OXCDATA] are 16-bit integers. The Exchange Server NSPI Protocol uses the same numeric values but expressed as 32-bit integers. The high-order 16 bits of the 32-bit representation that is used by the Exchange Server NSPI Protocol are always 0x0000. The following table lists the permitted values for the Exchange Server NSPI Protocol.

Value name	Value as defined in [MS-OXCDATA]	Value as used in the Exchange Server NSPI Protocol
PtypInteger32 ([MS-OXCDATA] section 2.11.1)	0x0003	0x00000003
PtypBoolean ([MS-OXCDATA] section 2.11.1)	0x000B	0x0000000B
PtypString8 ([MS-OXCDATA] section 2.11.1)	0x001E	0x0000001E
PtypBinary ([MS-OXCDATA] section 2.11.1)	0x0102	0x00000102
PtypString ([MS-OXCDATA] section 2.11.1)	0x001F	0x0000001F
PtypTime ([MS-OXCDATA] section 2.11.1)	0x0040	0x00000040
PtypErrorCode ([MS-OXCDATA] section 2.11.1)	0x000A	0x0000000A
PtypMultipleString8 ([MS-OXCDATA] section 2.11.1)	0x101E	0x0000101E
PtypMultipleBinary ([MS-OXCDATA] section 2.11.1)	0x1102	0x00001102
PtypMultipleString ([MS-OXCDATA] section 2.11.1)	0x101F	0x0000101F

In addition, all Exchange NSPI servers and clients MUST recognize and be capable of accepting and returning the property types that are listed in the following table.

Property type name and value	Description
PtypEmbeddedTable ([MS-OXCDATA] section 2.11.1.5) 0x0000000D	Single 32-bit value, referencing an **address list**.
PtypNull ([MS-OXCDATA] section 2.11.1) 0x00000001	Clients MUST NOT specify this property type in any method's input parameters. The server MUST specify this property type in any method's output parameters to indicate that a property has a value that cannot be expressed in the Exchange Server NSPI Protocol.
PtypUnspecified ([MS-OXCDATA] section 2.11.1)	Clients specify this property type in a method's input parameter to indicate that the client will accept any property type the server chooses when

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Property type name and value	Description
0x00000000	returning propvalues. Servers MUST NOT specify this property type in any method's output parameters.

All clients and servers MUST NOT use any other property types.

2.2.1.2 Permitted Error Code Values

The error code values listed in this section are used to specify status from an NSPI method. They appear as return codes from NSPI methods and as values of properties with property type **PtypErrorCode** ([MS-OXCDATA] section 2.11.1). All Exchange NSPI servers MUST recognize and be capable of accepting and returning these error codes. The values that represent the error codes are defined in [MS-OXCDATA] section 2.4. The following are the permitted error code values for the Exchange Server NSPI Protocol:

- Success
- UnbindSuccess
- UnbindFailure
- ErrorsReturned
- GeneralFailure
- NotSupported
- InvalidObject
- OutOfResources
- NotFound
- LogonFailed
- TooComplex
- InvalidCodepage
- InvalidLocale
- TableTooBig
- InvalidBookmark
- AccessDenied
- NotEnoughMemory
- InvalidParameter

All clients and servers MUST NOT use any other error codes.

2.2.1.3 Display Type Values

The values listed in this section are used to specify display types. They appear in various places in the Exchange Server NSPI Protocol as object properties and as part of **EntryIDs**. Except where otherwise specified in the following table, all Exchange NSPI servers MUST recognize and be capable of accepting

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and returning these display types. The following table lists the permitted display type values for the Exchange Server NSPI Protocol.

Display type name and value	Description
DT_MAILUSER 0x00000000	A typical messaging user.
DT_DISTLIST 0x00000001	A **distribution list**.
DT_FORUM 0x00000002	A forum, such as a bulletin board service or a public or **shared folder**.
DT_AGENT 0x00000003	An automated agent, such as Quote-Of-The-Day or a weather chart display.
DT_ORGANIZATION 0x00000004	An Address Book object defined for a large group, such as helpdesk, accounting, coordinator, or department. Department objects usually have this display type. An Exchange NSPI server MUST NOT return display type.
DT_PRIVATE_DISTLIST 0x00000005	A private, personally administered distribution list.
DT_REMOTE_MAILUSER 0x00000006	An Address Book object known to be from a foreign or remote messaging system.
DT_CONTAINER 0x00000100	An address book hierarchy table container. An Exchange NSPI server MUST NOT return this display type except as part of an EntryID of an object in the address book hierarchy table.
DT_TEMPLATE 0x00000101	A **display template** object. An Exchange NSPI server MUST NOT return this display type.
DT_ADDRESS_TEMPLATE 0x00000102	An **address creation template**. An Exchange NSPI server MUST NOT return this display type except as part of an EntryID of an object in the Address Creation Table.
DT_SEARCH 0x00000200	A search template. An Exchange NSPI server MUST NOT return this display type.

All clients and servers MUST NOT use any other display types.

2.2.1.4 Default Language Code Identifier

The language code identifier (LCID) specified in this section is associated with the minimal required sort order for **Unicode** strings. It appears in input parameters to Exchange Server NSPI Protocol methods. It affects Exchange NSPI server string handling, as specified in section 3.1.4.3. The following table lists and describes the default LCID for this protocol.

Default LCID name and value	Description
NSPI_DEFAULT_LOCALE 0x00000409	Represents the default LCID that is used for comparison of Unicode string representations.

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2.2.1.5 Required Code Pages

The required code pages listed in this section are associated with the string handling in the Exchange Server NSPI Protocol, and they appear in input parameters to methods in the Exchange Server NSPI Protocol. They affect Exchange NSPI server string handling, as specified in section 3.1.4.3. The following table lists the required code pages.

Code page name and value	Description
CP_TELETEX 0x00004F25	Represents the Teletex code page.
CP_WINUNICODE 0x000004B0	Represents the Unicode code page.

2.2.1.6 Unicode Comparison Flags

These values are associated with string handling in the Exchange Server NSPI Protocol. These values are defined in terms of definitions, as specified in section 2.2.1.6.1. The server uses these flags to modify the behavior of comparisons of Unicode string representations, as detailed in section 3.1.4.3

Name and value	Description
NSPI_DEFAULT_LOCALE_COMPARE_FLAGS (NORM_IGNORECASE | NORM_IGNOREKANATYPE | NORM_IGNORENONSPACE | NORM_IGNOREWIDTH | SORT_STRINGSORT)	Flags used when comparing Unicode strings in the language code identifier (LCID) represented by NSPI_DEFAULT_LOCALE. The comparison flag values are defined in section 2.2.1.6.1.
NSPI_NON_DEFAULT_LOCALE_COMPARE_FLAGS (NORM_IGNORECASE | NORM_IGNOREKANATYPE | NORM_IGNORENONSPACE | NORM_IGNOREWIDTH | NORM_IGNORESYMBOLS | SORT_STRINGSORT)	Flags used when comparing Unicode strings in any LCID except the LCID represented by NSPI_DEFAULT_LOCALE. The comparison flag values are defined in section 2.2.1.6.1.

2.2.1.6.1 Comparison Flags

The following defines the bit settings and meaning of the bits used by the Unicode comparison flags. The flags are presented in big-endian byte order.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
V	U	T	S	R	Q	P	O	N	M	L	K	J	I	H	G	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0

V (1 bit): NORM IGNORECASE: Ignore Case.

U (1 bit): NORM IGNORENONSPACE: Ignore non-spacing characters.

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T (1 bit): NORM IGNORESYMBOLS: Ignore symbols.

S (1 bit): Unused.

R (1 bit): Unused.

Q (1 bit): Unused.

P (1 bit): Unused.

O (1 bit): Unused.

N (1 bit): Unused.

M (1 bit): Unused.

L (1 bit): Unused.

K (1 bit): Unused.

J (1 bit): SORT STRINGSORT: Treat punctuation the same as symbols.

I (1 bit): Unused.

H (1 bit): Unused.

G (1 bit): Unused.

F (1 bit): NORM IGNOREKANATYPE: Do not differentiate between hiragana and katakana characters. Corresponding hiragana and katakana characters compare as equal.

E (1 bit): NORM IGNOREWIDTH: Ignore the difference between half-width and full-width characters.

D (1 bit): Unused.

C (1 bit): Unused.

B (1 bit): Unused.

A (1 bit): Unused.

9 (1 bit): Unused.

8 (1 bit): Unused.

7 (1 bit): Unused.

6 (1 bit): Unused.

5 (1 bit): Unused.

4 (1 bit): Unused.

3 (1 bit): Unused.

2 (1 bit): Unused.

1 (1 bit): Unused.

0 (1 bit): Unused.

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2.2.1.7 Permanent Entry ID GUID

The following table lists the **Permanent Entry ID** that is associated with the Exchange Server NSPI Protocol.

Permanent Entry ID name and value	Description
GUID_NSPI {0xDC, 0xA7, 0x40, 0xC8, 0xC0, 0x42, 0x10, 0x1A, 0xB4, 0xB9, 0x08, 0x00, 0x2B, 0x2F, 0xE1, 0x82}	Represents the Exchange Server NSPI Protocol in Permanent Entry IDs.

2.2.1.8 Positioning Minimal Entry IDs

The positioning **Minimal Entry IDs** are used to specify objects in the address book as a function of their positions in tables. They appear as Minimal Entry IDs in the **CurrentRec** field of the **STAT** structure, as specified in section 2.2.8. The following table lists the possible values.

Minimal Entry ID name and value	Description
MID_BEGINNING_OF_TABLE 0x00000000	Specifies the position before the first row in the current **address book container**.
MID_END_OF_TABLE 0x00000002	Specifies the position after the last row in the current address book container.
MID_CURRENT 0x00000001	Specifies the current position in a table. This Minimal Entry ID is only valid in the **NspiUpdateStat** method, as specified in section 3.1.4.1.4. In all other cases, it is an invalid Minimal Entry ID, guaranteed to not specify any object in the address book.

2.2.1.9 Ambiguous Name Resolution Minimal Entry IDs

Ambiguous name resolution (ANR) Minimal Entry IDs are used to specify the outcome of the ANR process. They appear in return data from the **NspiResolveNames** method, as specified in section 3.1.4.1.16, and the **NspiResolveNamesw** method, as specified in section 3.1.4.1.17. The following table lists the possible values.

Minimal Entry ID name and value	Description
MID_UNRESOLVED 0x00000000	The ANR process was unable to map a string to any objects in the address book.
MID_AMBIGUOUS 0x0000001	The ANR process mapped a string to multiple objects in the address book.
MID_RESOLVED 0x0000002	The ANR process mapped a string to a single object in the address book.

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2.2.1.10 Table Sort Orders

The following table lists the values that are used to specify specific sort orders for tables. These values appear in the **SortType** field of the **STAT** data structure, as specified in section 2.2.8.

Sort type name and value	Description
SortTypeDisplayName 0x00000000	The table is sorted ascending on the **PidTagDisplayName** property, as specified in [MS-OXCFOLD] section 2.2.2.2.2.5. All Exchange NSPI servers MUST support this sort order for at least one LCID.
SortTypePhoneticDisplayName 0x00000003	The table is sorted ascending on the **PidTagAddressBookPhoneticDisplayName** property, as specified in [MS-OXOABK] section 2.2.3.9. Exchange NSPI servers SHOULD support this sort order.
SortTypeDisplayName_RO 0x000003E8	The table is sorted ascending on the **PidTagDisplayName** property. The client MUST set this value only when using the **NspiGetMatches** method, as specified in section 3.1.4.1.10, to open a non-writable table on an object-valued property.
SortTypeDisplayName_W 0x000003E9	The table is sorted ascending on the **PidTagDisplayName** property. The client MUST set this value only when using the **NspiGetMatches** method to open a writable table on an object-valued property.

2.2.1.11 Retrieve Property Flags

The following table lists the property flag values that are used to specify optional behavior to a server. They appear as bit flags in methods that return property values to the client (**NspiGetPropList**, **NspiGetProps**, and **NspiQueryRows**).

Property flag name and value	Description
fSkipObjects 0x00000001	Client requires that the server MUST NOT include proptags with the **PtypEmbeddedTable** property type in any lists of proptags that the server creates on behalf of the client.
fEphID 0x00000002	Client requires that the server MUST return **Entry ID** values in Ephemeral Entry ID form.

2.2.1.12 NspiGetSpecialTable Flags

NspiGetSpecialTable flag values are used to specify optional behavior to a server. They appear as bit flags in the **NspiGetSpecialTable** method, as specified in section 3.1.4.1.3. The following table lists the possible values.

Flag name and value	Description
NspiAddressCreationTemplates 0x00000002	Specifies that the server MUST return the table of the available address creation templates. Specifying this flag causes the server to ignore the **NspiUnicodeStrings** flag.

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Flag name and value	Description
NspiUnicodeStrings 0x00000004	Specifies that the server MUST return all strings as Unicode representations rather than as multibyte strings in the client's code page.

2.2.1.13 NspiQueryColumns Flag

The **NspiQueryColumns** flag value is used to specify optional behavior to a server. It appears as a bit flag in the **NspiQueryColumns** method. The following table lists the value for this flag.

Flag name and value	Description
NspiUnicodeProptypes 0x80000000	Specifies that the server MUST return all proptags that specify values with string representations as having the **PtypString** property type. If the **NspiUnicodeProptypes** flag is not set, the server MUST return all proptags specifying values with string representations as having the **PtypString8** property type.

2.2.1.14 NspiGetTemplateInfo Flags

The **NspiGetTemplateInfo** flag values are used to specify optional behavior to a server. They appear as bit flags in the **NspiGetTemplateInfo** method. The following table lists the possible values.

Flag name and value	Description
TI_TEMPLATE 0x00000001	Specifies that the server is to return the value that represents a template.
TI_SCRIPT 0x00000004	Specifies that the server is to return the value of the script that is associated with a template.
TI_EMT 0x00000010	Specifies that the server is to return the e-mail type that is associated with a template.
TI_HELPFILE_NAME 0x00000020	Specifies that the server is to return the name of the help file that is associated with a template.
TI_HELPFILE_CONTENTS 0x00000040	Specifies that the server is to return the contents of the help file that is associated with a template.

2.2.1.15 NspiModLinkAtt Flags

The **NspiModLinkAtt** flag value is used to specify optional behavior to a server. It appears as a bit flag in the **NspiModLinkAtt** method. The following table lists the value of the flag.

Flag name and Value	Description
fDelete 0x00000001	Specifies that the server is to remove values when modifying. If the **fDelete** flag is not set, the server adds values when modifying.

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2.2.2 Property Values

The following structures are used to represent specific property values.

2.2.2.1 FlatUID_r Structure

The **FlatUID_r** structure is an encoding of the **FlatUID_r** data structure defined in [MS-OXCDATA] section 2.5.2. The semantic meaning is unchanged from the **FlatUID** data structure.

```
typedef struct {
  BYTE ab[16];
} FlatUID_r;
```

ab: Encodes the ordered bytes of the **FlatUID** data structure.

2.2.2.2 PropertyTagArray_r Structure

The **PropertyTagArray_r** structure is an encoding of the **PropertyTagArray_r** data structure defined in [MS-OXCDATA] section 2.10.2. The permissible number of proptag values in the **PropertyTagArray_r** structure exceeds that of the **PropertyTagArray_r** data structure. The semantic meaning is otherwise unchanged from the **PropertyTagArray_r** data structure.

```
typedef struct PropertyTagArray_r {
  DWORD cValues;
  [size_is(cValues+1), length_is(cValues)]
    DWORD aulPropTag[];
} PropertyTagArray_r;
```

cValues: Encodes the **Count** field of the **PropertyTagArray_r** data structure.

aulPropTag: Encodes the **PropertyTags** field of the **PropertyTagArray_r** data structure.

2.2.2.3 Binary_r Structure

The **Binary_r** structure encodes an array of uninterpreted bytes.

```
typedef struct Binary_r {
  [range(0,2097152)] DWORD cb;
  [size_is(cb)] BYTE* lpb;
} Binary_r;
```

cb: The number of uninterpreted bytes represented in this structure. This value MUST NOT exceed 2,097,152.

lpb: The uninterpreted bytes.

2.2.2.4 ShortArray_r Structure

The **ShortArray_r** structure encodes an array of 16-bit integers.

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```
typedef struct ShortArray_r {
  [range(0,100000)] DWORD cValues;
  [size_is(cValues)] short int* lpi;
} ShortArray_r;
```

cValues: The number of 16-bit integer values represented in the **ShortArray_r** structure. This value MUST NOT exceed 100,000.

lpi: The 16-bit integer values.

2.2.2.5 LongArray_r Structure

The **LongArray_r** structure encodes an array of 32-bit integers.

```
typedef struct _LongArray_r {
  [range(0,100000)] DWORD cValues;
  [size_is(cValues)] long* lpl;
} LongArray_r;
```

cValues: The number of 32-bit integers represented in this structure. This value MUST NOT exceed 100,000.

lpl: The 32-bit integer values.

2.2.2.6 StringArray_r Structure

The **StringArray_r** structure encodes an array of references to 8-bit character strings.

```
typedef struct _StringArray_r {
  [range(0,100000)] DWORD cValues;
  [string, size_is(cValues)] char** lppszA;
} StringArray r;
```

cValues: The number of 8-bit character string references represented in the **StringArray_r** structure. This value MUST NOT exceed 100,000.

lppszA: The 8-bit character string references. The strings referred to are NULL-terminated.

2.2.2.7 BinaryArray_r Structure

The **BinaryArray_r** structure is an array of **Binary_r** data structures.

```
typedef struct  BinaryArray r {
  [range(0,100000)] DWORD cValues;
  [size_is(cValues)] Binary_r* lpbin;
} BinaryArray_r;
```

cValues: The number of **Binary_r** data structures represented in the **BinaryArray_r** structure. This value MUST NOT exceed 100,000.

lpbin: The **Binary_r** data structures.

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2.2.2.8 FlatUIDArray_r Structure

The **FlatUIDArray_r** structure encodes an array of **FlatUID_r** data structures.

```
typedef struct _FlatUIDArray_r {
  [range(0,100000)] DWORD cValues;
  [size is(cValues)] FlatUID r** lpguid;
} FlatUIDArray_r;
```

cValues: The number of **FlatUID_r** structures represented in the **FlatUIDArray_r** structure. This value MUST NOT exceed 100,000.

lpguid: The **FlatUID_r** data structures.

2.2.2.9 WStringArray_r Structure

The **WStringArray_r** structure encodes an array of references to Unicode strings.

```
typedef struct _WStringArray_r {
  [range(0,100000)] DWORD cValues;
  [string, size is(cValues)] wchar t** lppszW;
} WStringArray r;
```

cValues: The number of Unicode character string references represented in the **WStringArray_r** structure. This value MUST NOT exceed 100,000.

lppszW: The Unicode character string references. The strings referred to are NULL-terminated.

2.2.2.10 DateTimeArray_r Structure

The **DateTimeArray_r** structure encodes an array of **FILETIME** structures.

