[MS-OXCDATA]: Data Structures Protocol Specification

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Revision Summary			
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Microsoft Corporation	April 4, 2008	0.1	Initial Availability.
Microsoft Corporation	April 25, 2008	0.2	Revised and updated property names and other technical content.
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Microsoft Corporation	August 6, 2008	1.01	Revised and edited technical content.
Microsoft Corporation	September 3, 2008	1.02	Revised and edited technical content.
Microsoft Corporation	December 3, 2008	1.03	Revised and edited technical content.
Microsoft Corporation	April 10, 2009	2.0	Updated technical content and applicable product releases.

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1 Introduction

Certain data structures appear repeatedly in different **remote operations (ROPs)** and property values, and in both store and address book protocols.

The Data Structures Protocol specifies certain common data structures that are used repeatedly in the ROPs specified in the Remote Operations (ROP) List and Encoding Protocol and in the Office Exchange Protocols Master Property List. This protocol includes structure layouts and semantics.

1.1 Glossary

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

Augmented Backus-Naur Form (ABNF)
EntryID
folder ID (FID)
LongTermID
message ID (MID)
Message object
Personal Information Manager (PIM)
remote operation (ROP)
X500 DN
WebDAV

The following terms are specific to this document:

multiple-byte character set (MBCS): A charset, such as iso-2022-jp, in which more than 1 byte is required to encode at least some characters.

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

1.2 References

1.2.1 Normative References

[ISO-8601] International Organization for Standardization, "Data Elements and Interchange Formats - Information Interchange - Representation of Dates and Times", ISO 8601:2004, December 2004, http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=40874.

[MS-DTYP] Microsoft Corporation, "Windows Data Types", March 2007, http://go.microsoft.com/fwlink/?LinkId=111558.

[MS-NSPI] Microsoft Corporation, "Name Service Provider Interface (NSPI) Protocol Specification", June 2008.

[MS-OAUT] Microsoft Corporation, "OLE Automation Protocol Specification", March 2007, http://go.microsoft.com/fwlink/?LinkId=112419.

[MS-OXCNOTIF] Microsoft Corporation, "Core Notifications Protocol Specification", June 2008.

[MS-OXCROPS] Microsoft Corporation, "Remote Operations (ROP) List and Encoding Protocol Specification", June 2008.

[MS-OXCRPC] Microsoft Corporation, "Wire Format Protocol Specification", June 2008.

[MS-OXCTABL] Microsoft Corporation, "Table Object Protocol Specification", June 2008.

[MS-OXGLOS] Microsoft Corporation, "Exchange Server Protocols Master Glossary", June 2008.

[MS-OXOAB] Microsoft Corporation, "Offline Address Book (OAB) Format and Schema Protocol Specification", June 2008.

[MS-OXOCNTC] Microsoft Corporation, "Contact Object Protocol Specification", June 2008.

[MS-OXOMSG] Microsoft Corporation, "E-Mail Object Protocol Specification", June 2008.

[MS-OXORULE] Microsoft Corporation, "E-Mail Rules Protocol Specification", June 2008.

[MS-OXOSFLD] Microsoft Corporation, "Special Folders Protocol Specification", June 2008.

[MS-OXOSRCH] Microsoft Corporation, "Search Folder List Configuration Protocol Specification", June 2008.

[MS-OXPROPS] Microsoft Corporation, "Exchange Server Protocols Master Property List Specification", June 2008.

[MS-XWDSEARCH] Microsoft Corporation, "WebDAV Extensions for Search", December 2008.

[RFC1123] Braden, R., "Requirements for Internet Hosts – Application and Support", RFC 1123, October 1989, http://www.ietf.org/rfc/rfc1123.txt.

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

[RFC3986] Berners-Lee, T., Fielding, R., and Masinter, L., "Uniform Resource Identifier (URI): Generic Syntax", RFC 3986, January 2005, http://www.ietf.org/rfc/rfc3986.txt.

[RFC4122] Leach, P., Mealling, M., Salz, R., "A Universally Unique Identifier (UUID) Namespace", RFC 4122, July 2005, http://www.ietf.org/rfc/rfc4122.txt.

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

[W3C-XML] World Wide Web Consortium, "XML Schema (Second Edition)", October 2004, http://www.w3.org/XML/Schema.

1.2.2 Informative References

None.

1.3 Structure Overview

The Data Structures Protocol specifies several commonly used data structures. These structures are primarily concerned with property values, folder and **Message object** identifiers, and folder queries.