```
typedef struct _DateTimeArray_r {
  [range(0,100000)] DWORD cValues;
  [size_is(cValues)] FILETIME* lpft;
} DateTimeArray_r;
```

cValues: The number of **FILETIME** data structures represented in the **DateTimeArray_r** structure. This value MUST NOT exceed 100,000.

lpft: The **FILETIME** data structures.

2.2.2.11 PROP_VAL_UNION Structure

The **PROP_VAL_UNION** structure encodes a single instance of any type of property value. It is an aggregation data structure, allowing a single parameter to an NSPI method to contain any type of property value.

```
typedef
[switch_type(long)]
  union _PV_r {
  [case(0x00000002)]
    short int i;
```


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```
    [case(0x00000003)]
      long l;
    [case(0x0000000B)]
      unsigned short int b;
    [case(0x0000001E)]
      [string] char* lpszA;
    [case(0x00000102)]
      Binary_r bin;
    [case(0x0000001F)]
      [string] wchar_t* lpszW;
    [case(0x00000048)]
      FlatUID_r* lpguid;
    [case(0x00000040)]
      FILETIME ft;
    [case(0x0000000A)]
      long err;
    [case(0x00001002)]
      ShortArray_r MVi;
    [case(0x00001003)]
      LongArray_r MVl;
    [case(0x0000101E)]
      StringArray_r MVszA;
    [case(0x00001102)]
      BinaryArray_r MVbin;
    [case(0x00001048)]
      FlatUIDArray_r MVguid;
    [case(0x0000101F)]
      WStringArray_r MVszW;
    [case(0x00001040)]
      DateTimeArray_r MVft;
    [case(0x00000001, 0x0000000D)]
      long lReserved;
  } PROP_VAL_UNION;
```

i: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single 16-bit integer value.

l: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single 32-bit integer value.

b: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single Boolean value. The client and server MUST NOT set this to values other than 1 or 0.

lpszA: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single 8-bit character string value. This value is NULL-terminated.

bin: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single binary data value. The number of bytes that can be encoded in this structure is 2,097,152.

lpszW: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single Unicode string value. This value is NULL-terminated.

lpguid: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single GUID value. The value is encoded as a **FlatUID_r** data structure.

ft: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single 64-bit integer value. The value is encoded as a **FILETIME** structure.

err: PROP_VAL_UNION contains an encoding of the value of a property that can contain a single **PtypErrorCode** value.

MVi: PROP_VAL_UNION contains an encoding of the values of a property that can contain multiple 16-bit integer values. The number of values that can be encoded in this structure is 100,000.

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MVl: PROP_VAL_UNION contains an encoding of the values of a property that can contain multiple 32-bit integer values. The number of values that can be encoded in this structure is 100,000.

MVszA: PROP_VAL_UNION contains an encoding of the values of a property that can contain multiple 8-bit character string values. These string values are NULL-terminated. The number of values that can be encoded in this structure is 100,000.

MVbin: PROP_VAL_UNION contains an encoding of the values of a property that can contain multiple binary data values. The number of bytes that can be encoded in each value of this structure is 2,097,152. The number of values that can be encoded in this structure is 100,000.

MVguid: PROP_VAL_UNION contains an encoding of the values of a property that can contain multiple GUID values. The values are encoded as **FlatUID_r** data structures. The number of values that can be encoded in this structure is 100,000.

MVszW: PROP_VAL_UNION contains an encoding of the values of a property that can contain multiple Unicode string values. These string values are NULL-terminated. The number of values that can be encoded in this structure is 100,000.

MVft: PROP_VAL_UNION contains an encoding of the value of a property that can contain multiple 64-bit integer values. The values are encoded as **FILETIME** structures. The number of values that can be encoded in this structure is 100,000.

lReserved: Reserved. All clients and servers MUST set this value to the constant 0x00000000.

2.2.2.12 PropertyValue_r Structure

The **PropertyValue_r** structure is an encoding of the **PropertyValue_r** data structure, as specified in [MS-OXCDATA] section 2.11.2.2.

For property values with uninterpreted byte values, the permissible number of bytes in the **PropertyValue_r** structure exceeds that of the **PropertyValue** data structure. For property values with multiple values, the permissible number of values in the **PropertyValue_r** structure exceeds that of the **PropertyValue** data structure. The semantic meaning is otherwise unchanged from the **PropertyValue** data structure.

```
typedef struct _PropertyValue_r {
  DWORD ulPropTag;
  DWORD ulReserved;
  [switch_is((long)(ulPropTag & 0x0000FFFF))]
    PROP_VAL_UNION Value;
} PropertyValue_r;
```

ulPropTag: Encodes the proptag of the property whose value is represented by the **PropertyValue_r** data structure.

ulReserved: Reserved. All clients and servers MUST set this value to the constant 0x00000000.

Value: Encodes the actual value of the property represented by the **PropertyValue_r** data structure. The type value held is specified by the property type of the proptag in the **ulPropTag** field.

2.2.3 PropertyRow_r Structure

The **PropertyRow_r** structure is an encoding of the **StandardPropertyRow** data structure, as specified in [MS-OXCDATA] section 2.8.1.1. The semantic meaning is unchanged from the **StandardPropertyRow** data structure.

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```
typedef struct _PropertyRow_r {
  DWORD Reserved;
  [range(0,100000)] DWORD cValues;
  [size_is(cValues)] PropertyValue_r* lpProps;
} PropertyRow_r;
```

Reserved: Reserved. All clients and servers MUST set this value to the constant 0x00000000.

cValues: The number of **PropertyValue_r** structures represented in the **PropertyRow_r** structure. This value MUST NOT exceed 100,000.

lpProps: Encodes the **ValueArray** field of the **StandardPropertyRow** data structure.

2.2.4 PropertyRowSet_r Structure

The **PropertyRowSet_r** structure is an encoding of the **PropertyRowSet_r** data structure, as specified in [MS-OXCDATA] section 2.8.2.2.

The permissible number of **PropertyRows** in the **PropertyRowSet_r** data structure exceeds that of the **PropertyRowSet** data structure. The semantic meaning is otherwise unchanged from the **PropertyRowSet** data structure.

```
typedef struct _PropertyRowSet_r {
  [range(0,100000)] DWORD cRows;
  [size_is(cRows)] PropertyRow_r aRow[];
} PropertyRowSet_r;
```

cRows: Encodes the **RowCount** field of the **PropertyRowSet** data structures. This value MUST NOT exceed 100,000.

aRow: Encodes the **Rows** field of the **PropertyRowSet** data structure.

2.2.5 Restrictions

The following structures are used to represent restrictions of a table, as defined in [MS-OXCDATA] section 2.12.

2.2.5.1 AndRestriction_r Restriction, OrRestriction_r Restriction

The **AndRestriction_r, OrRestriction_r** restriction types share a single RPC encoding. The **AndOrRestriction_r** structure is an encoding of the both the **AndRestriction_r** data structure and the **OrRestriction_r** data structure, as specified in [MS-OXCDATA] sections 2.12.1.2 and 2.12.2.2. These two data structures share the same data layout, so a single encoding is included in the Exchange Server NSPI Protocol. The sense of the data structure's use is derived from the context of its inclusion in the **RestrictionUnion_r** data structure, as specified in section 2.2.5.6.

The permissible number of restriction structures in the **AndRestriction_r and OrRestriction_r** data structures exceeds that of the **AndRestriction** and **OrRestriction** structures. The semantic meaning is otherwise unchanged from the **AndRestriction** and **OrRestriction** data structures, as context dictates.

```
typedef struct _AndOrRestriction_r {
  [range(0,100000)] DWORD cRes;
  [size is(cRes)] Restriction r* lpRes;
} AndRestriction_r,
```


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```
OrRestriction_r;
```

cRes: Encodes the **RestrictCount** field of the **AndRestriction** and **OrRestriction** data structures. This value MUST NOT exceed 100,000.

lpRes: Encodes the **Restricts** field of the **AndRestriction** and **OrRestriction** data structures.

2.2.5.2 NotRestriction_r Restriction

The **NotRestriction_r** structure is an encoding of the **NotRestriction_r** data structure, as specified in [MS-OXCDATA] section 2.12.3.2. The semantic meaning is unchanged from the **NotRestriction** data structure.

```
typedef struct _NotRestriction_r {
  Restriction_r* lpRes;
} NotRestriction r;
```

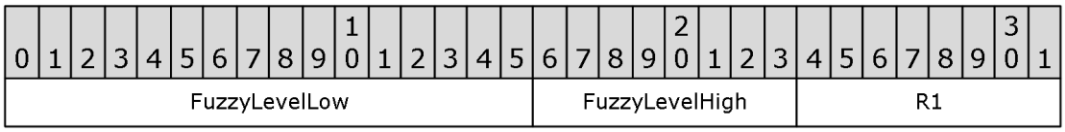
lpRes: Encodes the **Restriction** field of the **NotRestriction** data structure.

2.2.5.3 ContentRestriction_r Restriction

The **ContentRestriction_r** structure is an encoding of the **ContentRestriction_r** data structure, as specified in [MS-OXCDATA] section 2.12.4.2. The semantic meaning is unchanged from the **ContentRestriction** data structure.

```
typedef struct _ContentRestriction_r {
  DWORD ulFuzzyLevel;
  DWORD ulPropTag;
  PropertyValue_r * lpProp;
} ContentRestriction r;
```

ulFuzzyLevel: Encodes the **FuzzyLevelLow** and **FuzzyLevelHigh** fields of the **ContentRestriction** data structure.



FuzzyLevelLow: Encodes the **FuzzyLevelLow** field of the **ContentRestriction** data structure.

FuzzyLevelHigh: Encodes the **FuzzyLevelHigh** field of the **ContentRestriction** data structure.

R1: Reserved. All clients MUST set this value to the constant 0x00.

ulPropTag: Encodes the **PropertyTag** field of the **ContentRestriction** data structure.

lpProp: Encodes the **TaggedValue** field of the **ContentRestriction** data structure.

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2.2.5.4 PropertyRestriction_r Restriction

The **PropertyRestriction_r** structure is an encoding of the **PropertyRestriction_r** data structure, as specified in [MS-OXCDATA] section 2.12.5.2. The semantic meaning is unchanged from the **PropertyRestriction** data structure.

```
typedef struct _PropertyRestriction_r {
  DWORD relop;
  DWORD ulPropTag;
  PropertyValue_r* lpProp;
} PropertyRestriction_r;
```

relop: Encodes the **RelOp** field of the **PropertyRestriction** data structure.

ulPropTag: Encodes the **PropTag** field of the **PropertyRestriction** data structure.

lpProp: Encodes the **TaggedValue** field of the **PropertyRestriction** data structure.

2.2.5.5 ExistRestriction_r Restriction

The **ExistRestriction_r** structure is an encoding of the **ExistRestriction_r** data structure, as specified in [MS-OXCDATA] section 2.12.9.2. The semantic meaning is unchanged from the **ExistRestriction** data structure.

```
typedef struct _ExistRestriction_r {
  DWORD ulReserved1;
  DWORD ulPropTag;
  DWORD ulReserved2;
} ExistRestriction r;
```

ulReserved1: Reserved. All clients MUST set this value to the constant 0x00000000.

ulPropTag: Encodes the **PropTag** field of the **ExistRestriction** data structure.

ulReserved2: Reserved. All clients MUST set this value to the constant 0x00000000.

2.2.5.6 RestrictionUnion_r Restriction

The **RestrictionUnion_r** structure encodes a single instance of any type of restriction. It is an aggregation data structure, allowing a single parameter to an NSPI method to contain any type of restriction data structure.

```
typedef
[switch_type(long)]
  union _RestrictionUnion_r {
  [case(0x00000000)]
    AndRestriction_r resAnd;
  [case(0x00000001)]
    OrRestriction_r resOr;
  [case(0x00000002)]
    NotRestriction_r resNot;
  [case(0x00000003)]
    ContentRestriction r resContent;
  [case(0x00000004)]
    PropertyRestriction_r resProperty;
  [case(0x00000008)]
    ExistRestriction_r resExist;
```


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```
} RestrictionUnion_r;
```

resAnd: **RestrictionUnion_r** contains an encoding of an **AndRestriction**.

resOr: **RestrictionUnion_r** contains an encoding of an **OrRestriction**.

resNot: **RestrictionUnion_r** contains an encoding of a **NotRestriction**.

resContent: **RestrictionUnion_r** contains an encoding of a **ContentRestriction**.

resProperty: **RestrictionUnion_r** contains an encoding of a **PropertyRestriction**.

resExist: **RestrictionUnion_r** contains an encoding of an **ExistRestriction**.

2.2.5.7 Restriction_r Restriction

The **Restriction_r** structure is an encoding of the **Restriction** filters, as specified in [MS-OXCDATA] section 2.12.

The permissible number of **Restriction** structures encoded in **AndRestriction_r and OrRestriction_r** data structures recursively included in the **Restriction_r** data type exceeds that of the **AndRestriction_r** and **OrRestriction_r** data structures recursively included in the **Restriction** filters. The semantic meaning is otherwise unchanged from the **Restriction** filters.

```
typedef struct _Restriction_r {
  DWORD rt;
  [switch_is((long)rt)] RestrictionUnion_r res;
} Restriction r;
```

rt: Encodes the **RestrictType** field common to all restriction structures.

res: Encodes the actual restriction specified by the type in the **rt** field.

2.2.6 Property Name/Property ID Structures

The following structures are used to represent named properties, as specified in [MS-OXCDATA] section 2.6.

2.2.6.1 PropertyName_r Structure

The **PropertyName_r** structure is an encoding of the **PropertyName_r** data structure, as specified in [MS-OXCDATA] section 2.6.2. The semantic meaning is unchanged from the **PropertyName** data structure.

```
typedef struct PropertyName_r {
  FlatUID r* lpguid;
  DWORD ulReserved;
  long lID;
} PropertyName_r;
```

lpguid: Encodes the GUID field of the **PropertyName** data structure. This field is encoded as a **FlatUID_r** data structure.

ulReserved: Reserved. All clients MUST set this value to the constant 0x00000000.

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lID: Encodes the **lID** field of the **PropertyName** data structure. In addition to the definition of the **LID** field, this field is always present in the **PropertyName_r** data structure; it is not optional.

2.2.7 String Arrays

The following structures are used to aggregate a number of strings into a single data structure.

2.2.7.1 StringsArray_r

The **StringsArray_r** structure is used to aggregate a number of character type strings into a single data structure.

```
typedef struct _StringsArray {
  [range(0,100000)] DWORD Count;
  [string, size_is(Count)] char* Strings[];
} StringsArray_r;
```

Count: The number of character string structures in this aggregation. The value MUST NOT exceed 100,000.

Strings: The list of character type strings in this aggregation. The strings in this list are NULL-terminated.

2.2.7.2 WStringsArray_r

The **WStringsArray_r** structure is used to aggregate a number of **wchar_t** type strings into a single data structure.

```
typedef struct _WStringsArray {
  [range(0,100000)] DWORD Count;
  [string, size_is(Count)] wchar_t* Strings[];
} WStringsArray r;
```

Count: The number of character strings structures in this aggregation. The value MUST NOT exceed 100,000.

Strings: The list of **wchar_t** type strings in this aggregation. The strings in this list are NULL-terminated.

2.2.8 STAT

The **STAT** structure is used to specify the state of a table and location information that applies to that table. It appears as both an input parameter and an output parameter in many NSPI methods.

```
typedef struct {
  DWORD SortType;
  DWORD ContainerID;
  DWORD CurrentRec;
  long Delta;
  DWORD NumPos;
  DWORD TotalRecs;
  DWORD CodePage;
  DWORD TemplateLocale;
  DWORD SortLocale;
} STAT;
```


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SortType: This field contains a **DWORD** [MS-DTYP] value that represents a sort order. The client sets this field to specify the sort type of this table. Possible values are specified in section 2.2.1.10. The server MUST NOT modify this field.

ContainerID: This field contains a Minimal Entry ID. The client sets this field to specify the Minimal Entry ID of the address book container that this **STAT** structure represents. The client obtains these Minimal Entry IDs from the server's address book hierarchy table. The server MUST NOT modify this field in any NSPI method except the **NspiGetMatches** method.

CurrentRec: This field contains a Minimal Entry ID. The client sets this field to specify a beginning position in the table for the start of an NSPI method. The server sets this field to report the end position in the table after processing an NSPI method.

Delta: This field contains a long value. The client sets this field to specify an offset from the beginning position in the table for the start of an NSPI method. If the NSPI method returns a success value, the server MUST set this field to 0.

NumPos: This field contains a **DWORD** value that specifies a position in the table. The client sets this field to specify a fractional position for the beginning position in the table for the start of an NSPI method, as specified in section 3.1.4.5.2. If absolute positioning, as specified in section 3.1.4.5.1, is used, the value of this field specified by the client will be ignored by the server. The server sets this field to specify the approximate fractional position at the end of an NSPI method. This value is a zero index; the first element in a table has the numeric position 0. Although the protocol places no boundary or requirements on the accuracy of the approximation the server reports, it is recommended that implementations maximize the accuracy of the approximation to improve usability of the server for clients.

TotalRecs: This field contains a **DWORD** value that specifies the number of rows in the table. The client sets this field to specify a fractional position for the beginning position in the table for the start of an NSPI method, as specified in section 3.1.4.5.2. If absolute positioning, as specified in section 3.1.4.5.1, is used, the value of this field specified by the client will be ignored by the server. The server sets this field to specify the total number of rows in the table. Unlike the **NumPos** field, the server MUST report this number accurately; an approximation is insufficient.

CodePage: This field contains a **DWORD** value that represents a code page. The client sets this field to specify the code page the client uses for non-Unicode strings. The server MUST use this value during string handling, as specified in section 3.1.4.3. The server MUST NOT modify this field.

TemplateLocale: This field contains a **DWORD** value that represents a language code identifier (LCID). The client sets this field to specify the LCID associated with the template the client wants the server to return. The server MUST NOT modify this field.

SortLocale: This field contains a **DWORD** value that represents an LCID. The client sets this field to specify the LCID that it wants the server to use when sorting any strings. The server MUST use this value during sorting, as specified in section 3.1.4.3. The server MUST NOT modify this field.

2.2.9 EntryIDs

Each object in the address book is identified by one or more EntryIDs, as specified in section 3.1.4.6. The following table lists the three types of EntryIDs.

EntryID name	Description
MinimalEntryID	A minimal identifier

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EntryID name	Description
EphemeralEntryID	An ephemeral identifier
PermanentEntryID	A permanent identifier

2.2.9.1 MinimalEntryID

A Minimal Entry ID is a single **DWORD** value that identifies a specific object in the address book. Minimal Entry IDs with values less than 0x00000010 are used by clients as signals to trigger specific behaviors in specific NSPI methods. Except in those places where the protocol defines a specific behavior for these Minimal Entry IDs, the server MUST treat these Minimal Entry IDs as Minimal Entry IDs that do not specify an object in the address book. Specific values used in this way are defined in sections 2.2.1.8 and 2.2.1.9.

Minimal Entry IDs are created and assigned by Exchange NSPI server. The algorithm used by a server to create a Minimal Entry ID is not restricted by this protocol. A Minimal Entry ID is valid only to servers that respond to an NspiBind method, as specified in section 3.1.4.1.1, with the same server GUID as that used by the server that created the Minimal Entry ID. It is not possible for a client to predict a Minimal Entry ID.

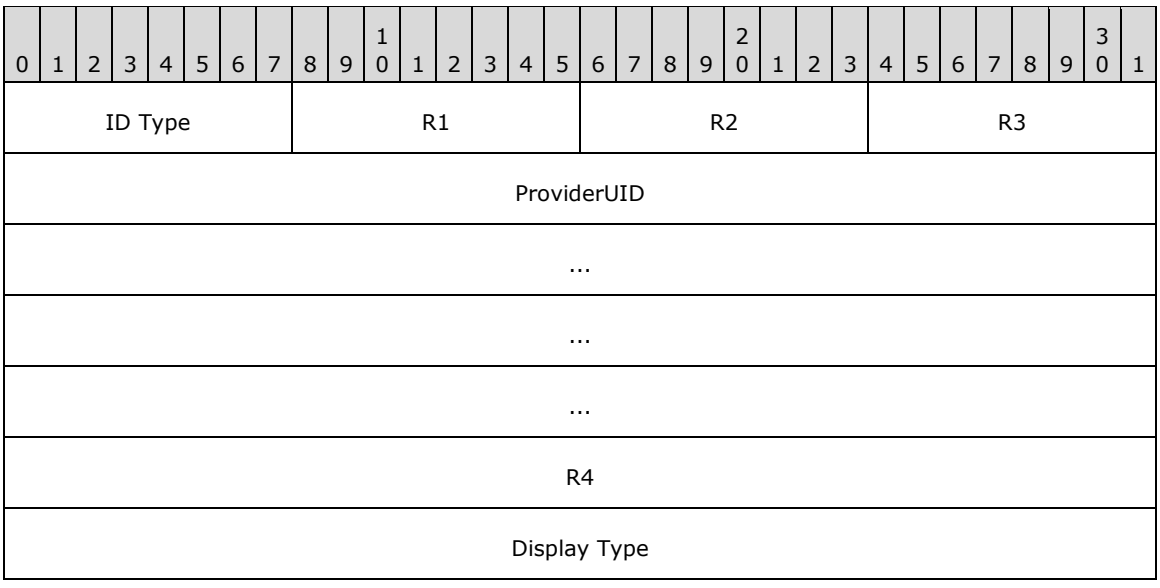
This type is declared as follows:

```
typedef DWORD MinEntryID;
```

2.2.9.2 EphemeralEntryID

The **EphemeralEntryID** structure identifies a specific object in the address book. Additionally, it encodes the server that issued the Ephemeral Entry ID and enough information for a client to make a decision as to how to display the object to an end user.

A server MUST NOT change an object's Ephemeral Entry ID during the lifetime of an NSPI session.



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MId

ID Type (1 byte): The type of this ID. The value is the constant 0x87. The server uses the presence of this value to identify this EntryID as an Ephemeral Entry ID rather than a Permanent Entry ID.

R1 (1 byte): Reserved. All clients and servers MUST set this value to the constant 0x00.

R2 (1 byte): Reserved. All clients and servers MUST set this value to the constant 0x00.

R3 (1 byte): Reserved. All clients and servers MUST set this value to the constant 0x00.

ProviderUID (16 bytes): A **FlatUID_r** value, as specified in section 2.2.2.1, that contains the GUID of the server that issued this Ephemeral Entry ID.

R4 (4 bytes): Reserved. All clients and servers MUST set this value to the constant 0x00000001.

Display Type (4 bytes): The display type of the object specified by this Ephemeral Entry ID. This value is expressed in little-endian format. Valid values for this field are specified in section 2.2.1.3. The display type is not considered part of the object's identity; it is set in the **EphemeralEntryID** structure by the server as a convenience to clients. The server MUST set this field when this data structure is returned in an output parameter. A server MUST ignore values of this field on input parameters.

MId (4 bytes): The Minimal Entry ID of this object, as specified in section 2.2.9.1. This value is expressed in little-endian format.

2.2.9.3 PermanentEntryID

The **PermanentEntryID** structure identifies a specific object in the address book. Additionally, it encodes the constant Exchange Server NSPI Protocol interface (via the **ProviderUID** field) and enough information for a client to make a decision as to how to display the object to an end user.

Permanent Entry IDs are transmitted in the protocol as values with the **PtypBinary** property type.

A server MAY allow an object's **distinguished name (DN)** to change. If this happens, the server is expected to map a Permanent Entry ID that contains the original DN to the object with the new DN. When returning a **PermanentEntryID** structure to satisfy a query from a client, a server MUST use the most current version of an object's DN.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ID Type								R1								R2								R3							
ProviderUID																															
...																															
...																															
...																															
R4																															

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Display Type String
Distinguished Name (variable)
...

ID Type (1 byte): The type of this ID. The value is the constant 0x00. The server uses the presence of this value to identify this EntryID as a Permanent Entry ID rather than an Ephemeral Entry ID.

R1 (1 byte): Reserved. All clients and servers MUST set this value to the constant 0x00.

R2 (1 byte): Reserved. All clients and servers MUST set this value to the constant 0x00.

R3 (1 byte): Reserved. All clients and servers MUST set this value to the constant 0x00.

ProviderUID (16 bytes): A **FlatUID_r** value that contains the constant GUID specified in Permanent Entry ID GUID, as specified in section 2.2.1.7.

R4 (4 bytes): Reserved. All clients and servers MUST set this value to the constant 0x00000001.

Display Type String (4 bytes): The display type of the object specified by this Permanent Entry ID. This value is expressed in little-endian format. Valid values for this field are specified in section 2.2.1.3. The display type is not considered part of the object's identity; it is set in the **PermanentEntryID** field by the server as a convenience to clients. A server MUST set this field when this data structure is returned in an output parameter. A server MUST ignore values of this field on input parameters.

Distinguished Name (variable): The DN of the object specified by this Permanent Entry ID. The value is expressed as a DN, as specified in [MS-OXOABK] section 2.2.1.1.<2>

2.2.10 NSPI_HANDLE

The **NSPI_HANDLE** handle is an RPC context handle that is used to share a session between method calls.

The RPC context handle is specified in [C706] section 2.3.1.

This type is declared as follows:

```
typedef [context handle] void* NSPI HANDLE;
```


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3 Protocol Details

The client side of this protocol is simply a pass-through. That is, no additional timers or other state is required on the client side of this protocol. Calls made by the higher-layer protocol or application are passed directly to the transport, and the results returned by the transport are passed directly back to the higher-layer protocol or application.

The client MUST call the NSPI **NspiBind** method, as specified in section 3.1.4.1.1, in order to obtain an RPC context handle to be used in all other NSPI methods. The NSPI **NspiUnbind** method, as specified in section 3.1.4.1.2, destroys this context handle. Therefore, it is not possible to call any methods other than **NspiBind** immediately after a call to **NspiUnbind**. The final method a client MUST call is **NspiUnbind**.

3.1 Server Details

This protocol enables address book access to a directory data store. This includes address book hierarchy table discovery, address creation template table discovery, address book container access and browsing, and read and modification of individual address book entries. In addition to the abstract data model specified here, this specification uses the address book data model, as specified in [MS-OXOABK], for the server of this protocol. This specification uses the definitions of object properties specified in [MS-OXPROPS].

3.1.1 Abstract Data Model

None.

3.1.2 Timers

This protocol does not introduce any timers. For details about any transport-level timers, see [MS-RPCE].

3.1.3 Initialization

Each server MUST have at least one unique GUID, used to identify an NSPI session, as specified in section 3.1.4.1.1. The server MUST acquire this GUID before it is prepared to respond to Exchange Server NSPI Protocol methods. The protocol does not constrain how a server acquires this GUID. The server MUST maintain this GUID for the duration of an NSPI session. Although the protocol places no further boundary or requirements on the time period for which the server maintains this GUID, it is recommended that implementations maximize this time period to improve the usability of the server for clients.

Each server maintains a set of Address Book objects and containers, as specified in [MS-OXOABK]. The Exchange Server NSPI Protocol does not constrain how a server obtains its initial data set, nor does it constrain the contents of this initial data set. How a server obtains this data is an implementation-specific detail.

When a server is prepared to respond to Exchange Server NSPI Protocol methods, it creates an RPC listening endpoint, as specified in section 2.1.

3.1.4 Message Processing Events and Sequencing Rules

This protocol MUST indicate to the RPC runtime that it is to perform a strict **Network Data Representation (NDR)** data consistency check at target level 6.0, as specified in [MS-RPCE].

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This protocol MUST indicate to the RPC runtime via the **strict_context_handle** property that it is to reject use of context handles created by a method of a different RPC interface than this one, as specified in [MS-RPCE].

This protocol MUST indicate to the RPC runtime via the **type_strict_context_handle** property that it is to reject use of context handles created by a method that creates a different type of context handle, as specified in [MS-RPCE].

This interface includes the methods listed in the following table.

Method name	Description
NspiBind	Initiates a session with the server. **Opnum**: 0
NspiUnbind	Concludes a session with the server. Opnum: 1
NspiUpdateStat	Updates the logical position in a specified table. Opnum: 2
NspiQueryRows	Returns information about a set of rows in a table. Opnum: 3
NspiSeekEntries	Seeks forward in a specified table and update the logical position in that table. Opnum: 4
NspiGetMatches	Restricts a specific table based on input parameters and return the resultant Explicit Table. Opnum: 5
NspiResortRestriction	Changes the sort order of an Explicit Table. Opnum: 6
NspiDNToMId	Translates a DN to a Minimal Entry ID. Opnum: 7
NspiGetPropList	Returns a list of all the properties which exist on a specific object in the address book. Opnum: 8
NspiGetProps	Returns a list of properties and their values for a specific object in the address book. Opnum: 9
NspiCompareMIds	Compares the position of two rows in a table. Opnum: 10
NspiModProps	Modifies a property of a row in the address book. Opnum: 11
NspiGetSpecialTable	Retrieves the **address book hierarchy table** of the server, or retrieves the **address creation table** from the server. Opnum: 12
NspiGetTemplateInfo	Retrieves addressing or display templates from the server. Opnum: 13
NspiModLinkAtt	Modifies a property of a row in the address book. Applies only to rows that support the

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Method name	Description
	PtypEmbeddedTable property type. Opnum: 14
NspiQueryColumns	Returns the information about a list of all the properties that the server is aware of. Opnum: 16
NspiResolveNames	Performs ANR on a set of provided names. The names are specified in the code page of the client. Opnum: 19
NspiResolveNamesW	Performs ANR on a set of provided names. The names are specified in the Unicode character set. Opnum: 20

No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

The server MUST return the value **NotEnoughMemory** if unable to complete processing a method due to errors allocating memory.

The server MUST return the value **OutOfResources** if unable to complete processing a method due to lack of some non-memory resource.

The server MUST return the value **GeneralFailure** if unable to complete processing a method for reasons other than those specified here or in the methods details.

The server MUST return the value **Success** if it completes without some other return value being specified in the method details.

Note Gaps in the opnum numbering sequence represent opnums that are reserved for local use. The server behavior is undefined, because it does not affect interoperability.

3.1.4.1 NSPI Methods

3.1.4.1.1 NspiBind (Opnum 0)

The **NspiBind** method initiates a session between a client and the server.

```
long NspiBind(
  [in] handle_t hRpc,
  [in] DWORD dwFlags,
  [in] STAT* pStat,
  [in, out, unique] FlatUID_r* pServerGuid,
  [out, ref] NSPI_HANDLE* contextHandle
);
```

hRpc: An RPC binding handle parameter, as specified in [C706] section 2.

dwFlags: A **DWORD** [MS-DTYP] value that contains a set of bit flags. The server MUST ignore values other than the bit flag **fAnonymousLogin** (0x00000020).

pStat: A pointer to a **STAT** block that describes a logical position in a specific address book container. This parameter is used to specify input parameters from the client.

pServerGuid: The value NULL or a pointer to a GUID value that is associated with the specific server.

contextHandle: An RPC context handle, as specified in section 2.2.10.

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Return Values: The server returns a **LONG** [MS-DTYP] value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value **CP_WINUNICODE**, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

2. The server MAY make additional validations including but not limited to limiting the number of concurrent connections to any specific client or checking the data access rights of the client. If these checks fail, the server MUST return "LogonFailed".

3. A value of "fAnonymousLogin" in the input parameter *dwFlags* indicates that the server did not validate that the client is an authenticated user. The server MAY ignore this request.

4. Subject to constraint 3, the server MAY authenticate the client. How a server authenticates a client is an implementation-specific detail.

5. The **CodePage** field of the input parameter *pStat* specifies the code page to use in this session. If the server will not service connections using that code page, the server MUST return the error code "InvalidCodepage".

6. Subject to the prior constraints, if the input parameter *pServerGuid* is not NULL, the server MUST set the output parameter *pServerGuid* to a GUID associated with the server. The server MAY use a different GUID for each RPC connection. Each server MUST use a different GUID.

7. If no other return code has been set, the server MUST return the value "Success".

3.1.4.1.2 NspiUnbind (Opnum 1)

The **NspiUnbind** method destroys the context handle. No other action is taken.

```
DWORD NspiUnbind(
  [in, out] NSPI_HANDLE* contextHandle,
  [in] DWORD Reserved
);
```

contextHandle: An RPC context handle as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value reserved for future use. MUST be ignored by the server.

Return Values: The server returns a **DWORD** value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the server successfully destroys the context handle, the server MUST return the value "UnbindSuccess", as specified in section 2.2.1.2.

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2. If the server does not successfully destroy the context handle, the server MUST return the value "UnbindFailure", as specified in section 2.2.1.2.

3. The server MUST set the output parameter *contextHandle* to NULL.

3.1.4.1.3 NspiGetSpecialTable (Opnum 12)

The **NspiGetSpecialTable** method returns the rows of a special table to the client. The special table can be an address book hierarchy table or an address creation table.

```
long NspiGetSpecialTable(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD dwFlags,
  [in] STAT* pStat,
  [in, out] DWORD* lpVersion,
  [out] PropertyRowSet_r** ppRows
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

dwFlags: A **DWORD** [MS-DTYP] value that contains a set of bit flags. The server MUST ignore values other than the bit flags **NspiAddressCreationTemplates** and **NspiUnicodeStrings**.

pStat: A pointer to a **STAT** block that describes a logical position in a specific address book container. This parameter is used to specify input parameters from the client.

lpVersion: A reference to a **DWORD**. On input, holds the value of the version number of the address book hierarchy table that the client has.

ppRows: A **PropertyRowSet_r** structure. On return, holds the rows for the table that the client is requesting.

Return Values: The server returns a **LONG** [MS-DTYP] value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the input parameter *dwFlags* does not contain the value "NspiUnicodeStrings", and the input parameter *dwFlags* does not contain the value "NspiAddressCreationTemplates", and the **CodePage** field of the input parameter *pStat* contains the value **CP_WINUNICODE**, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or whether the server changes its state.

2. If the server returns any return value other than "Success", the server MUST return a NULL for the output parameter *ppRows*.

3. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

4. If the input parameter *dwFlags* contains both the value "NspiAddressCreationTemplates" and the value "NspiUnicodeStrings", the server MUST ignore the value "NspiUnicodeStrings" and proceed as if the parameter *dwFlags* contained only the value "NspiAddressCreationTemplates".

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5. If the input parameter *dwFlags* does not contain the value "NspiAddressCreationTemplates", the client is requesting the rows of the server's address book hierarchy table, as specified in section 3.1.4.4.3.1.

6. If the client is requesting the rows of the server's address book hierarchy table and the server is not maintaining an address book hierarchy table, the server MUST return the error code "OutOfResources".

7. If the client is requesting the rows of the server's address book hierarchy table, the input parameter *lpVersion* contains a version number. If the version number of the address book hierarchy table the server is holding matches this version number, the server MUST proceed as if the address book hierarchy table had no rows.<3>

8. If the client is requesting the rows of the server's address book hierarchy table and the server returns the value "Success", the server MUST set the output parameter *lpVersion* to the version of the server's address book hierarchy table.<4>

9. If the input parameter *dwFlags* contains the value "NspiAddressCreationTemplates", the client is requesting the rows of an address creation table, as specified in section 3.1.4.4.3.2.

10. There is no constraint on the parameter *lpVersion* if the client is requesting the rows of an address creation table.

11. If the client is requesting the rows of an address creation table, the **TemplateLocale** field of the input parameter *pStat* specifies the LCID for which the client requires an address creation table. If the server does not maintain an address creation table for that LCID, the server MUST proceed as if it maintained an address creation table with no rows for that LCID. That is, the server MUST NOT return an error code if it does not maintain an address creation table for that LCID.

12. If the input parameter *dwFlags* contains the value "NspiUnicodeStrings" and the client is requesting the rows of the server's address book hierarchy table, the server MUST express string-valued properties in the table as Unicode values, as specified in section 3.1.4.3.

13. If the input parameter *dwFlags* does not contain the value "NspiUnicodeStrings" and the client is requesting the rows of the server's hierarchy table, and the **CodePage** field of the input parameter *pStat* does not contain the value **CP_WINUNICODE**, the server MUST express string-valued properties as 8-bit strings in the code page specified by the field **CodePage** in the input parameter *pStat*. For more details, see section 3.1.4.3.

14. The server MUST return the following properties for each container in the hierarchy, in the order listed:

    - **PidTagEntryId** ([MS-OXPROPS] section 2.674)
    - **PidTagContainerFlags** ([MS-OXPROPS] section 2.635)
    - **PidTagDepth** ([MS-OXPROPS] section 2.664)
    - **PidTagAddressBookContainerId** ([MS-OXPROPS] section 2.503)
    - **PidTagDisplayName** ([MS-OXPROPS] section 2.667)
    - **PidTagAddressBookIsMaster** ([MS-OXPROPS] section 2.536)
    - **PidTagAddressBookParentEntryId** ([MS-OXPROPS] section 2.550) (optional, and MUST be the seventh column if it is included)

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

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16. The **PidTagEntryId** property MUST be in the form of a PermanentEntryID structure, as section 2.2.9.3, with its **PidTagDisplayType** property having the value DT_CONTAINER, as specified in section 2.2.1.3, and its DN following the *addresslist-dn* format specification, as specified in [MS-OXOABK] section 2.2.1.1. When the object is the **Global Address List (GAL)** container, its DN MUST follow the *gal-addrlist-dn* format specification.

17. Subject to the prior constraints, the server returns the rows of the table requested by the client in the output parameter *ppRows*.

18. If no error condition has been specified by the previous constraints, the server MUST return the value "Success".

3.1.4.1.4 NspiUpdateStat (Opnum 2)

The **NspiUpdateStat** method updates the **STAT** block that represents position in a table to reflect positioning changes requested by the client.

```
long NspiUpdateStat(
  [in] NSPI HANDLE hRpc,
  [in] DWORD Reserved,
  [in, out] STAT* pStat,
  [in, out, unique] long* plDelta
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value. Reserved for future use. Ignored by the server.

pStat: A pointer to a **STAT** block describing a logical position in a specific address book container. This parameter is used to specify both input parameters from the client and return values from the server.

plDelta: The value NULL or a pointer to a **LONG** [MS-DTYP] value that, on return, indicates movement within the address book container specified by the input parameter *pStat*. The server MUST ignore the value specified by this parameter in the request if it is not NULL.

Return Values: The server returns a long value specifying the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value **CP_WINUNICODE**, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or whether the server changes its state.

2. If the server returns any return value other than "Success", the server MUST NOT modify the output parameter *pStat*.

3. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

4. If the server is unable to locate the address book container specified by the **ContainerID** field in the input parameter *pStat*, the server MUST return the return value **InvalidBookmark**.

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5. The server locates the initial position row in the table specified by the **ContainerID** field of the input parameter *pStat* as follows:

    - If the row specified by the **CurrentRec** field of the input parameter pStat is not MID_CURRENT, the server locates that row as the initial position row using the absolute position, as specified in section 3.1.4.5.1. If the row cannot be found, the server MUST return the error "NotFound".

    - If the row specified by the **CurrentRec** field of the input parameter *pStat* is MID_CURRENT, the server locates the initial position row using the fractional position specified in the **NumPos** field of the input parameter *pStat* as specified in section 3.1.4.5.2.

6. After locating the initial position row in the current table, the server locates the final position row by moving forward or backward in the table from the current position row as specified in the **Delta** field of the input parameter *pStat*, with the constraints specified in section 3.1.4.5 with respect to movement beyond the beginning or end of a table.

7. If the input parameter *plDelta* is not null, the server MUST set it to the actual number of rows between the initial position row and the final position row. If the input parameter *plDelta* is null, the server MUST set the output parameter plDelta to null.

8. The server MUST set the **CurrentRec** field of the parameter *pStat* to the Minimal Entry ID of the current row in the current address book container.

9. The server MUST set the **NumPos** field of the parameter *pStat* to the approximate numeric position of the current row of the current address book container according to section 3.1.4.5.2.

10. The server MUST set the **TotalRecs** field of the parameter *pStat* to the number of rows in the current address book container according to section 3.1.4.5.2.

11. The server MUST leave all other fields of the parameter *pStat* unchanged.

12. If no error condition has been specified by the previous constraints, the server MUST return "Success".

3.1.4.1.5 NspiQueryColumns (Opnum 16)

The **NspiQueryColumns** method returns a list of all the properties that the server is aware of. It returns this list as an array of proptags.

```
long NspiQueryColumns(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in] DWORD dwFlags,
  [out] PropertyTagArray r** ppColumns
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value reserved for future use. Ignored by the server.

dwFlags: A **DWORD** value that contains a set of bit flags. The server MUST ignore values other than the bit flag **NspiUnicodeProptypes**.

ppColumns: A reference to a **PropertyTagArray_r** structure. On return, contains a list of proptags.

Return Values: The server returns a **LONG** [MS-DTYP] value that specifies the return status of the method.

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Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the server returns any return value other than "Success", the server MUST return a NULL for the output parameter *ppColumns*.
2. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.
3. If the input parameter *dwFlags* contains the bit flag **NspiUnicodeProptypes**, then the server MUST report the property type of all string valued properties as **PtypString**.
4. If the input parameter *dwFlags* does not contain the bit flag **NspiUnicodeProptypes**, the server MUST report the property type of all string valued properties as **PtypString8**.
5. Subject to the prior constraints, the server MUST construct a list of all the properties it is aware of and return that list as a **PropertyTagArray_r** structure, as specified in section 2.2.2.2, in the output parameter *ppColumns*. The protocol does not constrain the order of this list.
6. If no error condition has been specified by the previous constraints, the server MUST return the value "Success".

3.1.4.1.6 NspiGetPropList (Opnum 8)

The **NspiGetPropList** method returns a list of all the properties that have values on a specified object.

```
long NspiGetPropList(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD dwFlags,
  [in] DWORD dwMId,
  [in] DWORD CodePage,
  [out] PropertyTagArray r** ppPropTags
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

dwFlags: A **DWORD** [MS-DTYP] value that contains a set of bit flags. The server MUST ignore values other than the bit flag **fSkipObjects**.

dwMId: A **DWORD** value that contains a Minimal Entry ID.

CodePage: The code page in which the client wants the server to express string values properties.

ppPropTags: A **PropertyTagArray_r** value. On return, it holds a list of properties.

Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the server returns any return value other than "Success", the server MUST return a NULL for the output parameter *ppPropTags*.

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2. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

3. If the input parameter *dwFlags* contains the bit flag **fSkipObjects**, the server MUST NOT return any proptags with the **PtypEmbeddedTable** property type in the output parameter *ppPropTags*.

4. The server MUST return all string valued properties as having the **PtypString8** property type.

5. Subject to the previous constraints, the server constructs a list of all proptags that correspond to values on the object specified in the input parameter *dwMId*. The server MUST return this list in the output parameter *ppPropTags*. The protocol does not constrain the order of this list.

6. If no error condition has been specified by the previous constraints, the server MUST return the value "Success".

3.1.4.1.7 NspiGetProps (Opnum 9)

The **NspiGetProps** method returns an address book row that contains a set of the properties and values that exist on an object.

```
long NspiGetProps(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD dwFlags,
  [in] STAT* pStat,
  [in, unique] PropertyTagArray_r* pPropTags,
  [out] PropertyRow_r** ppRows
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

dwFlags: A **DWORD** [MS-DTYP] value that contains a set of bit flags. The server MUST ignore values other than the bit flags **fEphID** and **fSkipObjects**.

pStat: A pointer to a **STAT** block that describes a logical position in a specific address book container. This parameter is used to specify input parameters from the client.

pPropTags: The value NULL or a reference to a **PropertyTagArray_r** value. Contains list of the proptags of the properties that the client wants to be returned.

ppRows: A reference to a **PropertyRow_r** value. Contains the address book container row the server returns in response to the request.

Return Values: The server returns a long value specifying the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* is set to the value **CP_WINUNICODE** and the type of the proptags in the input parameter *pPropTags* is **PtypString8**, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

2. If the server returns any return values other than "ErrorsReturned" (0x00040380) or "Success" (0x00000000), the server MUST return a NULL for the output parameter *ppRows*.

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3. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

4. If the server is unable to locate the address book container specified by the **ContainerID** field in the input parameter *pStat*, the server MUST return the value "InvalidBookmark" (0x80040405).<5>

5. The server constructs a list of proptags for which it will return property values as follows:

   - If the input parameter *pPropTags* is not NULL, the client is requesting the server return only those properties and their values in the output parameter *ppRows*. The server MUST use this list.

   - If the input parameter *pPropTags* is NULL, the client is requesting that the server constructs a list of proptags on its behalf. The server MUST construct a proptag list that is exactly the same list that would be returned to the client in the *pPropTags* output parameter of the **NspiGetPropList** method, as specified in section 3.1.4.1.6, using the following parameters as inputs to the **NspiGetPropList** method:

     - The **NspiGetProps** parameter *hRpc* is used as the **NspiGetPropList** parameter *hRpc*.

     - The **NspiGetProps** parameter *dwFlags* is used as the **NspiGetPropList** parameter *dwFlags*.

     - The **CurrentRec** field of the **NspiGetProps** parameter *pStat* is used as the **NspiGetPropList** parameter *dwMId*.

     - The **CodePage** field of the **NspiGetProps** parameter *pStat* is used as the **NspiGetPropList** parameter *CodePage*.

   - If a call to the **NspiGetPropList** method with these parameters and relaxed constraints would return anything other than "Success", the server MUST return that error code as the return value for the **NspiGetProps** method.

6. If the length of the list of proptags for which the server will return property values is excessive, the server MUST return the return value "TableTooBig", as specified in [MS-OXCDATA] section 2.4. The Exchange Server NSPI Protocol does not prescribe what constitutes an excessive length.

7. If input parameter *dwFlags* contains the bit flag **fEphID** and the **PidTagEntryId** property is present in the list of proptags, the server MUST return the values of the **PidTagEntryId** property in the Ephemeral Entry ID format, as specified in section 2.2.9.2.

8. If input parameter *dwFlags* does not contain the bit flag **fEphID** and the **PidTagEntryId** property is present in the list of proptags, the server MUST return the values of the **PidTagEntryId** property in the Permanent Entry ID format, as specified in section 2.2.9.3.

9. The server MUST return string-valued properties in the code page specified in **CodePage** field of the input parameter *pStat*, as specified in section 3.1.4.3.

10. If the server can locate the object specified in the **CurrentRec** field of the input parameter *pStat*, the server MUST return values associated with this object.

11. If the server is unable to locate the object specified in the **CurrentRec** field of the input parameter *pStat*, the server MUST proceed as if the object was located but had no values for any properties.

12. If a property in the proptag list has no value on the object specified by the **CurrentRec** field, the server MUST return the error code ErrorsReturned. The server MUST set the **aulPropTag** member corresponding to the proptag with no value with the proptag that has no value with the **PtypErrorCode** property type. Subject to the prior constraints, the server constructs a list of

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properties and their values as a single **PropertyRow_r** structure with a one-to-one order preserving correspondence between the values in the proptag list specified by input parameters and the returned properties and values in the **RowSet**. If there are duplicate properties in the proptag list, the server MUST create duplicate values in the parameter **RowSet**. The server MUST return this **RowSet** in the output parameter *ppRows*.

13. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.8 NspiQueryRows (Opnum 3)

The **NspiQueryRows** method returns to the client a number of rows from a specified table. Although the protocol places no boundary or requirements on the minimum number of rows the server returns, implementations SHOULD return as many rows as possible to improve usability of the server for clients.

```
long NspiQueryRows(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD dwFlags,
  [in, out] STAT* pStat,
  [in, range(0,100000)] DWORD dwETableCount,
  [in, unique, size_is(dwETableCount)]
    DWORD* lpETable,
  [in] DWORD Count,
  [in, unique] PropertyTagArray_r* pPropTags,
  [out] PropertyRowSet r** ppRows
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

dwFlags: A **DWORD** [MS-DTYP] value that contains a set of bit flags. The server MUST ignore values other than the bit flags **fEphID** and **fSkipObjects**.

pStat: A pointer to a **STAT** block that describes a logical position in a specific address book container. This parameter is used to specify both input parameters from the client and return values from the server.

dwETableCount: A **DWORD** value that contains the number values in the input parameter *lpETable*. This value is limited to 100,000.

lpETable: An array of **DWORD** values, representing an Explicit Table, as specified in section 3.1.4.4.2.

Count: A **DWORD** value that contains the number of rows the client is requesting.

pPropTags: The value NULL or a reference to a **PropertyTagArray_r** value, containing a list of the proptags of the properties that client requires to be returned for each row returned.

ppRows: A reference to a **PropertyRowSet_r** value. Contains the address book container rows that the server returns in response to the request.

Return Values: The server returns a long value specifying the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

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1. If the **CodePage** field of the input parameter *pStat* contains the value CP_WINUNICODE, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or whether the server changes its state.

2. If the input parameter *lpETable* is NULL and the input parameter *Count* is 0, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

3. If the server returns any return values other than "Success", the server MUST return a NULL for the output parameter *ppRows* and MUST NOT modify the output parameter *pStat*.

4. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

5. If the input parameter *lpETable* is NULL and the server is unable to locate the address book container specified by the **ContainerID** field in the input parameter *pStat*, the server MUST return the return value "InvalidBookmark".

6. The server constructs a list of proptags for which it will return property values as follows:

    - If the input parameter *pPropTags* is not NULL, the client is requesting the server return only those properties and their values in the output parameter *ppRows*. The server MUST use this list.

    - If the input parameter *pPropTags* is NULL, the client is requesting that the server construct a list of proptags on its behalf. This server MUST use the following proptag list (using proptags defined in [MS-OXPROPS]), in this order: {**PidTagAddressBookContainerId** ([MS-OXOABK] section 2.2.2.3), **PidTagObjectType** ([MS-OXOABK] section 2.2.3.10), **PidTagDisplayType** ([MS-OXOABK] section 2.2.3.11), **PidTagDisplayName** ([MS-OXOABK] section 2.2.3.1) with the property type **PtypString8**, as specified in [MS-OXCDATA] section 2.11.1, **PidTagPrimaryTelephoneNumber** ([MS-OXOCNTC] section 2.2.1.4.5) with the property type **PtypString8**, **PidTagDepartmentName** ([MS-OXOABK] section 2.2.4.6) with the property type **PtypString8**, **PidTagOfficeLocation** ([MS-OXOABK] section 2.2.4.5) with the property type **PtypString8**}

7. If the input parameter *lpETable* is NULL, the server MUST use the table specified by the input parameter *pStat* when constructing the return parameter *ppRows*.

8. If the input parameter *lpETable* is not NULL, it contains an Explicit Table. The server MUST use that table when constructing the return parameter *ppRows*.

9. The client MUST NOT specify the value 0 for the input parameter *Count* if the input parameter *lpETable* is not NULL.

10. If there are any rows that satisfy the client's query, the server MUST return at least one row.

11. The server MUST return rows in the order they exist in the table being used.

12. If the server is using the table specified by the input parameter *pStat*, the server MUST process rows starting from the current position in the table specified in that parameter (including any values of the **Delta** field).

13. If the server is using the table specified by the input parameter *lpETable*, the server MUST process rows starting from the beginning of the table.

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14. The server constructs a **RowSet**. Each row in the **RowSet** corresponds to a row in the table specified by input parameters. The rows in the **RowSet** are in a one-to-one order preserving correspondence with the rows in the table specified by input parameters. The Rows placed into the **RowSet** are exactly those rows that would be returned to the client in the *ppRows* output parameter of the **NspiGetProps** method, as specified in section 3.1.4.1.7, using the following parameters:

    - The **NspiQueryRows** parameter *hRpc* is used as the **NspiGetProps** parameter *hRpc*.
    - The **NspiQueryRows** parameter *dwFlags* is used as the **NspiGetProps** parameter *dwFlags*.
    - The **NspiQueryRows** input parameter pStat is used as the NspiGetProps parameter pStat The **CurrentRec** field is set to the Minimal Entry ID of the row being returned.
    - The list of proptags the server constructs as specified by constraint 6 is used as the **NspiGetProps** parameter *pPropTags*.
    - If a call to the **NspiGetProps** method with these parameters would return any value other than "Success" or "ErrorsReturned", the server MUST return that error code as the return value for the **NspiQueryRows** method. Otherwise, the server MUST return the **RowSet** constructed in the output parameter *ppRows*.

15. If the server has no rows that satisfy this query, the server MUST return the value "Success" and place a **PropertyRowSet_r** with rows according to the input parameter "Count" in the output parameter *ppRows*, in which the property type fields of the property are all set to 0x0000000A (PtypErrorCode).

16. If the server is using the table specified by the input parameter *pStat*, the server MUST update the status of the table. This update MUST be exactly the same update that would occur via the **NspiUpdateStat** method with the following parameters:

    - The **NspiQueryRows** parameter *hRpc* is used as the **NspiUpdateStat** parameter *hRpc*.
    - The value 0 is used as **NspiUpdateStat** parameter *Reserved*.
    - The **NspiQueryRows** output parameter *pStat* (as modified by the prior constraints) is used as the **NSPIUpdateStat** parameter *pStat*. The number of rows returned in the **NspiQueryRows** output parameter *ppRows* is added to the **Delta** field.
    - The value NULL is used as the **NspiUpdateStat** parameter *plDelta*.

17. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.9 NspiSeekEntries (Opnum 4)

The **NspiSeekEntries** method searches for and sets the logical position in a specific table to the first entry greater than or equal to a specified value. Optionally, it might also return information about rows in the table.