There are some apparent redundancies; for example, **EntryIDs** are specified in several different ways in section 2.2. This is because information is formatted differently in different contexts. For example, store EntryIDs are formatted differently in the context of a **remote operation (ROP)** than in the context of a binary property value created by clients.

As a rule, integers in the data structures here specified are transmitted in little-endian byte order, with the *least significant byte* first. But when individual bits within a byte field are specified, they are numbered *starting with the most significant bit*. Therefore, in a 1-byte field, bit 0 is the 0x80 bit, bit 1 is the 0x40 bit, and bit 7 ix the 0x01 bit.

1.4 Relationship to Protocols and Other Structures

This specification defines structures used by more than one of the **ROPs** as specified in [MS-OXCROPS]. It also defines structures used by more than one of the **PIM** object type specifications, such as [MS-OXOMSG] and the protocols that extend it.

The descriptions and list of properties in [MS-OXPROPS] provides context for many of the structures defined in this specification.

1.5 Applicability Statement

This specification applies to communication between clients and mailbox or public folder <1> servers via the protocol as specified in [MS-OXCRPC].

1.6 Versioning and Localization

None.

1.7 Vendor-Extensible Fields

None.

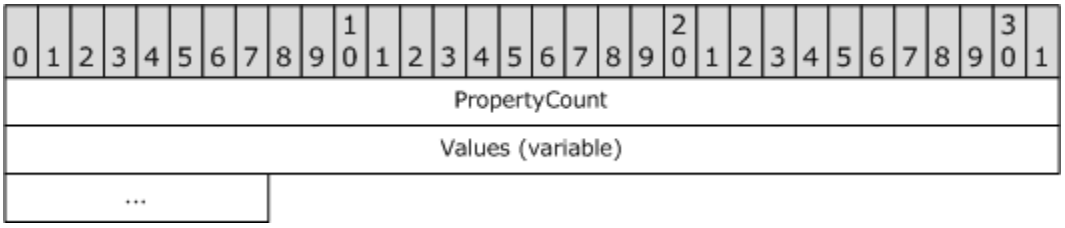
2 Structures

2.1 Address Lists

In the context of a **ROP**, addressees or recipients of a **Message object** are represented either by a few property values or by a **RecipientRow** structure. In certain other contexts, such as in saved search folder criteria, addressees are represented less compactly by counted lists of property tags and values, called AddressLists.

2.1.1 AddressEntry

An **AddressEntry** is a set of properties representing one addressee.

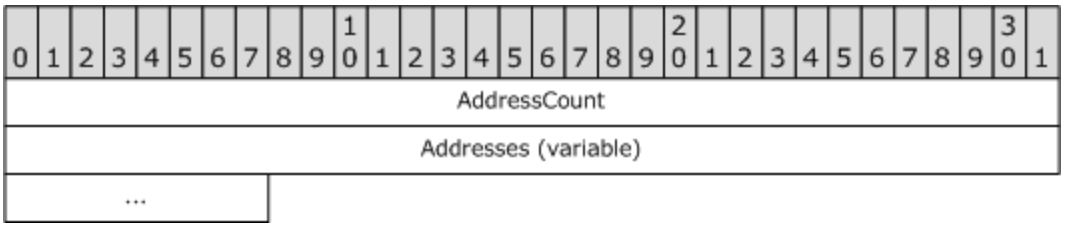


PropertyCount (4 bytes): A 32-bit unsigned integer giving the number of **TaggedPropertyValues** to follow. Please refer to section 2.13.4 for the specification of **TaggedPropertyValue**.

Values (variable): 'PropertyCount' **TaggedPropertyValue** structures representing one addressee.

2.1.2 AddressList

An AddressList is simply a counted set of **AddressEntry** structures. Each AddressEntry represents one addressee.



AddressCount (4 bytes): A 32-bit unsigned integer giving the number of addressees to follow.

Addresses (variable size): 'AddressCount' **AddressEntry** structures.

2.2 EntryID and Related Types

EntryID is an abstraction of an identifier for many different types of objects including folders, messages, recipients, address book entries, and message stores.

For the most common **ROPs**, concrete identifiers such as **folder ID** and **message ID** – which are much more compact than **EntryID** – are used instead. However, in many cases, **EntryIDs** are stored as part or all of a binary property value; for example:

- Address book IDs are stored in the **PidTagSentRepresentingEntryId** property of a **Message object**.
- Address book and one-off EntryIDs are stored in the **PidTagEntryId** property of a recipient.
- Contact address EntryIDs are stored in the **PidLidDistributionListMembers** property of a contact distribution list.

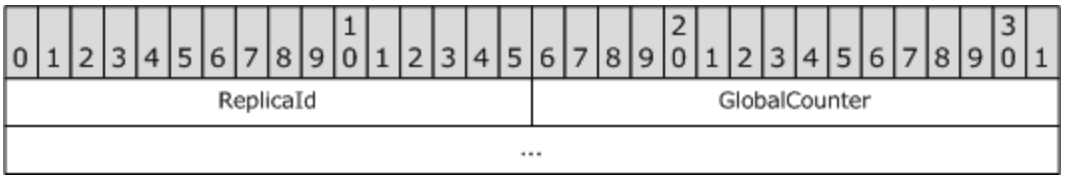
This section first describes the compact **FID**, **MID**, and **GID** structures, then the general **EntryID** structure, followed by folder, message, and message database EntryIDs, and finally recipient EntryIDs.

2.2.1 FID, MID, and GID

These are compact structures used in **ROPs** where the message database context of the objects they refer to is known.

2.2.1.1 Folder ID (FID)

A **folder ID** uniquely identifies a folder in the context of a logon to a message database. The folder ID is serialized compactly in the context of a **ROP**, such as **RopOpenFolder** <2>, where the message database context is already established. It is an 8-byte structure:

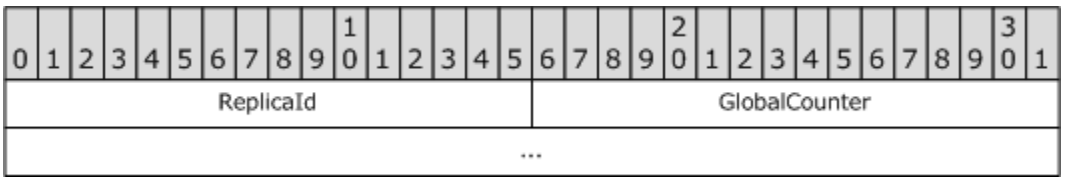


ReplicaId (2 bytes): A 16-bit unsigned integer identifying a message database.

GlobalCounter (6 bytes): An unsigned 48-bit integer identifying the folder within its message database.

2.2.1.2 Message ID (MID)

A **message ID** uniquely identifies a message in the context of a logon to a message database. The message ID is serialized compactly in the context of a ROP, such as **RopOpenMessage** <3>, where the message database context is already established. It is an 8-byte structure:

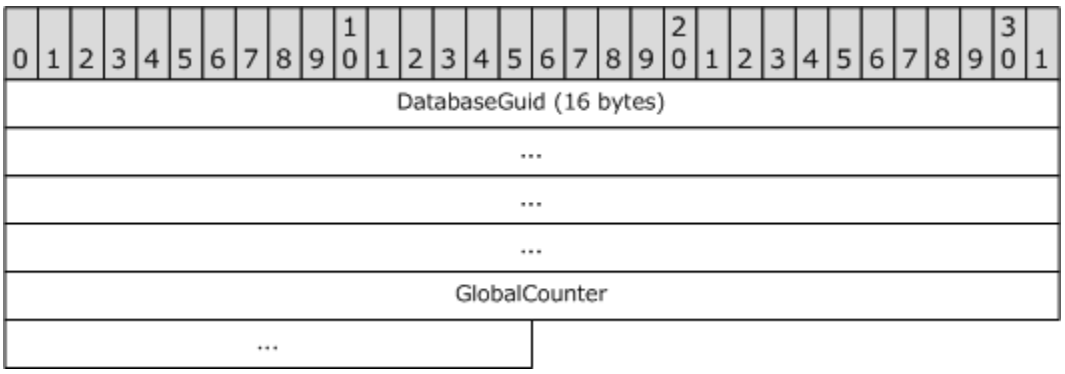


ReplicaId (2 bytes): A 16-bit unsigned integer identifying a message database.

GlobalCounter (6 bytes): An unsigned 48-bit integer identifying the message within its message database.

2.2.1.3 GID

A **GID** identifies a folder or message in a message database. It differs from a **FID** or **MID** in that the **ReplicaId** is replaced by the corresponding message database's GUID. The last fields of a folder or message **EntryID** are effectively a **GID**.



DatabaseGuid (16 bytes): A 128-bit unsigned integer identifying a message database.

GlobalCounter (6 bytes): An unsigned 48-bit integer identifying the folder within its message database.