```
long NspiSeekEntries(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in, out] STAT* pStat,
  [in] PropertyValue_r* pTarget,
  [in, unique] PropertyTagArray_r* lpETable,
  [in, unique] PropertyTagArray_r* pPropTags,
  [out] PropertyRowSet r** ppRows
);
```


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hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value that is reserved for future use. Ignored by the server.

pStat: A pointer to a **STAT** block that describes a logical position in a specific address book container. This parameter is used to both specify input parameters from the client and return values from the server.

pTarget: A **PropertyValue_r** value holding the value that is being sought.

lpETable: The value NULL or a **PropertyTagArray_r** value. It holds a list of Minimal Entry IDs that comprises a restricted address book container.

pPropTags: The value NULL or a reference to a **PropertyTagArray_r** value. Contains list of the proptags of the columns that client wants to be returned for each row returned.

ppRows: A reference to a **PropertyRowSet_r** value. Contains the address book container rows the server returns in response to the request.

Return Values: The server returns a long value specifying the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value CP_WINUNICODE, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or whether the server changes its state.

2. If the input parameter *lpETable* is not NULL and does not contain an Explicit Table both containing a restriction of the table specified by the input parameter *pStat* and sorted as specified by the **SortType** field of the input parameter pStat, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or whether the server changes its state.

3. If the input parameter *Reserved* contains any value other than 0, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

4. If the server returns any return values other than "Success", the server MUST return a NULL for the output parameter *ppRows* and MUST NOT modify the value of the parameter *pStat*.

5. The server MAY make additional validations as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

6. If the server is unable to locate the address book container specified by the **ContainerID** field in the input parameter *pStat*, the server MUST return the return value "InvalidBookmark".

7. If the input parameter *lpETable* is NULL, the server MUST use the table specified by the input parameter *pStat* when constructing the return parameter *ppRows*.

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8. If the input parameter *lpETable* contains an Explicit Table, the server MUST use that table when constructing the return parameter *ppRows*.

9. If the **SortType** field in the input parameter *pStat* has any value other than **SortTypeDisplayName**, the server MUST return the value **GeneralFailure**.

10. If the **SortType** field in the input parameter *pStat* is **SortTypeDisplayName** and the property specified in the input parameter *pTarget* is anything other than **PidTagDisplayName** (with either the Property Type **PtypString8** or **PtypString**), the server MUST return the value **GeneralFailure**.

11. The server MUST locate the first row in the specified table that has a value equal to or greater than the value specified in the input parameter *pTarget*. If no such row exists, the server MUST return the value **NotFound**.

12. If a qualifying row was found, the server MUST update the position information in the parameter *pStat*.

    - The server MUST set **CurrentRec** field of the parameter *pStat* to the Minimal Entry ID of the qualifying row.
    - If the server is using the table specified by the input parameter *lpETable*, the server MUST set the **NumPos** field of the parameter *pStat* to the accurate numeric position of the qualifying row in the table.
    - If the server is using the table specified by the input parameter *pStat*, the server MUST set the **NumPos** field of the parameter *pStat* to the approximate numeric position of the qualifying row in the table.
    - The **TotalRecs** field of the parameter *pStat* MUST be set to the accurate number of records in the table used.
    - The server MUST NOT modify any other fields of the parameter *pStat*.

13. If the input parameter *pPropTags* is not NULL, the client is requesting the server to return an **PropertyRowSet_r**. Subject to the prior constraints, the server MUST construct an **PropertyRowSet_r** to return to the client in the output parameter *ppRows*. This **PropertyRowSet_r** MUST be exactly the same **PropertyRowSet_r** that would be returned in the *ppRows* parameter of a call to the **NspiQueryRows** method with the following parameters:

    - The **NspiSeekEntries** parameter *hRpc* is used as the **NspiQueryRows** parameter *hRpc*.
    - The value **fEphID** is used as the **NspiQueryRows** parameter *dwFlags*.
    - The **NspiSeekEntries** output parameter *pStat* (as modified by the prior constraints) is used as the **NspiQueryRows** parameter *pStat*.
    - If the **NspiSeekEntries** input parameter *lpETable* is NULL, the value 0 is used as the **NspiQueryRows** parameter *dwETableCount*, and the value NULL is used as the **NspiQueryRows** parameter *lpETable*.
    - If the **NspiSeekEntries** input parameter *lpETable* is not NULL, the server constructs an explicit table from the table specified by *lpETable* by copying rows in order from *lpETable* to the new explicit table. The server begins copying from the row specified by the **NumPos** field of the *pStat* parameter (as modified by the prior constraints), and continues until all remaining rows are added to the new table. The number of rows in this new table is used as the **NspiQueryRows** parameter *dwETableCount*, and the new table is used as the **NspiQueryRows** *lpETable* parameter.
    - The list of Minimal Entry IDs in the input parameter *lpETable* starting with the qualifying row is used as the **NspiQueryRows** parameter *lpETable*. These Minimal Entry IDs are

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expressed as a simple array of **DWORD** values rather than as a **PropertyTagArray_r** value. Note that the qualifying row is included in this list, and that the order of the Minimal Entry IDs from the input parameter *lpETable* is preserved in this list.

- If the **NspiSeekEntries** input parameter *lpETable* is NULL, the server MUST choose a value for the **NspiQueryRows** parameter *Count*. The Exchange Server NSPI Protocol does not prescribe any particular algorithm. The server MUST use a value greater than 0.
- If the **NspiSeekEntries** input parameter *lpETable* is not NULL, the value used for the **NspiQueryRows** parameter *dwETableCount* is used for the **NspiQueryRows** parameter *Count*.
- The **NspiSeekEntries** parameter *pPropTags* is used as the **NspiQueryRows** parameter *pPropTags*.
- Note that the server MUST NOT modify the return value of the **NspiSeekEntries** output parameter *pStat* in any way in the process of constructing the output **PropertyRowSet_r**.

14. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.10 NspiGetMatches (Opnum 5)

The **NspiGetMatches** method returns an Explicit Table. The rows in the table are chosen based on two possible criteria: a restriction applied to an address book container or the values of a property on a single object that hold references to other objects.

```
long NspiGetMatches(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved1,
  [in, out] STAT* pStat,
  [in, unique] PropertyTagArray_r* pReserved,
  [in] DWORD Reserved2,
  [in, unique] Restriction r* Filter,
  [in, unique] PropertyName_r* lpPropName,
  [in] DWORD ulRequested,
  [out] PropertyTagArray_r** ppOutMIds,
  [in, unique] PropertyTagArray_r* pPropTags,
  [out] PropertyRowSet_r** ppRows
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved1: A **DWORD** [MS-DTYP] value reserved for future use.

pStat: A reference to a **STAT** block describing a logical position in a specific address book container.

pReserved: A **PropertyTagArray_r** reserved for future use.

Reserved2: A **DWORD** value reserved for future use. Ignored by the server.

Filter: The value NULL or an **Restriction_r** value. Holds a logical restriction to apply to the rows in the address book container specified in the *pStat* parameter.

lpPropName: The value NULL or a **PropertyName_r** value. Holds the property to be opened as a restricted address book container.

ulRequested: A **DWORD** value. Contains the maximum number of rows to return in a restricted address book container.

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ppOutMIds: A **PropertyTagArray_r** value. On return, it holds a list of Minimal Entry IDs that comprise a restricted address book container.

pPropTags: The value NULL or a reference to a **PropertyTagArray_r** value. Contains list of the proptags of the columns that client wants to be returned for each row returned.

ppRows: A reference to a **PropertyRowSet_r** value. Contains the address book container rows the server returns in response to the request.

Return Values: The server returns a long value specifying the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value **CP_WINUNICODE**, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

2. If the input parameter *Filter* contains any value other than NULL and the **SortType** field of the input parameter *pStat* contains any value other than **SortTypeDisplayName** or **SortTypePhoneticDisplayName**, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

3. If the input parameter *Reserved1* contains any value other than 0, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

4. If the server returns any return values other than "Success", the server MUST return a NULL for the output parameters *ppOutMIds* and *ppRows* and MUST NOT modify the value of the parameter *pStat*.

5. The server MAY make additional validations as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

6. If the input **SortType** field of the input parameter *pStat* is **SortTypeDisplayName** or **SortTypePhoneticDisplayName** and the server is unable to locate the address book container specified by the **ContainerID** field in the input parameter *pStat*, the server MUST return the return value "InvalidBookmark".

7. If the input parameter *Filter* is not NULL, the server constructs an Explicit Table as follows:

    - If the input parameter *Filter* is not NULL, it specifies a restriction, as specified in [MS-OXCDATA].

    - If the server will not support the call because the search is too complex, the server MUST return the value "TooComplex". The Exchange Server NSPI Protocol does not prescribe what constitutes a search that is too complex.

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- If the server will support the filter, it identifies the rows in the table specified in the input parameter *pStat* for which the filter is true. The Minimal IDs of these rows are inserted into the Explicit Table, maintaining their order from the originating table.

8. If the input parameter *Filter* is NULL, the server constructs an Explicit Table as follows:

    - The Minimal Entry ID of the object the server is to read values from is specified in the **CurrentRec** field of the input parameter *pStat*. The server MUST ignore any values of the **Delta** and **ContainerID** fields while locating the object. That is, the server MUST NOT enforce any restrictions that the object specified by **CurrentRec** is actually in any particular address book container. Note that this is an exceptional use of the *pStat* parameter for position, not conforming to the semantic meaning of this field in all other NSPI methods.

    - If the input parameter *lpPropName* is not NULL, it specifies the property the server is to read the values of. If the input parameter *lpPropName* is NULL, the server is to read the values of the property specified as a proptag value in the **ContainerID** field of the input parameter *pStat*. Note, this is an exceptional use of this field, not conforming to the semantic meaning of this field in all other NSPI methods.

11. The server locates the object specified by the client, subject to these restraints. If the server is unable to locate the object, the server MUST return the value "GeneralFailure".

12. If the **SortType** field of the input parameter *pStat* has the value **SortTypeDisplayName_W** and the server does not support modifying the value of the property specified by the client on the object specified by the client, the server MUST return the value "NotSupported".

13. If the server is unable to locate objects in the address book based on values of the property specified by the client on the object specified by the client, the server MUST return the value "NotSupported". Note that this constraint is intended to apply in the case where the server is categorically unable to locate specific objects based on the value of the property, not the case where the property has no values.

14. The server reads the values of the property specified by the client. For each value read, the server tries to locate a specific object in the address book corresponding to this value. If a specific object is located, the Minimal ID of the object is inserted into the Explicit Table.

15. The server MUST sort the rows in Explicit Table by the Unicode representation of the value of the **PidTagDisplayName** property, as specified in section 3.1.4.3).

16. If the server returns "Success", the server MUST set the **ContainerID** field of the output parameter *pStat* to be equal to the **CurrentRec** field of the input parameter *pStat*. The server MUST NOT modify any other fields in this parameter.

17. If the number of rows in the constructed Explicit Table is greater than the input parameter *ulRequested*, the server MUST return the value "TableTooBig".

18. If the server will not support the call because the Explicit Table is larger than the server will allow, the server MUST return the value "TableTooBig". The Exchange Server NSPI Protocol does not prescribe what constitutes a table that is too large.

19. If the input parameter proptags is not NULL, the client is requesting the server to return a **PropertyRowSet_r**. Subject to the prior constraints, the server MUST construct a **PropertyRowSet_r** to return to the client in the output parameter *ppRows*. This **PropertyRowSet_r** MUST be exactly the same **PropertyRowSet_r** that would be returned in the *ppRows* parameter of a call to the **NspiQueryRows** method with the following parameters:

    - The **NspiGetMatches** parameter *hRpc* is used as the **NspiQueryRows** parameter *hRpc*.

    - The value "fEphID" is used as the **NspiQueryRows** parameter *dwFlags*.

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- The **NspiGetMatches** output parameter *pStat* (as modified by the prior constraints) is used as the **NspiQueryRows** parameter *pStat*.
- The number of Minimal Entry IDs in the constructed Explicit Table is used as the **NspiQueryRows** parameter *dwETableCount*.
- The constructed Explicit Table is used as the **NspiQueryRows** parameter *lpETable*. These Minimal Entry IDs are expressed as a simple array of **DWORD** values rather than as a **PropertyTagArray_r** value.
- The number of Minimal Entry IDs in the constructed Explicit Table is used as the **NspiQueryRows** parameter *Count*.
- The **NspiGetMatches** parameter *proptags* is used as the **NspiQueryRows** parameter *proptags*.

Note that the server MUST NOT modify the return value of the **NspiGetMatches** method output parameter *pStat* in any way in the process of constructing the output **PropertyRowSet_r**. The server MUST return the constructed **PropertyRowSet_r** in the output parameter *ppRows*.

20. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.11 NspiResortRestriction (Opnum 6)

The **NspiResortRestriction** method applies a sort order to the objects in a restricted address book container.

```
long NspiResortRestriction(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in, out] STAT* pStat,
  [in] PropertyTagArray_r* pInMIds,
  [in, out] PropertyTagArray_r** ppOutMIds
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value reserved for future use. Ignored by the server.

pStat: A reference to a **STAT** block describing a logical position in a specific address book container.

pInMIds: A **PropertyTagArray_r** value. It holds a list of Minimal Entry IDs that comprise a restricted address book container.

ppOutMIds: A **PropertyTagArray_r** value. The server MUST ignore this parameter in the request. On return, it holds a list of Minimal Entry IDs that comprise a restricted address book container.

Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value CP_WINUNICODE, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note

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especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

2. If the **SortType** field of the input parameter *pStat* contains any value other than "SortTypeDisplayName" or "SortTypePhoneticDisplayName", the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

3. If the server returns any return values other than "Success", the server MUST return a NULL for the output parameter *ppOutMIds* and MUST NOT modify the value of the parameter *pStat*

4. The server MAY make additional validations as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

5. If the **SortType** field in the input parameter *pStat* has any value other than **SortTypeDisplayName**, the server MUST return the value "GeneralFailure".

6. The server constructs an Explicit Table as follows:

    - The server locates all the objects specified in the Explicit Table specified by the input value *pInMIds*. The server MUST ignore any Minimal Entry IDs that do not specify an object.
    - For each such object located, a row is inserted into the constructed Explicit Table.
    - The server MUST sort the rows in the constructed explicit table by the property specified in the **SortType** field of the input parameter *pStat*.

7. The server MUST return the constructed Explicit Table in the output parameter *ppOutMIds*.

8. The server MUST update the output parameter *pStat* as follows:

    - The **TotalRecs** field is set to the number of objects in the constructed Explicit Table.
    - If the object specified by the **CurrentRec** field of the input parameter *pStat* is not in the constructed Explicit Table, the **CurrentRec** field of the output parameter *pStat* is set to the value MID_BEGINNING_OF_TABLE and the **NumPos** field of the output parameter *pStat* is set to the value 0.
    - The server MUST NOT modify any other fields of the output parameter *pStat*.

9. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.12 NspiCompareMIds (Opnum 10)

The **NspiCompareMIds** method compares the position in an address book container of two objects identified by Minimal Entry ID and returns the value of the comparison.

```
long NspiCompareMIds(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in] STAT* pStat,
  [in] DWORD MId1,
  [in] DWORD MId2,
  [out] long* plResult
);
```


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hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value reserved for future use. Ignored by the server.

pStat: A reference to a **STAT** block that describes a logical position in a specific address book container.

MId1: A **DWORD** value containing a Minimal Entry ID.

MId2: A **DWORD** value containing a Minimal Entry ID.

plResult: A pointer to a long value which specifies the compare result of the NspiCompareMids method.

Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value CP_WINUNICODE, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

2. The server MAY make additional validations as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

3. If the server is unable to locate the address book container specified by the **ContainerID** field in the input parameter *pStat*, the server MUST return the return value "InvalidBookmark".

4. If the server returns any return value other than "Success", the protocol does not constrain the value in the return parameter *plResult*.

5. If the server is unable to locate the objects specified by the input parameters *MId1* or *MId2* in the table specified by the **ContainerID** field of the input parameter *pStat*, the server MUST return the return value "GeneralFailure".

6. If the position of the object specified by *MId1* comes before the position of the object specified by *MId2* in the table specified by the field **ContainerID** of the input parameter *pStat*, the server MUST return a value less than 0 in the output parameter *plResult*.

7. If the position of the object specified by *MId1* comes after the position of the object specified by *MId2* in the table specified by the field **ContainerID** of the input parameter *pStat*, the server MUST return a value greater than 0 in the output parameter *plResult*.

8. If the position of the object specified by *MId1* is the same as the position of the object specified by *MId2* in the table specified by the **ContainerID** field of the input parameter *pStat* (that is, they specify the same object), the server MUST return a value of 0 in the output parameter *plResult*.

9. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.13 NspiDNToMId (Opnum 7)

The **NspiDNToMId** method maps a set of DNs to a set of Minimal Entry ID.

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```
long NspiDNToMId(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in] StringsArray_r* pNames,
  [out] PropertyTagArray_r** ppMIds
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value reserved for future use. Ignored by the server.

pNames: A **StringsArray_r** value. It holds a list of strings that contain DNs, as specified in [MS-OXOABK].

ppMIds: A **PropertyTagArray_r** value. On return, it holds a list of Minimal Entry IDs.

Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the server returns any return value other than "Success", the server MUST return the value NULL in the return parameter *ppMIds*.
2. The server MAY make additional validations as described in section 5). If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.
3. If the server is unable to locate an appropriate mapping between a DN and a Minimal Entry ID, it MUST map the DN to a Minimal Entry ID with the value 0.
4. The server constructs a list of Minimal Entry IDs to return to the client, encoding the mappings. The list is in a one-to-one order preserving correspondence with the list of DNs in the input parameter *pNames*. The server MUST return the list in the output parameter *ppMIds*.
5. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.14 NspiModProps (Opnum 11)

The **NspiModProps** method is used to modify the properties of an object in the address book. This protocol supports the **PidTagUserX509Certificate** ([MS-OXPROPS] section 2.1044) and **PidTagAddressBookX509Certificate** ([MS-OXPROPS] section 2.566) properties.

```
long NspiModProps(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in] STAT* pStat,
  [in, unique] PropertyTagArray r* pPropTags,
  [in] PropertyRow r* pRow
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value reserved for future use.

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pStat: A reference to a **STAT** block that describes a logical position in a specific address book container.

pPropTags: The value NULL or a reference to a **PropertyTagArray_r**. Contains list of the proptags of the columns that client requests all values to be removed from.

pRow: A **PropertyRow_r** value. Contains an address book row.

Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value CP_WINUNICODE, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.
2. If the server returns any return value other than "Success", the server MUST NOT modify any properties of any objects in the address book.
3. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.
4. If the *Reserved* input parameter contains any value other than 0, the server MUST ignore the value.
5. If the input parameter *pPropTags* is NULL, the server MUST return the value "InvalidParameter".
6. If the server is unable to locate the object specified by the **CurrentRec** field of the input parameter *pStat*, the server MUST return the value "InvalidParameter".
7. If the server is able to locate the object, but will not allow modifications to the object due to its display type, the server MUST return the value "InvalidObject".
8. The server MUST remove all values for all properties specified in the input parameter *pPropTags* from the object specified by the field **CurrentRec** in the input parameter *pStat*.
9. The server MUST remove all values for all properties specified in the input parameter *pRow* from the object specified by the field **CurrentRec** in the input parameter *pStat*.
10. The server SHOULD<6> add all values for all properties specified in the input parameter *pRow* to the object specified by the field **CurrentRec** in the input parameter *pStat*.
11. If the server is unable to apply the modifications specified for any other reason, the server MUST return the value "AccessDenied".
12. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.15 NspiModLinkAtt (Opnum 14)

The **NspiModLinkAtt** method modifies the values of a specific property of a specific row in the address book. This protocol only supports modifying the value of the **PidTagAddressBookMember** property ([MS-OXOABK] section 2.2.6.1) of an address book object with display type DT_DISTLIST

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and the **PidTagAddressBookPublicDelegates** property ([MS-OXOABK] section 2.2.5.5) of an address book object with display type DT_MAILUSER.

```
long NspiModLinkAtt(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD dwFlags,
  [in] DWORD ulPropTag,
  [in] DWORD dwMId,
  [in] BinaryArray_r* lpEntryIds
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

dwFlags: A **DWORD** [MS-DTYP] value that contains a set of bit flags. The server MUST ignore values other than the bit flag **fDelete**.

ulPropTag: A **DWORD** value. Contains the proptag of the property that the client wants to modify.

dwMId: A **DWORD** value that contains the Minimal Entry ID of the address book row that the client wants to modify.

lpEntryIds: A **BinaryArray** value. Contains a list of EntryIDs to be used to modify the requested property on the requested address book row. These EntryIDs can be either Ephemeral Entry IDs or Permanent Entry IDs or both.

Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the server returns any return value other than Success (0x00000000), the server MUST NOT modify any properties of any objects in the address book.<7>

2. The server MAY make additional validations, as described in section 5). If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

3. If the input parameter *ulPropTag* does not specify a proptag the server recognizes, the server MUST return **NotFound**.

4. If the server is unable to locate the object specified by the input parameter *dwMId*, the server MUST return the value InvalidParameter (0x80070057).

5. If the server is able to locate the object, but will not allow modifications to the object due to its display type, the server MUST NOT modify any properties of any objects in the address book, and the server MUST return the value AccessDenied (0x80070005).

6. If the input parameter *dwFlags* contains the bit value **fDelete**, the server MUST remove all values specified by the input parameter *lpEntryIDs* from the property specified by **ulPropTag** for the object specified by input parameter *dwMId*. The server MUST ignore any values specified by *lpEntryIDs* that are not present on the object specified by *dwMId*.

7. If the input parameter *dwFlags* does not contain the bit value **fDelete**, the server MUST add all values specified by the input parameter *lpEntryIDs* to the property specified by *ulPropTag* for the object specified by the input parameter *dwMId*. The server MUST ignore any values specified by *lpEntryIDs* that are already present on the object specified by *dwMId*.

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8. If the server is unable to apply the modifications specified, the server MUST return the value AccessDenied (0x80070005).

9. If no other return values have been specified by these constraints, the server MUST return the return value Success (0x00000000).

3.1.4.1.16 NspiResolveNames (Opnum 19)

The **NspiResolveNames** method takes a set of string values in an 8-bit character set and performs ANR (as specified in section 3.1.4.7 on those strings. The server reports the Minimal Entry ID that is the result of the ANR process. Certain property values are returned for any valid Minimal Entry IDs identified by the ANR process.