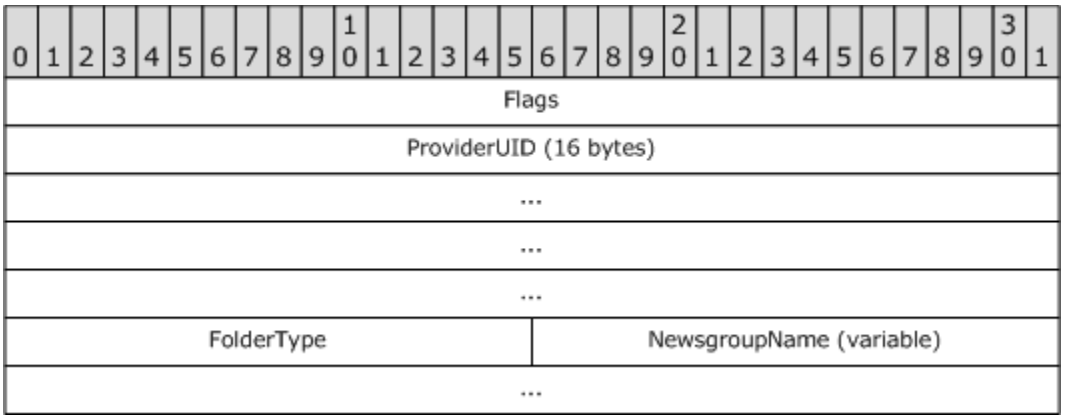
2.2.1.3.1 Long Term EntryID Structure

A Long Term **EntryID** (also referred to as a **LongTermID**) is a **GID**, as defined in section 2.2.1.3, plus a 2-byte Pad field containing "0x0000". The total length of the Long Term **EntryID** is 24 bytes.

Long Term EntryIDs can be generated from the **MID** and **FID** by using **RopLongTermIdFromId**. Going the other way, **MID** and **FID** can be generated from their Long Term EntryIDs by using **RopIdFromLongTermId**. See [MS-OXCROPS] for the **ROP** specifications.

2.2.2 NNTP Newsgroup Folder EntryID Structure

The NNTP Newsgroup Folder **EntryID** identifies a newsgroup folder in a public store. <4>



Flags (4 bytes): MUST be set to 0x00000000.

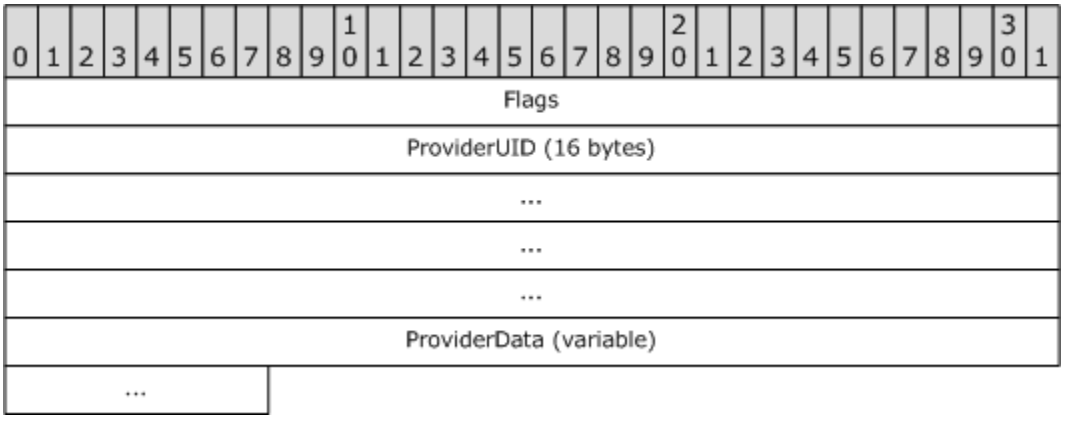
ProviderUID (16 bytes): MUST be set to %x38.A1.BB.10.05.E5.10.1A.A1.BB.08.00.2B.2A.56.C2.

FolderType (2 bytes): MUST be set to 0x000C.

NewsgroupName (variable): The name of the newsgroup formatted as a null-terminated string of 8-bit characters.

2.2.3 General EntryID Structure

An **EntryID** carries a sequence of bytes used to identify and access an object. Note that the length of an **EntryID** is specified externally, not in the structure itself.



Flags (4 bytes): MUST be set to "0x00000000". Bits in this field indicate under what circumstances a short-term **EntryID** is valid. However, in any **EntryID** stored in a property value, these 4 bytes MUST be zero indicating a long-term EntryID.

ProviderUID (16 bytes): Identifies the provider that created the EntryID, and used to route EntryIDs to the correct provider. A table of values for this field appears below at Table 1.

ProviderData (variable): Provider-specific data, further specified below for several different types.

The following table specifies possible values for the **ProviderUID** field.