```
long NspiResolveNames(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in] STAT* pStat,
  [in, unique] PropertyTagArray_r* pPropTags,
  [in] StringsArray_r* paStr,
  [out] PropertyTagArray r** ppMIds,
  [out] PropertyRowSet_r** ppRows
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] reserved for future use.

pStat: A reference to a STAT block that describes a logical position in a specific address book container.

pPropTags: The value NULL or a reference to a **PropertyTagArray_r** value containing a list of the proptags of the columns that the client requests to be returned for each row returned.

paStr: A **StringsArray_r** value. Specifies the values the client is requesting the server to do ANR on. The server MUST apply any necessary character set conversion as specified in section 3.1.4.3.

ppMIds: A **PropertyTagArray_r** value. On return, contains a list of Minimal Entry IDs that match the array of strings, as specified in the input parameter *paStr*.

ppRows: A reference to a **PropertyRowSet_r** structure (section 2.2.4), which contains the address book container rows that the server returns in response to the request.

Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value CP_WINUNICODE, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

2. If the input parameter *Reserved* contains any value other than 0, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is

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no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

3. If the server returns any return value other than "Success", the server MUST return the value NULL in the return parameters *ppMIds* and *ppRows*.

4. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

5. If the server is unable to locate the address book container specified by the **ContainerID** field in the input parameter *pStat*, the server MUST return the return value "InvalidBookmark".

6. The server constructs a list of the Minimal Entry IDs specified in section 2.2.1.9 to return to the client. These Minimal Entry IDs are those that result from applying the ANR process, as specified in section 3.1.4.7, to the strings in the input parameter *paStr*. The server MUST return this list of Minimal Entry IDs in the output parameter *ppMIds*.

7. Subject to the prior constraints, the server MUST construct a **PropertyRowSet_r** structure to return to the client.

8. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.17 NspiResolveNamesW (Opnum 20)

The **NspiResolveNamesW** method takes a set of string values in the Unicode character set and performs ANR (as specified in section 3.1.4.7) on those strings. The server reports the Minimal Entry IDs that are the result of the ANR process. Certain property values are returned for any valid Minimal Entry IDs identified by the ANR process.

```
long NspiResolveNamesW(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in] STAT* pStat,
  [in, unique] PropertyTagArray_r* pPropTags,
  [in] WStringsArray_r* paWStr,
  [out] PropertyTagArray_r** ppMIds,
  [out] PropertyRowSet_r** ppRows
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

Reserved: A **DWORD** [MS-DTYP] value that is reserved for future use.

pStat: A reference to a STAT block that describes a logical position in a specific address book container.

pPropTags: The value NULL or a reference to a **PropertyTagArray_r** containing a list of the proptags of the columns that the client requests to be returned for each row returned.

paWStr: A **WStringsArray_r** value. Specifies the values on which the client is requesting that the server perform ANR. The server MUST apply any necessary character set conversion, as specified in section 3.1.4.3.

ppMIds: A **PropertyTagArray_r** value. On return, contains a list of Minimal Entry IDs that match the array of strings, as specified in the input parameter *paWStr*

ppRows: A reference to a **PropertyRowSet_r** structure (section 2.2.4), which contains the address book container rows that the server returns in response to the request.

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Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the **CodePage** field of the input parameter *pStat* contains the value CP_WINUNICODE, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

2. If the input parameter *Reserved* contains any value other than 0, the server MUST return one of the return values specified in section 2.2.1.2. No further constraints are applied to server processing of this method; in this case server behavior is undefined. Note especially that there is no constraint on the data the server returns in any output parameter other than the return value, nor is there any constraint on how or if the server changes its state.

3. If the server returns any return value other than "Success", the server MUST return the value NULL in the return parameters *ppMIds*and *ppRows*.

4. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

5. If the server is unable to locate the address book container specified by the **ContainerID** field in the input parameter *pStat*, the server MUST return the return value "InvalidBookmark".

6. The server constructs a list of the Minimal Entry IDs specified in section 2.2.1.9 to return to the client. These Minimal Entry IDs are those that result from the ANR process, as specified in section 3.1.4.7, to the strings in the input parameter *paWStr*. The server MUST return this list of Minimal Entry IDs in the output parameter *ppMIds*.

7. Subject to the prior constraints, the server MUST construct a **PropertyRowSet_r** structure to return to the client.

8. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.1.18 NspiGetTemplateInfo (Opnum 13)

The **NspiGetTemplateInfo** method returns information about template objects in the address book.