EntryID UID type	ProviderUID value
object in private store	MUST be set to the **MailboxGuid** field value provided in the **RopLogon** response buffer, as specified in [MS-OXCROPS].
object in public store	%x1A. 44.73.90.AA.66.11.CD.9B.C8.00.AA.00.2F.C4.5A
Address book recipient	%xDC.A7.40.C8.C0.42.10.1A.B4.B9.08.00.2B.2F.E1.82
One-off recipient	%x81.2B.1F.A4.BE.A3.10.19.9D.6E.00.DD.01.0F.54.02
Contact address or personal distribution list recipient	%xFE.42.AA.0A.18.C7.1A.10.E8.85.0B.65.1C.24.00.00

2.2.4 Message Database Object EntryIDs

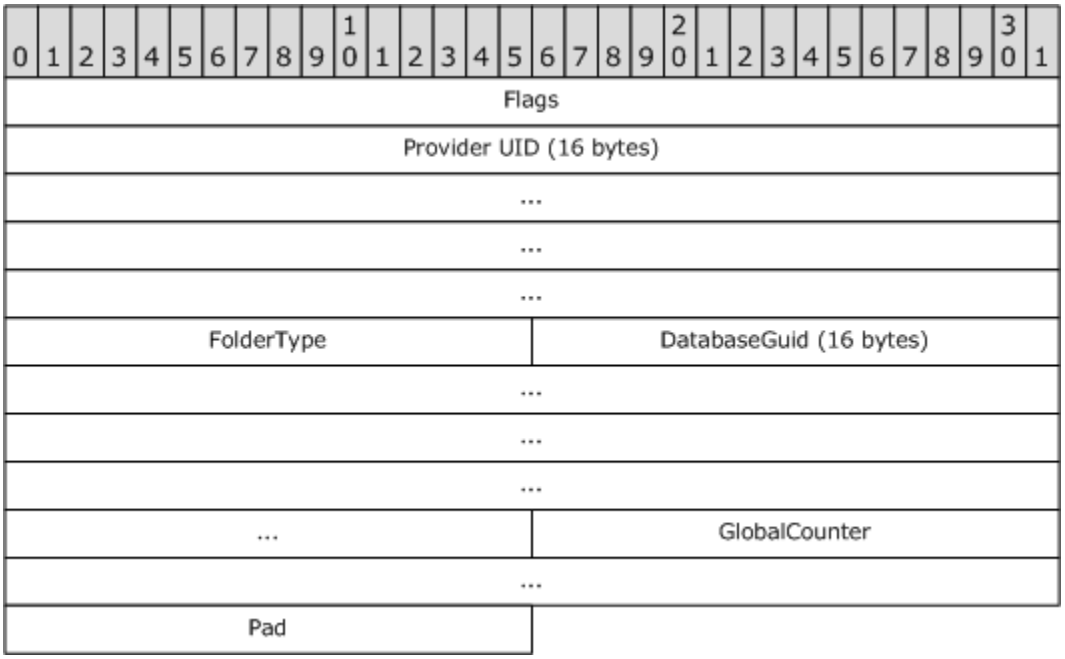
All EntryIDs for objects in a message database include, at the beginning of the **ProviderData** field, a 16-bit unsigned integer indicating the type of object to which the **EntryID** corresponds. Here are the valid values for that type.

Message database object type (alternate name)	Hexadecimal value
PrivateFolder (eitLTPrivateFolder)	0x0001 %x01.00
PublicFolder (eitLTPublicFolder)	0x0003 %x03.00

MappedPublicFolder (eitLTWackyFolder)	0x0005 %x05.00
PrivateMessage (eitLTPrivateMessage)	0x0007 %x07.00
PublicMessage (eitLTPublicMessage)	0x0009 %x09.00
MappedPublicMessage (eitLTWackyMessage)	0x000B %x0B.00
PublicNewsgroupFolder (eitLTPublicFolderByName)	0x000C %x0c.00

2.2.4.1 Folder EntryID

In the context of an EntryID, a **folder ID** looks quite different than in the context of a **ROP**. The **ReplicaId** is mapped to a **DatabaseGuid**; the **RopLongTermIdFromId** operation supports this mapping. This less compact format is necessary because no assumptions can be made about the message database context in which a folder **EntryID** is used.



Flags (4 bytes): MUST be zero.

Provider UID (16 bytes): For a folder in a private mailbox MUST be set to the **MailboxGuid** field value from the **RopLogon** response buffer. For a folder in the public store MUST be set to %x1A.44.73.90.AA.66.11.CD.9B.C8.00.AA.00.2F.C4.5A.

FolderType (2 bytes): One of several types as specified in Table 2 above.