```
long NspiGetTemplateInfo(
  [in] NSPI HANDLE hRpc,
  [in] DWORD dwFlags,
  [in] DWORD ulType,
  [string, in, unique] char* pDN,
  [in] DWORD dwCodePage,
  [in] DWORD dwLocaleID,
  [out] PropertyRow_r** ppData
);
```

hRpc: An RPC context handle, as specified in section 2.2.10.

dwFlags: A **DWORD** [MS-DTYP] value that contains a set of bit flags. The server MUST ignore values other than the bit flags **TI_EMT**, **TI_SCRIPT** and **TI_TEMPLATE**.

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ulType: A **DWORD** value. Specifies the display type of the template for which information is requested.

pDN: The value NULL or the DN of the template requested. The value is NULL-terminated.

dwCodePage: A **DWORD** value. Specifies the code page of the template for which information is requested.

dwLocaleID: A **DWORD** value. Specifies the LCID, as specified in [MS-LCID], of the template for which information is requested.

ppData: A reference to a **PropertyRow_r** value. On return, it contains the information requested.

Return Values: The server returns a long value that specifies the return status of the method.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying RPC protocol, as specified in [MS-RPCE].

Server Processing Rules: Upon receiving this message, the server MUST process the data from the message subject to the following constraints:

1. If the server returns any return value other than "Success", the server MUST return the value NULL in the return parameters *ppData*.

2. The server MAY make additional validations, as described in section 5. If the server chooses to limit the visibility of data based on these validations, the server MUST proceed as if that data did not exist in the address book.

3. If the codepage specified in the *dwCodePage* input parameter has the value CP_WINUNICODE, the server MUST return the value "InvalidCodePage".

4. If the server does not recognize the codepage specified in the *dwCodePage* input parameter as a supported code page, the server MUST return the value "InvalidCodePage".

5. The server locates the template for which it will return information as follows:

    - If the input parameter *pDN* is NULL, the server MUST choose an appropriate template object for the display type specified by the input parameter *ulType* and for the LCID specified by the input parameter *dwLocaleID*. The specific choice of an appropriate template object is defined by local policy, and is not constrained by the Exchange Server NSPI Protocol. For details, see [MS-OXOABKT].

    - If the input parameter *pDN* is not NULL, it specifies the DN of a template object in the address book. In this case, the server MUST ignore the input parameters *ulType* and *dwLocaleID*.

    - If the server is unable to locate a specific object based on these constraints, the server MUST return the value "InvalidLocale".

6. The server constructs a **PropertyRow_r** value. The property values in this **PropertyRow_r** are specified as follows:

    - If the input parameter *dwFlags* has the **TI_SCRIPT** bit set, the client is requesting the script data for the template, as specified in [MS-OXOABKT]. The server MUST place this data into the **PropertyRow_r** structure.

    - If the input parameter *dwFlags* has the **TI_TEMPLATE** bit set, the client is requesting the user interface data for the template, as specified in the [MS-OXOABKT]. The server MUST place this data into the **PropertyRow_r** structure.

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7. The server MUST return the constructed **PropertyRow_r** structure in the output parameter *ppData*.

8. If no other return values have been specified by these constraints, the server MUST return the return value "Success".

3.1.4.2 Required Properties

For every object in the address book, the server MUST minimally maintain the following properties, which are defined in [MS-OXOABK]:

- **PidTagObjectType** ([MS-OXOABK] section 2.2.3.10)
- **PidTagInitialDetailsPane** ([MS-OXOABK] section 2.2.3.33)
- **PidTagAddressBookDisplayNamePrintable** ([MS-OXOABK] section 2.2.3.7)
- **PidTagAddressBookContainerId** ([MS-OXOABK] section 2.2.2.3)
- **PidTagEntryId** ([MS-OXOABK] section 2.2.3.2)
- **PidTagInstanceKey** ([MS-OXOABK] section 2.2.3.6)
- **PidTagSearchKey** ([MS-OXOABK] section 2.2.3.5)
- **PidTagRecordKey** ([MS-OXOABK] section 2.2.3.4)
- **PidTagAddressType** ([MS-OXOABK] section 2.2.3.13)
- **PidTagEmailAddress** ([MS-OXOABK] section 2.2.3.14)
- **PidTagDisplayType** ([MS-OXOABK] section 2.2.3.11)
- **PidTagTemplateid** ([MS-OXOABK] section 2.2.3.3)
- **PidTagTransmittableDisplayName** ([MS-OXOABK] section 2.2.3.8)
- **PidTagDisplayName** ([MS-OXOABK] section 2.2.3.1)
- **PidTagMappingSignature** ([MS-OXOABK] section 2.2.3.32)
- **PidTagAddressBookObjectDistinguishedName** ([MS-OXOABK] section 2.2.3.15)

The server MUST maintain the following properties, which are defined in [MS-OXOABK], for every object that has a **PidTagObjectType** property with a value of **DISTLIST**, value, as specified in [MS-OXOABK] section 2.2.3.10:

- **PidTagContainerContents** ([MS-OXOABK] section 2.2.6.3)
- **PidTagContainerFlags** ([MS-OXOABK] section 2.2.2.1)

If the server does not conform to the preceding rules, client behavior is undefined.

3.1.4.3 String Handling

A server holds values of properties for objects. Some of these values are strings. The Exchange Server NSPI Protocol allows string values to be represented as 8-bit character strings or Unicode strings. All string valued properties held by a server are categorized as either natively of property type **PtypString** or natively of property type **PtypString8**. Those properties natively of property type **PtypString8** are further categorized as either case-sensitive or case-insensitive.

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3.1.4.3.1 Required Native Categorizations

Unless otherwise specified in this document, the Exchange Server NSPI Protocol does not constrain the categorization of properties, and clients and servers MUST NOT require specific categorizations. However, because the protocol intends for clients to be able to persist sorted string values across multiple NSPI connections to a server, a server MUST NOT modify its native categorization for string properties after the categorization has been determined, as doing so would lead to inconsistent behavior of NSPI methods across multiple NSPI sessions.

The following table lists those properties categorization for which is specified by the Exchange Server NSPI Protocol, and the categorization of those properties.

Property name	String categorization
PidTagDisplayName	**PtypString**
PidTagAddressBookPhoneticDisplayName	**PtypString**
PidTagAddressBookDisplayNamePrintable	**PtypString8**, case sensitive

3.1.4.3.2 Required Code Page Support

While processing an NSPI method, a server associates a code page with all strings expressed as parameters in the method. The server MUST at a minimum be able to convert string representations between the Unicode code page **CP_WINUNICODE** and the TELETEX code page **CP_TELETEX**. Clients specify a code page for 8-bit strings in input parameters to server methods. This protocol does not specify conversion rules. However, because the protocol allows for clients to be able to reliably access data that has been so converted, after a server uses an algorithm, it MUST NOT modify its algorithm for converting between string representations in different code pages. Doing so would lead to inconsistent behavior of NSPI methods across multiple NSPI sessions.

3.1.4.3.3 Conversion Rules for String Values Specified by the Server to the Client

When returning string values as output parameters for methods where the method allows for both Unicode and 8-bit character representations, the server MUST adhere to the following conversion rules.

If the native type of a property is **PtypString** and the client has requested that property with the type **PtypString8**, the server MUST convert the Unicode representation to an 8-bit character representation in the code page specified by the **CodePage** field of the *pStat* parameter, or the dwCodePage parameter prior to returning the value.

If the native type of a property is **PtypString** and the client has requested that property with the type **PtypString**, the server MUST return the Unicode representation unmodified.

If the native type of a property is **PtypString8** and the client has requested that property with the type **PtypString**, the server MUST convert the 8-bit character representation to a Unicode representation prior to returning the value. The 8-bit character representation is considered to be in the code page CP_TELETEX.

If the native type of a property is **PtypString8** and the client has requested that property with the type **PtypString8**, the server MUST return the 8-bit character representation unmodified.

Servers MAY undertake other conversions and substitutions for specific properties.

The following table lists NSPI methods that are capable of returning string values in both Unicode and 8-bit character representations, and the methods for which the conversion rules are applicable.

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Method name	Description
NspiGetTemplateInfo	String values can be returned in the output parameter *ppData*.
NspiGetSpecialTable	String values can be returned in the output parameter *ppRows*.
NspiGetProps	String values can be returned in the output parameter *ppRows*.
NspiQueryRows	String values can be returned in the output parameter *ppRows*.
NspiGetMatches	String values can be returned in the output parameter *ppRows*.
NspiSeekEntries	String values can be returned in the output parameter *ppRows*.
NspiResolveNames	String values can be returned in the output parameter *ppRows*.
NspiResolveNamesW	String values can be returned in the output parameter *ppRows*.

3.1.4.3.4 Conversion Rules for String Values Specified by the Client to the Server

When accepting strings as input parameters for methods where the method allows for both Unicode and 8-bit character representations, the server MUST follow these conversion rules:

If the native type of a property is **PtypString8** and the client has specified a property value with the type **PtypString**, the server MUST convert the Unicode representation to an 8-bit character representation in the code page specified by the **CodePage** field of the *pStat* parameter prior to processing the method.

If the native type of a property is **PtypString8** and the client has specified a property value with the type **PtypString8**, the server MUST leave the 8-bit character representation unmodified while processing the method.

If the native type of a property is **PtypString** and the client has specified a property value with the type **PtypString8**, the server MUST convert the 8-bit character representation to a Unicode representation prior to processing the method. The 8-bit character representation is considered to be in the code page specified by the **CodePage** field of the *pStat* parameter.

If the native type of a property is **PtypString** and the client has specified a property value with the type **PtypString**, the server MUST leave the Unicode representation unmodified while processing the method.

The following table lists NSPI methods that are capable of specifying input parameters that contain string values in both Unicode and 8-bit character representations, and methods for which these conversion rules are applicable.

Method name	Description
NspiModProps	String values can be specified in the input parameter *pRow*.
NspiSeekEntries	String values can be specified in the input parameter *pTarget*.
NspiGetMatches	String values can be specified in the input parameter *Filter*.
NspiResolveNames	String values can be specified in the input parameter *paStr*.
NspiResolveNamesW	String values can be specified in the input parameter *paWStr*.

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3.1.4.3.5 String Comparison

Servers MUST implement comparison between string values. This comparison yields the normal semantics of **less than**, **equal to**, and **greater than**.

3.1.4.3.5.1 Unicode String Comparison

Servers MUST compare Unicode representations of strings as specified in [MS-UCODEREF]. All methods in which a server is required to perform such Unicode string comparison include LCID as part of the input parameters. The server SHOULD compare the strings using the closest supported LCID. The Exchange Server NSPI Protocol does not constrain how a server chooses this closest supported LCID. However, because the protocol intends for clients to be able to persist sorted string values across multiple NSPI connections to a server, a server SHOULD NOT modify its algorithm for choosing the closest LCID after an algorithm has been implemented because doing so would lead to inconsistent behavior of NSPI methods across multiple NSPI sessions. The server MUST minimally support the **LCID NSPI_DEFAULT_LOCALE** flag, as specified in section 2.2.1.4. When making comparisons of Unicode string values, if the server uses LCID **NSPI_DEFAULT_LOCALE**, the server MUST also use the **NSPI_DEFAULT_LOCALE_COMPARE_FLAGS** flag for the comparison. Otherwise, the server MUST use the **NSPI_NON_DEFAULT_LOCALE_COMPARE_FLAGS** flag.

3.1.4.3.5.2 8-Bit String Comparison

When making comparisons of 8-bit character string values, the server MUST compare according to the following series of steps:

If the strings are categorized as case-sensitive, the server MUST implement a case-sensitive buffer comparison. If the strings are case-insensitive, the server MUST implement a case-insensitive buffer comparison. The Exchange Server NSPI Protocol does not constrain how a server implements these comparison functions. However, because the protocol intends for clients to be able to persist sorted string values across multiple NSPI connections to a server, a server MUST NOT modify its algorithm for either of these buffer comparison functions, because doing so would lead to inconsistent behavior of NSPI methods across multiple NSPI sessions.

If the buffer representing one of the string values is shorter than the buffer representing the other string value, then the server considers the string value represented by the shorter buffer to be less than the string represented by the longer buffer. No further comparison steps are taken.

1. If the buffers representing the two string values have equal lengths, the comparison function implemented by the server MUST determine that one buffer is less than the other, or that the buffers are equal.

If the comparison function determines that one of the buffers is less than the other, then the server considers the string value represented by the lesser buffer to be less than the string value represented by the greater buffer. No further comparison steps are taken.

If the comparison function determines that the two buffers are equal, the server considers the two string values to be equal.

3.1.4.3.6 String Sorting

Every server MUST support sorting on Unicode string representations for the **PidTagDisplayName** property. If the server supports the **SortTypePhoneticDisplayName** sort order, it MUST also support sorting on Unicode string representation for the **PidTagAddressBookPhoneticDisplayName** property. The server MUST minimally support the LCID **NSPI_DEFAULT_LOCALE** flag. This sorting conforms to that specified in [MS-UCODEREF].

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3.1.4.4 Tables

In order to achieve the primary goal of the Exchange Server NSPI Protocol (browsing address book containers), the protocol defines a data model based on tables. Two types of tables are used in the data model for the Exchange Server NSPI Protocol.

3.1.4.4.1 Status-Based Tables

The first type of table specified by the Exchange Server NSPI Protocol is the Status-Based Table. This table directly represents an address book container. A Status-Based Table is specified in the protocol by the use of a **STAT** data structure. The data structure identifies an address book container, the order of objects in the address book container as exposed by the table, and positioning in the address book container.

The server is not required to maintain any state for a Status-Based Table; the state of the table is entirely specified by the fields of the **STAT** data structure, which is passed back and forth between the client and the server. Therefore, a single client can have multiple instances of an "open" address book container, each specified by a separate **STAT** structure.

3.1.4.4.2 Explicit Tables

The second type of table specified by the Exchange Server NSPI Protocol is the Explicit Table. This table is implemented as a list of Minimal Entry IDs. The list is instantiated in the protocol either as an array of **DWORDs** or as a **PropertyTagArray_r** structure. This kind of table is used to implement Restriction-Based Explicit Tables and Property Value-Based Explicit Tables.

3.1.4.4.2.1 Restriction-Based Explicit Tables

When a restriction on a table is specified to the server via the **NspiGetMatches** method, the server locates all the objects that meet the restriction criteria, and the list of the Minimal Entry IDs of those objects is constructed. This list is passed back to the client. Therefore, these Explicit Tables are "snapshots" of the base table. That is, if an object is placed in an Explicit Table, even if the object is deleted from the server, the Minimal Entry ID that specifies that object will still be in the Explicit Table.

3.1.4.4.2.2 Property Value-Based Explicit Tables

When a specific object in the address book and a property on that object is specified to the server via the **NspiGetMatches** method, the server reads the values of that property and constructs a list of Minimal Entry IDs based on a mapping between the values and other objects in the address book. This is not possible on all properties, only on those properties for which the server can establish a reference between the value of the property and some object in the address book. The Exchange Server NSPI Protocol does not constrain how a server establishes this reference. Clients can identify the properties that the server can map by trying to obtain such a table. The server MUST return an error when it cannot make such a mapping, as specified in section 3.1.4.1.10.

3.1.4.4.3 Specific Instantiations of Special Tables

The Exchange Server NSPI Protocol requires servers to maintain two special tables, in addition to any tables they maintain for normal browsing. The two required special tables are specified in the following two sections.

3.1.4.4.3.1 Address Book Hierarchy Table

Each server MUST maintain an address book hierarchy table, as specified in [MS-OXOABK] section 3.1.4.1.

3.1.4.4.3.2 Address Creation Table

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Each server MUST maintain an address creation table to clients, as specified in [MS-OXOABKT].

3.1.4.5 Positioning in a Table

In order to achieve the primary goal of the Exchange Server NSPI Protocol (browsing address lists), in addition to the concept of tables, a server MUST support the concept of position in Status-Based and Explicit Tables. Each such table has a Current Position, which specifies a specific row in the table. Methods such as **NspiQueryRows** return values based on the Current Position in the table, and methods such as **NspiUpdateStat** and **NspiQueryRows** modify the Current Position. Positioning in an Explicit Table is defined specifically in the semantics of the NSPI methods that operate on them.

When specifying position in a **STAT** structure–based table, the client sets the **CurrentRec**, **Delta**, **ContainerID**, **SortType**, and **SortLocale** fields of the **STAT** structure to specify to the server the **Current Position** in the table at the beginning of an NSPI method. The server sets the **CurrentRec**, **NumPos**, and **TotalRecs** fields to specify to the client the Current Position in the table at the end of an NSPI method. There are two ways for the client to specify position in a **STAT** structure-based table in the Exchange Server NSPI Protocol: Absolute Positioning and Fractional Positioning.

3.1.4.5.1 Absolute Positioning

The first form of specifying position in a **STAT** structure–based table is called Absolute Positioning. The client specifies this type of positioning by setting any value in the field **CurrentRec** field other than **MID_CURRENT**. The server uses the following steps to identify the Current Position specified by the client:

1. First, the server MUST determine the LCID that it supports that is closest to the LCID specified by **SortLocale**. The server MAY choose this closest LCID in any way.

2. The server sorts the objects in the address book container specified by **ContainerID** by the sort type specified in the **SortType** field and the LCID specified in step 1 of section 3.1.4.5.2.

3. The server identifies the number of objects in the sorted table. The server reports this in the **TotalRecs** field of the **STAT** structure.

4. The server locates the object specified by the **CurrentRec** field. If the server cannot locate the object, the **Current Position** in the table is undefined. The server MUST support the special Minimal Entry ID MID_BEGINNING_OF_TABLE and MID_END_OF_TABLE, as specified in section 2.2.1.8.

5. The server verifies that the object located in step 4 is in the container specified by the **ContainerID** field. If the server cannot verify this, the **Current Position** in the table is undefined.

6. The server moves the **Current Position** by the number of rows specified by the absolute value of the **Delta** field of the **STAT** structure. If the value of **Delta** is negative, the **Current Position** is moved toward the beginning of the table. If the value of **Delta** is positive, the **Current Position** is moved toward the end of the table. A **Delta** with the value 0 results in no change to the **Current Position**.

7. If applying the **Delta** as described in step 6 would move the **Current Position** to be before the first row of the table, the server sets the **Current Position** to the first row of the table and sets the **CurrentRec** to the Minimal Entry ID of the object that occupies the first row of the table.

8. If applying the **Delta** as described in step 6 would move the **Current Position** to be after the end of the table, the server sets the **Current Position** to a location one row past the last valid row of the table and sets the **CurrentRec** to the value **MID_END_OF_TABLE**.

9. The server sets the field **CurrentRec** to the Minimal Entry ID of the object occupying the row specified by the **Current Position**.

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The server identifies the numeric row of the **Current Position** in the sorted table. This numeric row is 0-based. That is, the first valid row in the table has the numeric position 0. This is the **Numeric Position** of the **Current Position** of the table. The server reports this in the **NumPos** field of the **STAT** structure. The server MAY report an approximate value for the **Numeric Position**. Although the protocol places no boundary or requirements on the accuracy of the approximate value the server returns, it is recommended that implementations maximize the accuracy of the approximation to improve usability of the Exchange NSPI server for clients.

3.1.4.5.2 Fractional Positioning

The second form of specifying position in a **STAT** structure–based table is called Fractional Positioning. The client specifies this type of positioning by setting the field **CurrentRec** to the value **MID_CURRENT**. Fractional positioning is defined as only an approximation in the Exchange Server NSPI Protocol. The server MAY be inaccurate both in locating a row based on fractional positioning and in reporting the resultant actual fractional position. The server uses the following steps to identify the Current Position specified by the client:

1. First, the server identifies the LCID it supports that is closest to the LCID specified by the **SortLocale** field. The server MAY choose this closest LCID in any way.

2. The server sorts the objects in the address book container specified by the **ContainerID** field by the sort type specified in the **SortType** field and the LCID specified in step 1 of section 3.1.4.3.

3. The server identifies the number of objects in the sorted table. The server reports this in the **TotalRecs** field of the **STAT** structure.

4. The server calculates the **Intended Numeric Position** in the table as the **TotalRecs** reported by the server multiplied by the **NumPos** field of the **STAT** structure divided by the value of **TotalRecs** as specified by the client. The value is truncated to its integral part.

5. If the **Intended Numeric Position** thus calculated is greater than **TotalRecs**, the intended **Intended Numeric Position** is **TotalRecs** (that is, the last row in the table).

After the server has identified the **Intended Numeric Position**, the server sets **Numeric Position** to an approximation of that value. Although the protocol places no boundary or requirements on the accuracy of the approximation the server uses to set the **Numeric Position**, it is recommended that implementations maximize accuracy of the approximation to improve usability of the server for clients.

6. The server moves the Current Position to the row chosen in step 6.

7. The server moves the Current Position by the number of rows specified by the absolute value of the **Delta** field of the **STAT** structure. If the value of **Delta** is negative, the Current Position is moved toward the beginning of the table. If the value of **Delta** is positive, the Current Position is moved toward the end of the table. A **Delta** field with the value 0 results in no change to the Current Position.

8. If applying the **Delta** as described in step 8 would move the Current Position to be before the beginning of the table, the server sets the Current Position to the beginning of the table and sets the **CurrentRec** field to the Minimal Entry ID of the object occupying the first row of the table.

9. If applying **Delta** as described in step 8 would move the Current Position to be after the end of the table, the server sets the Current Position to a location one row past the last valid row of the table and sets the **CurrentRec** to the value **MID_END_OF_TABLE**.

10. The server sets the field **CurrentRec** to the Minimal Entry ID of the object occupying the row specified by the Current Position.

11. The server identifies the numeric row of the Current Position in the sorted table. This numeric row is 0-based. That is, the first valid row in the table has the numeric position 0. This is the **Numeric**

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Position of the Current Position of the table. The server reports this in the **NumPos** field of the **STAT** structure.

3.1.4.6 Object Identity

Objects maintained by the server need to be identified in the Exchange Server NSPI Protocol. The Exchange Server NSPI Protocol makes use of the following three kinds of identifiers, differentiated primarily by their intended lifespan:

- **Permanent Identifier:** Specifies a specific object across all NSPI sessions. The display type of the object is included in the Permanent Identifier.
- **Ephemeral Identifier:** Specifies a specific object in a single NSPI session. The display type of the object is included in the Ephemeral Identifier. A server MUST NOT change an object's Ephemeral Identifier during the lifetime of an NSPI session. If a server uses the same NSPI session GUID (that is, the GUID returned by the server in the *pServerGuid* output parameter of the **NspiBind** method) for multiple NSPI sessions, the server MUST use the same Ephemeral Identifier for the same specific object in both sessions.
- **Minimal Identifier:** Specifies a specific object in a single NSPI session. A server MUST NOT change an object's Minimal Entry ID during the lifetime of an NSPI session. If a server uses the same NSPI session GUID (that is, the GUID returned by the server in the in the *pServerGuid* output parameter of the **NspiBind** method) for multiple NSPI sessions, the server MUST use the same Minimal Identifier for the same specific object in all sessions.

3.1.4.7 Ambiguous Name Resolution

Ambiguous name resolution (ANR) is a process by which a server maps a string to a specific object in a specific address book container. The string is provided by the client and is interpreted by the server as specified in section 3.1.4.3.

The specific algorithm used to map the string to an object is not prescribed by this protocol and is left to each server instance to define as local policy. The intended usage is an end user of a computer program entering free-form text and finding a unique object in an address book most closely matching the user's requirements. The specific result of an ANR process is a Minimal Entry ID. There are three possible outcomes to the ANR process:

1. If the server is unable to map the string to any objects in the address book, the result of the ANR process is the Minimal Entry ID with the value **MID_UNRESOLVED**.
2. If the server is able to map the string to more than one object in the address book, the result of the ANR process is the Minimal Entry ID with the value **MID_AMBIGUOUS**.
3. If the server is able to map the string to exactly one object in the address book, the result of the ANR process is the Minimal Entry ID with the value **MID_RESOLVED**.

The server MUST map the NULL string to the Minimal Entry ID **MID_UNRESOLVED**.

The server MUST map a zero-length string to the Minimal Entry ID **MID_UNRESOLVED**.

3.2 Client Details

3.2.1 Abstract Data Model

None.

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3.2.2 Timers

None.

3.2.3 Initialization

None.

3.2.4 Message Processing Events and Sequencing Rules

In order to obtain any context handle to the server, the **NspiBind** method MUST be called initially. With the *contextHandle* parameter returned from this method, it is possible to call any associated methods on the handle, as described in section 4.

This protocol MUST indicate to the RPC runtime that it is to perform a strict NDR data consistency check at target level 6.0, as specified in [MS-RPCE].

This protocol MUST indicate to the RPC runtime via the **strict_context_handle** attribute that it is to reject use of context handles created by a method of a different RPC interface than this one, as specified in [MS-RPCE].

This protocol MUST indicate to the RPC runtime via the **type_strict_context_handle** attribute that it is to reject use of context handles created by a method that creates a different type of context handle, as specified in [MS-RPCE].

3.2.5 Timer Events

For details about any transport-level timers, see [MS-RPCE].

3.2.6 Other Local Events

None.

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4 Protocol Examples

This section shows the call sequence for obtaining the address book hierarchy table at the NSPI layer. It further shows how a messaging client can use this table to retrieve properties of the Address Book objects by using the **NspiQueryRows** method.

It is assumed that the messaging client has established an RPC connection to the server.

Note Only parts of the details of client request parameters and server response parameters are documented, to show only the relevant information.

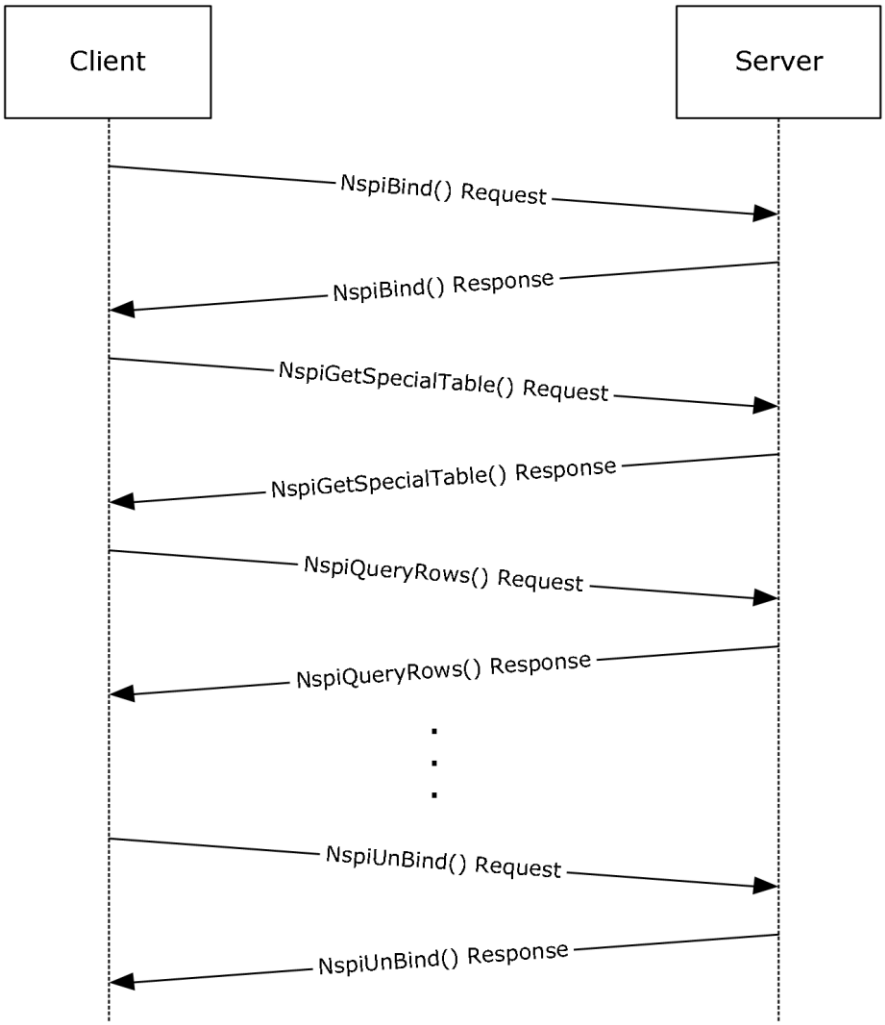

Figure 2: NSPI session message sequence example

The client initiates a session to the server by calling the **NspiBind** method. Messaging clients send the following values to the server.

Note Only relevant information, and not all parameters, are shown.

```
dwFlags        0x00000000        unsigned long
pStat
    hIndex           0x00000000        unsigned long
    ContainerID      0x00000000        unsigned long
```


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```
    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>
```

The server responds to the **NspiBind** method 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>
```

The client requests the address book hierarchy table from the server by calling the **NspiGetSpecialTable** method with *dwFlags* parameter typically set to the **NspiUnicodeStrings** bit flag. More importantly, the client does not set the **NspiAddressCreationTemplates** flag. Typical parameters are as follows.

```
dwFlags        0x00000004        unsigned long
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
ppRows
<memory location that holds  PropertyRowSet r** returned by the
  server>
```

The server responds to the **NspiGetSpecialTable** method call with return code "Success", and the rows of the address book hierarchy table typically have the following columns set, as described in [MS-OXOABK]:

- PidTagEntryId
- PidTagContainerFlags
- PidTagDepth
- PidTagAddressBookContainerId
- PidTagDisplayName
- PidTagAddressBookIsMaster.

In this example, the server did not return the optional **PidTagAddressBookParentEntryId** property. Typical parameters are as follows.

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Note Only relevant information, and not all return parameters, are shown.

```
ppRows_PropertyRowSet_r * *
      {
          cRows=0x00000007
          aRow=<a pointer to an array of rows>
       }
```

In this example, the server has returned a total of seven rows, denoted as [0x0]...[0x6], and each row typically looks as follows.

```
aRow[0x0] ... [0x6]_PropertyRow_r  *
     {
         Reserved=0x00000000
         cValues=0x00000006
         lpProps=<a pointer to an array of columns>
     }
```

In this example, the server has returned a column set of six properties, and each column looks as follows.

```
[0x0]_PropertyValue_r
      {
      ulPropTag=PidTagEntryId
        dwAlignPad=0x00000000
        Value={...}
       }
[0x1] PropertyValue r
     {
        ulPropTag=PidTagContainerFlags
        dwAlignPad=0x00000000
        Value={...}
     }
[0x2] PropertyValue r
     {
       ulPropTag=PidTagDepth
       dwAlignPad=0x00000000
       Value={...}
     }
[0x3]_PropertyValue_r
     {
       ulPropTag=PidTagAddressBookContainerId
       dwAlignPad=0x00000000
       Value={...}
     }
[0x4]_PropertyValue_r
     {
       ulPropTag=PidTagDisplayName
       dwAlignPad=0x00000000
       Value={...}
     }
[0x5]_PropertyValue_r
     {
       ulPropTag=PidTagAddressBookIsMaster
       dwAlignPad=0x00000000
       Value={...}
     }
```

Note The client can invoke additional NSPI calls to access other information from the server before calling the **NspiUnbind** method.

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Messaging clients call the **NspiQueryRows** method to retrieve various properties of Address Book objects. The following example shows the client requesting the server a total of two rows that contain the following properties:

- PidTagEntryId
- PidTagDisplayName
- PidTagSmtpAddress
- PidTagTitle.

Also, the client is requesting the server to use the *pStat* structure for table information by setting *lpETable* NULL and setting relevant values in the *pStat* structure. Typical parameters are as follows.

Note Only relevant information, and not all return parameters, are shown.

```
pStat
     hIndex           0x00000000        unsigned long
     ContainerID      0x00000000        unsigned long
     CurrentRec       0x00000000        unsigned long
     Delta            0x00000000        long
     NumPos           0x00000000        unsigned long
     TotalRecs        0xffffffff        unsigned long
     CodePage         0x000004e4        unsigned long
     TemplateLocale   0x00000409        unsigned long
     SortLocale       0x00000409        unsigned long
dwETableCount0        0x00000000        unsigned long
lpETable              0x00000000        unsigned long *
Count                 0x00000002        unsigned long
Flags                 0x00000000        unsigned long
pPropTags_PropertyTagArray_r *
     {
        cValues=0x00000004
        aulPropTag=<a pointer to an array of properties>
     }
     aulPropTag<array of 4 PropTags>
      [0x0]PidTagEntryId        unsigned long
      [0x1]PidTagDisplayName    unsigned long
      [0x2]PidTagSmtpAddress    unsigned long
      [0x3]PidTagTitle          unsigned long
```

The server responds to the **NspiQueryRows** method call with return code "Success" and a row set. Typical return parameters are as follows.

Note Only relevant information, and not all parameters, are shown.