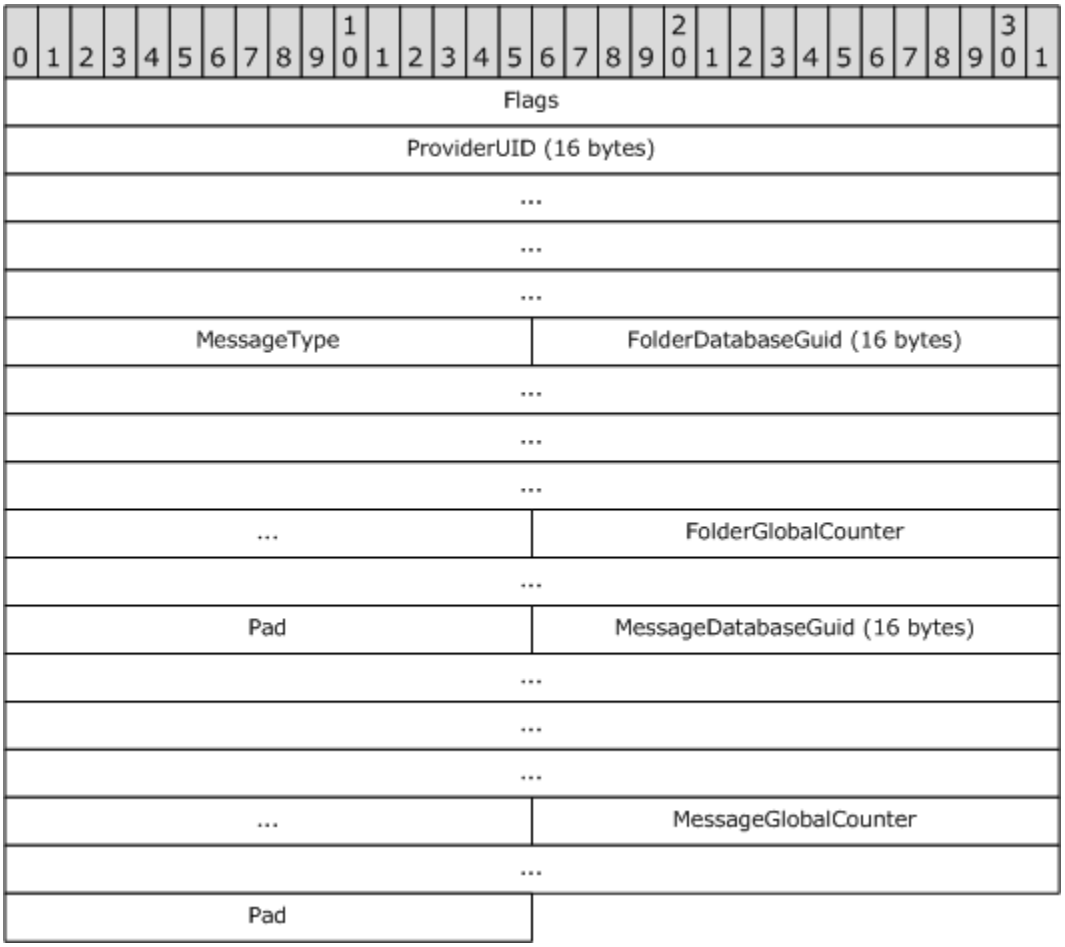
DatabaseGuid (16 bytes): A GUID associated with the message database, and corresponding to the **ReplicaId** field of the **FID**.

GlobalCounter (6 bytes): An unsigned 48-bit integer identifying the folder.

Pad (2 bytes): MUST be zero.

2.2.4.2 Message EntryID

In the context of an EntryID, a **message ID** looks quite different than in the context of a ROP. The **DatabaseReplicationId** is mapped to a **MessageDatabaseGuid** (perhaps using the **RopLongTermIdFromId** operation) and the whole ID is prefixed with flags and a provider UID. In addition, the **folder ID** of the folder in which the message resides is included.



Flags (4 bytes): MUST be "0x00000000".

ProviderUID (16 bytes): For a folder in a private mailbox MUST be set to the **MailboxGuid** field value from the **RopLogon** response buffer.. For a folder in the public store MUST be set to "%x1A.44.73.90.AA.66.11.CD.9B.C8.00.AA.00.2F.C4.5A".

MessageType (2 bytes): One of several types as specified in Table 2 above.

FolderDatabaseGuid (16 bytes): A GUID associated with the message database of the folder in which the message resides, and corresponding to the **DatabaseReplicationId** field of the **folder ID**.

FolderGlobalCounter (6 bytes): An unsigned 48-bit integer identifying the folder in which the message resides.

Pad (2 bytes): MUST be zero.

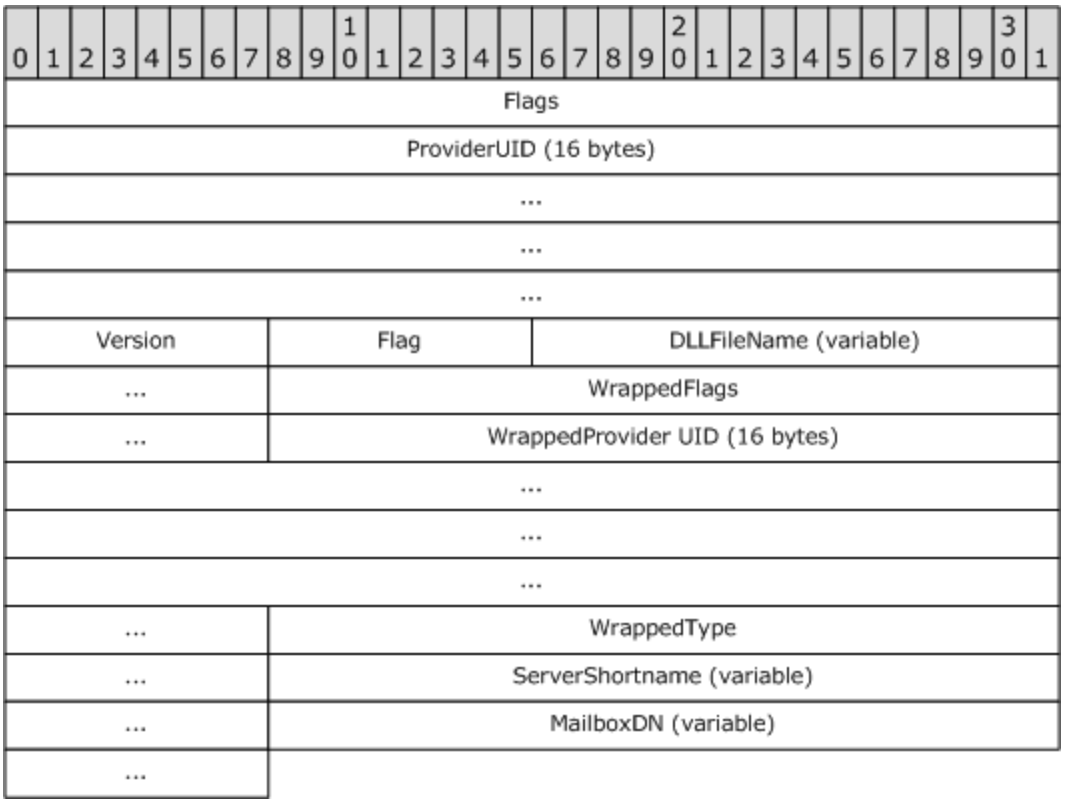
MessageDatabaseGuid (16 bytes): A GUID associated with the message database of the message and corresponding to the **DatabaseReplicationId** field of the **message ID**.

MessageGlobalCounter (6 bytes): An unsigned 48-bit integer identifying the message.

Pad (2 bytes): MUST be zero.

2.2.4.3 Message Database EntryIDs

A message database **EntryID** identifies a mailbox message database or a public folder message database itself, rather than a message or folder object residing in such a database. It is used in certain property values.



Flags (4 bytes): MUST be "0x00000000".

ProviderUID (16 bytes): MUST be %x38.A1.BB.10.05.E5.10.1A.A1.BB.08.00.2B.2A.56.C2

Version (1 byte): MUST be zero.

Flag (1 byte): MUST be zero.

DLLFileName (variable): MUST be set to the following value which represents "emsmdb.dll": %x45.4D.53.4D.44.42.2E.44.4C.4C.00.00.00.00

WrappedFlags (4 bytes): MUST be 0x00000000.

WrappedProvider UID (16 bytes): MUST be one of the following values:

Message database type	ProviderUID value
Mailbox message database	%x1B.55.FA.20.AA.66.11.CD.9B.C8.00.AA.00.2F.C4.5A
Public folder message database	%x1C.83.02.10.AA.66.11.CD.9B.C8.00.AA.00.2F.C4.5A

WrappedType (4 bytes): MUST be %x0C.00.00.00 for a mailbox store, or %x06.00.00.00 for a public store.