```
dwFlags    0x00000000unsigned long
pStat
     hIndex             0x00000000        unsigned long
     ContainerID        0x00000000        unsigned long
     CurrentRec         0x00001928        unsigned long
     Delta              0x00000000        long
     NumPos             0x00000002        unsigned long
     TotalRecs          0x00000016        unsigned long
     CodePage           0x000004e4        unsigned long
     TemplateLocale     0x00000409        unsigned long
     SortLocale         0x00000409        unsigned long

dwETableCount   0x00000000        unsigned long
lpETable        0x00000000        unsigned long *
Count           0x00000002        unsigned long
pPropTags PropertyRowSet r * *
{
```


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```
            cRows=0x00000002
            aRow=<a pointer to an array of rows>
    }
```

In this example, the server has returned a total of 0x2 rows denoted as [0x0]...[0x1] equal to the number of rows requested by the client. Each row typically looks as follows.

```
    aRow[0x0] ... [0x1]_PropertyRow_r  *
    {
        Reserved=0x00000000
        cValues=0x00000004
        lpProps=<a pointer to an array of columns>
    }
```

In this example, the server has returned a column set of four properties equal to the number of properties requested by the client. Each column looks as follows.

```
    [0x0]_PropertyValue_r
         {
             ulPropTag= PidTagEntryId
             dwAlignPad=0x00000000
             Value={...}
        }
    [0x1]_PropertyValue_r
         {
            ulPropTag= PidTagDisplayName
            dwAlignPad=0x00000000
            Value={...}
         }
    [0x2]_PropertyValue_r
         {
            ulPropTag= PidTagSmtpAddress
            dwAlignPad=0x00000000
            Value={...}
         }
    [0x3]_PropertyValue_r
         {
           ulPropTag= PidTagTitle
           dwAlignPad=0x00000000
           Value={...}
         }
```

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

```
    contextHandleNSPI_HANDLE  *
    <a token>
    dwFlags    0x00000000    unsigned long
```

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

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5 Security

5.1 Security Considerations for Implementers

The Exchange Server NSPI Protocol is not suitable for general administration of the data held by a server. It is suitable for client read access to data with limited modification of existing objects, not including address book container objects. Administration tasks the Exchange Server NSPI Protocol does not support include (but are not limited to) adding new objects to an address book, removing existing objects, and moving existing objects from one address book to another.

Beyond the basic support for address book browsing, a server can apply local security policies. When applying these security policies, the server can limit a client's access to data, either reading access and/or modification access. The simplest form of local security policy is the empty set; all data held by the server is accessible to all clients of the Exchange Server NSPI Protocol for both reading and modifying, regardless of the identity of the client. Local security policy is, with one exception, an implementation-specific detail and is not constrained by the Exchange Server NSPI Protocol. If local security policy allows a client read access to an object, the server is required to allow the client read access to the properties of the object specifying the objects identity. The following properties specify an object's identity:

- **PidTagTransmittableDisplayName**
- **PidTagDisplayName**
- **PidTagAddressBookDisplayNamePrintable**
- **PidTagEmailAddress**
- **PidTagAddressType**
- **PidTagInitialDetailsPane**
- **PidTagInstanceKey**
- **PidTagAddressBookContainerId**
- **PidTagObjectType**
- **PidTagContainerContents**
- **PidTagContainerFlags**
- **PidTagDisplayType**
- **PidTagTemplateid**
- **PidTagEntryId**
- **PidTagMappingSignature**
- **PidTagRecordKey**
- **PidTagSearchKey**

The protocol does not provide support for administration of local security policy or for client discovery of a server's security policy.

The protocol carries identity information from the client to the server in the form of an authenticated remote procedure call (RPC) connection. The client MUST create a secure RPC session such that the

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server can identify and determine the authorization for the client. For details about secure RPC, see [MS-RPCE]. This requirement exists so that the server can implement its security model.

The server can use this information to apply local security policy. How the server uses this information is an implementation-specific detail and is not constrained by the protocol.

5.2 Index of Security Parameters

Security parameter	Section
RPC connection security	2.1

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6 Appendix A: Full IDL

For ease of implementation, the following full IDL is provided, where "ms-dtyp.idl" refers to the IDL found in [MS-DTYP] Appendix A. The syntax uses the IDL syntax extensions defined in [MS-RPCE]. For example, as noted in [MS-RPCE], a pointer_default declaration is not required and pointer_default(unique) is assumed.

```
import "ms-dtyp.idl";

typedef long NTSTATUS;
typedef unsigned long DWORD;

[
 uuid (F5CC5A18-4264-101A-8C59-08002B2F8426),
 version(56.0)
 ]

interface nspi {

  typedef struct {
    BYTE ab[16];
  } FlatUID_r;

  typedef struct PropertyTagArray_r {
    DWORD cValues;
    [range(0, 100001)]
[size is(cValues + 1),
length_is(cValues)] DWORD aulPropTag[];
  } PropertyTagArray r;

  typedef struct Binary_r {
    [range(0, 2097152)] DWORD cb;
    [size_is(cb)] BYTE * lpb;
  } Binary_r;

  typedef struct ShortArray_r {
    [range(0, 100000)] DWORD cValues;
    [size_is(cValues)] short int * lpi;
  } ShortArray r;

  typedef struct _LongArray_r {
    [range(0, 100000)] DWORD cValues;
    [size_is(cValues)] long * lpl;
  } LongArray_r;

  typedef struct  StringArray r {
    [range(0, 100000)] DWORD cValues;
    [size_is(cValues)] [string] char ** lppszA;
  } StringArray_r;

  typedef struct _BinaryArray_r {
    [range(0, 100000)] DWORD cValues;
    [size_is(cValues)] Binary_r * lpbin;
  } BinaryArray r;

  typedef struct _FlatUIDArray_r {
    [range(0, 100000)] DWORD cValues;
    [size is(cValues)] FlatUID r** lpguid;
  } FlatUIDArray_r;

  typedef struct _WStringArray_r {
    [range(0, 100000)] DWORD cValues;
    [size_is(cValues)] [string] wchar_t ** lppszW;
  } WStringArray r;

  typedef struct _DateTimeArray_r {
    [range(0, 100000)] DWORD cValues;
```


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```
  [size_is(cValues)] FILETIME * lpft;

} DateTimeArray_r;


typedef struct _PropertyValue_r PropertyValue_r;

typedef struct  PropertyRow r {
  DWORD Reserved;
  [range(0, 100000)] DWORD cValues;
  [size_is(cValues)] PropertyValue_r * lpProps;
} PropertyRow_r;

typedef struct _PropertyRowSet_r {
  [range(0, 100000)] DWORD cRows;
  [size_is(cRows)] PropertyRow_r aRow[];
} PropertyRowSet_r;

typedef struct  Restriction r Restriction r;

typedef struct _AndOrRestriction_r {
  [range(0, 100000)] DWORD cRes;
  [size_is(cRes)] Restriction_r * lpRes;
} AndRestriction_r, OrRestriction_r;

typedef struct _NotRestriction_r {
  Restriction_r * lpRes;
} NotRestriction_r;

typedef struct _ContentRestriction_r {
  DWORD ulFuzzyLevel;
  DWORD ulPropTag;
  PropertyValue r * lpProp;
} ContentRestriction_r;

typedef struct  BitMaskRestriction r {
  DWORD relBMR;
  DWORD ulPropTag;
  DWORD ulMask;
} BitMaskRestriction_r;

typedef struct  PropertyRestriction r {
  DWORD relop;
  DWORD ulPropTag;
  PropertyValue_r * lpProp;
} PropertyRestriction_r;

typedef struct  ComparePropsRestriction r {
  DWORD relop;
  DWORD ulPropTag1;
  DWORD ulPropTag2;
} ComparePropsRestriction_r;

typedef struct  SubRestriction r {
  DWORD ulSubObject;
  Restriction r * lpRes;
} SubRestriction_r;

typedef struct  SizeRestriction r {
  DWORD relop;
  DWORD ulPropTag;
  DWORD cb;
} SizeRestriction_r;

typedef struct  ExistRestriction r {
  DWORD ulReserved1;
  DWORD ulPropTag;
  DWORD ulReserved2;
} ExistRestriction_r;
```


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```
typedef [switch_type(long)] union _RestrictionUnion_r {
  [case (0x00000000)] AndRestriction_r resAnd;

  [case (0x00000001)] OrRestriction_r resOr;
  [case (0x00000002)] NotRestriction_r resNot;
  [case (0x00000003)] ContentRestriction r resContent;
  [case (0x00000004)] PropertyRestriction_r resProperty;
  [case (0x00000005)] ComparePropsRestriction r resCompareProps;
  [case (0x00000006)] BitMaskRestriction_r resBitMask;
  [case (0x00000007)] SizeRestriction_r resSize;
  [case (0x00000008)] ExistRestriction_r resExist;
  [case (0x00000009)] SubRestriction r resSubRestriction;
} RestrictionUnion_r;

struct _Restriction_r {
  DWORD rt;
  [switch is((long)rt)] RestrictionUnion r res;
};

typedef struct PropertyName_r {
  FlatUID_r * lpguid;
  DWORD ulReserved;
  long lID;
} PropertyName_r;


typedef struct _StringsArray {
  [range(0, 100000)] DWORD Count;
  [size is(Count)] [string] char * Strings[];
} StringsArray_r;


typedef struct _WStringsArray {
  [range(0, 100000)] DWORD Count;
  [size is(Count)] [string] wchar t * Strings[];
} WStringsArray_r;

typedef struct _STAT {
  DWORD SortType;
  DWORD ContainerID;
  DWORD CurrentRec;
  long Delta;
  DWORD NumPos;
  DWORD TotalRecs;
  DWORD CodePage;
  DWORD TemplateLocale;
  DWORD SortLocale;
}STAT;


typedef [switch_type(long)] union _PV_r {
  [case (0x00000002)] short int i;
  [case (0x00000003)] long l;
  [case (0x0000000B)] unsigned short int b;
  [case (0x0000001E)] [string] char * lpszA;
  [case (0x00000102)] Binary_r bin;
  [case (0x0000001F)] [string] wchar_t * lpszW;
  [case (0x00000048)] FlatUID r * lpguid;
  [case (0x00000040)] FILETIME ft;
  [case (0x0000000A)] long err;
  [case (0x00001002)] ShortArray_r MVi;
  [case (0x00001003)] LongArray_r MVl;
  [case (0x0000101E)] StringArray_r MVszA;
  [case (0x00001102)] BinaryArray_r MVbin;
  [case (0x00001048)] FlatUIDArray r MVguid;
  [case (0x0000101F)] WStringArray_r MVszW;
  [case (0x00001040)] DateTimeArray_r MVft;
```


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```
    [case (0x00000001, 0x0000000D)] long lReserved;
  } PROP_VAL_UNION;

  struct _PropertyValue_r {
    DWORD ulPropTag;

    DWORD ulReserved;
    [switch is ((long)(ulPropTag & 0x0000FFFF))]
PROP_VAL_UNION Value;
  };

  typedef [context_handle ] void * NSPI_HANDLE;



//opnum 0
long
   NspiBind(
     [in] handle t hRpc,
     [in] DWORD dwFlags,
     [in] STAT * pStat,
     [in,out,unique] FlatUID_r * pServerGuid,
     [out,ref] NSPI_HANDLE * contextHandle
     );

//opnum 1
DWORD
    NspiUnbind(
       [in,out] NSPI_HANDLE * contextHandle,
       [in] DWORD Reserved
       );

  //opnum 2
  long
    NspiUpdateStat(
   [in] NSPI_HANDLE hRpc,
   [in] DWORD Reserved,
   [in,out] STAT * pStat,
   [in,out,unique] long * plDelta
   );

  //opnum 3
  long
    NspiQueryRows(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD dwFlags,
  [in, out] STAT * pStat,
  [in, range(0, 100000)] DWORD dwETableCount,
  [in, unique, size_is(dwETableCount)] DWORD * lpETable,
  [in] DWORD Count,
  [in,unique] PropertyTagArray_r * pPropTags,
  [out] PropertyRowSet_r ** ppRows
  );

  //opnum 4
  long
    NspiSeekEntries(
    [in] NSPI_HANDLE hRpc,
    [in] DWORD Reserved,
    [in,out] STAT * pStat,
    [in] PropertyValue_r * pTarget,
    [in, unique] PropertyTagArray r * lpETable,
    [in,unique] PropertyTagArray_r * pPropTags,
    [out] PropertyRowSet_r ** ppRows
    );

  //opnum 5
  long
    NspiGetMatches(
```


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```
    [in] NSPI_HANDLE hRpc,
    [in] DWORD Reserved1,
    [in,out] STAT * pStat,
    [in, unique] PropertyTagArray_r * pReserved,
    [in] DWORD Reserved2,
    [in,unique] Restriction_r * Filter,

    [in,unique] PropertyName r * lpPropName,
    [in] DWORD ulRequested,
    [out] PropertyTagArray r ** ppOutMIds,
    [in,unique] PropertyTagArray_r * pPropTags,
    [out] PropertyRowSet_r ** ppRows
    );

  //opnum 6
  long
    NspiResortRestriction(
  [in] NSPI_HANDLE hRpc,
  [in] DWORD Reserved,
  [in,out] STAT * pStat,
  [in] PropertyTagArray r * pInMIds,
  [in,out] PropertyTagArray_r ** ppOutMIds
  );

  //opnum 7
  long
    NspiDNToMId(
[in] NSPI_HANDLE hRpc,
[in] DWORD Reserved,
[in] StringsArray_r * pNames,
[out] PropertyTagArray r ** ppOutMIds
);

  //opnum 8
  long
     NspiGetPropList(
    [in] NSPI HANDLE hRpc,
    [in] DWORD dwFlags,
    [in] DWORD dwMId,
    [in] DWORD CodePage,
    [out] PropertyTagArray_r ** ppPropTags
    );

  //opnum 9
  long
    NspiGetProps(
 [in] NSPI_HANDLE hRpc,
 [in] DWORD dwFlags,
 [in] STAT * pStat,
 [in,unique] PropertyTagArray r * pPropTags,
 [out] PropertyRow_r ** ppRows
 );

  //opnum 10
  long
    NspiCompareMIds(
    [in] NSPI_HANDLE hRpc,
    [in] DWORD Reserved,
    [in] STAT * pStat,
    [in] DWORD MId1,
    [in] DWORD MId2,
    [out] long * plResult
    );

  //opnum 11
  long
    NspiModProps(
    [in] NSPI_HANDLE hRpc,
    [in] DWORD Reserved,
```


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```
      [in] STAT * pStat,
      [in, unique] PropertyTagArray_r * pPropTags,
      [in] PropertyRow_r * pRow
      );

    //opnum 12
    long

      NspiGetSpecialTable(
     [in] NSPI HANDLE hRpc,
     [in] DWORD dwFlags,
     [in] STAT * pStat,
     [in, out] DWORD * lpVersion,
     [out] PropertyRowSet r ** ppRows
     );

    //opnum 13
    long
      NspiGetTemplateInfo(
     [in] NSPI_HANDLE hRpc,
     [in] DWORD dwFlags,
     [in] DWORD ulType,
     [in,unique] [string] char * pDN,
     [in] DWORD dwCodePage,
     [in] DWORD dwLocaleID,
     [out] PropertyRow_r ** ppData
);

    //opnum 14
    long
      NspiModLinkAtt(
      [in] NSPI_HANDLE hRpc,
      [in] DWORD dwFlags,
      [in] DWORD ulPropTag,
      [in] DWORD dwMId,
      [in] BinaryArray_r * lpEntryIds
      );

  // opnum 15
  void Opnum15NotUsedOnWire(void);

    //opnum 16
    long
      NspiQueryColumns(
       [in] NSPI_HANDLE hRpc,
       [in] DWORD Reserved,
       [in] DWORD dwFlags,
       [out] PropertyTagArray r ** ppColumns
       );

  // opnum 17
  void Opnum17NotUsedOnWire(void);

  // opnum 18
  void Opnum18NotUsedOnWire(void);

    //opnum 19
    long
      NspiResolveNames(
       [in] NSPI HANDLE hRpc,
       [in] DWORD Reserved,
       [in] STAT * pStat,
       [in, unique] PropertyTagArray_r * pPropTags,
       [in] StringsArray_r * paStr,
       [out] PropertyTagArray_r ** ppMIds,
       [out] PropertyRowSet_r ** ppRows
       );

    //opnum 20
```


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```
  long
    NspiResolveNamesW(
      [in] NSPI_HANDLE hRpc,
      [in] DWORD Reserved,
      [in] STAT * pStat,
      [in, unique] PropertyTagArray_r * pPropTags,
      [in] WStringsArray_r * paWStr,
      [out] PropertyTagArray_r ** ppMIds,

      [out] PropertyRowSet_r ** ppRows
      );

}
```


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7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs.

- Microsoft Exchange Server 2010
- Microsoft Exchange Server 2013
- Microsoft Exchange Server 2016
- Microsoft Office Outlook 2003
- Microsoft Office Outlook 2007
- Microsoft Outlook 2010
- Microsoft Outlook 2013
- Microsoft Outlook 2016

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

<1> Section 2.1: Office Outlook 2003, Office Outlook 2007, Outlook 2010, Outlook 2013, and Outlook 2016 can connect to the Exchange 2010 NSPI server using RPC over TCP. Office Outlook 2003, Office Outlook 2007, Outlook 2010, Outlook 2013, and Outlook 2016 cannot connect to the Exchange 2013 NSPI server or the Exchange 2016 NSPI server using RPC over TCP.

<2> Section 2.2.9.3: Exchange 2013 and Exchange 2016 do not follow the **ABNF** format that is specified in [MS-OXOABK] section 2.2.1.1**.**

<3> Section 3.1.4.1.3: Exchange 2010, Exchange 2013, and Exchange 2016: the input parameter *lpVersion* does not impact the search results.

<4> Section 3.1.4.1.3: Exchange 2010, Exchange 2013, and Exchange 2016 do not set the output parameter *lpVersion* to the version of the server's address book hierarchy table.

<5> Section 3.1.4.1.7: Microsoft Exchange Server 2010 Service Pack 3 (SP3), Exchange 2013, and Exchange 2016 return "ErrorsReturned" (0x00040380).

<6> Section 3.1.4.1.14: Exchange 2010 SP3, Exchange 2013, and Exchange 2016 do not add values for the **PidTagUserX509Certificate** and **PidTagAddressBookX509Certificate** properties.

<7> Section 3.1.4.1.15: Exchange 2013 and Exchange 2016 return "GeneralFailure" (0x80004005) when modification of either the **PidTagAddressBookMember** property ([MS-OXOABK] section 2.2.6.1) or the **PidTagAddressBookPublicDelegates** property ([MS-OXOABK] section 2.2.5.5) is attempted.

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8 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

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9 Index

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T

V

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