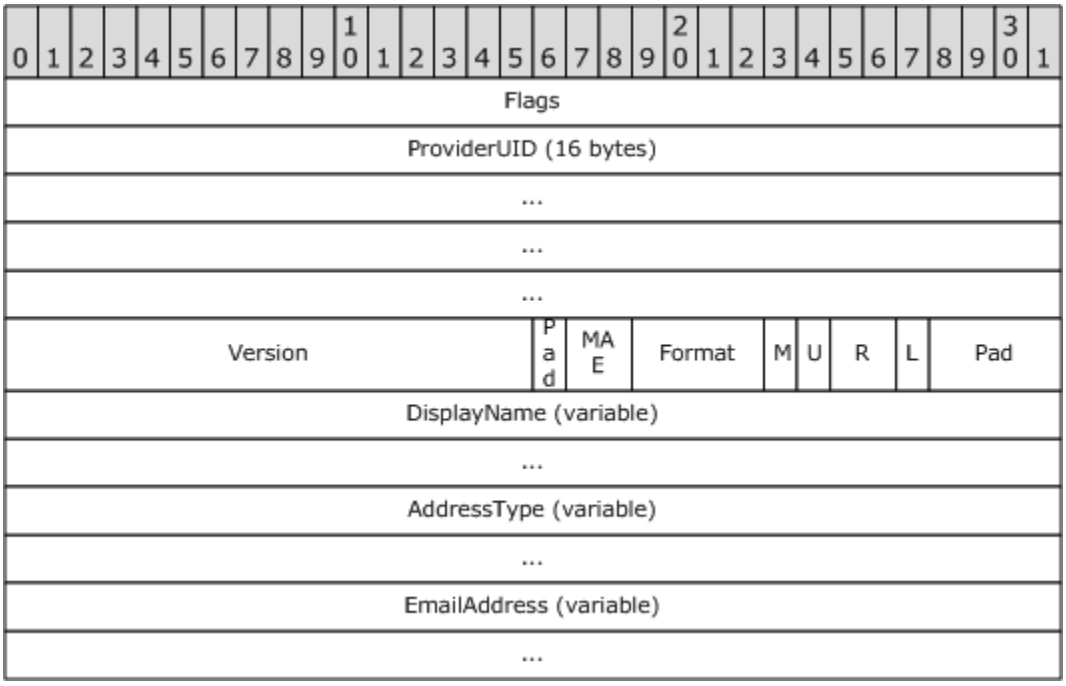
ServerShortname (variable): A string of single-byte characters terminated by a single zero byte, indicating the shortname or NetBIOS name of the server.

MailboxDN (variable): A string of single-byte characters terminated by a single zero byte and representing the **X500 DN** of the mailbox, as specified in [MS-OXOAB]. This field is present only for mailbox databases.

2.2.5 Recipient EntryIDs

2.2.5.1 One-Off EntryID

One-off EntryIDs are used to hold information about recipients that do not exist in the directory. All information about a one-off recipient is contained in the **EntryID** itself.



Flags (4 bytes): MUST be "0x00000000".

ProviderUID (16 bytes): MUST be "%x81.2B.1F.A4.BE.A3.10.19.9D.6E.00.DD.01.0F.54.02".

Version (2 bytes): MUST be "0x0000".

Pad (1bit): Reserved (mask 0x8000), MUST be b'0'.

MAE (2 bits): (2-bit flag, mask 0x0C00) The encoding used for Mac attachments, as specified in the following table.

Name	Word value	Field value	Description
BinHex	0x0000	b'00'	BinHex encoded.
UUENCODE	0x0020	b'01'	UUENCODED. Not valid if the message is in MIME, in which case the flag will be ignored and BinHex used instead.
AppleSingle	0x0040	b'10'	Apple Single encoded. Allowed only when the message format is MIME.
AppleDouble	0x0060	b'11'	Apple Double encoded. Allowed only when the message format is MIME.

Format (4 bits): (4-bit enumeration, mask 0x1E00) The message format desired for this recipient, as specified in the following table.

Name	Word value	Field value	Description
TextOnly	0x0006	b'0011'	Send a plain text message body.
HtmlOnly	0x000E	b'0111'	Send an HTML message body.
TextAndHtml	0x0016	b'1011'	Send a multipart/alternative body with both plain text and HTML.

M (1 bit): 1-bit flag (0x0100**).** If b'0', recipient prefers to receive messages in TNEF format; if b'1', recipient prefers to receive messages in MIME format.

U (1 bit): 1-bit flag (0x0080). If b'1', the string fields following are in Unicode (UTF-16) with two-byte null terminators; if b'0', the string fields following are **MBCS** characters terminated by a single 0 byte.

R (2 bits): Reserved (mask 0x0060), MUST be b'00'.

L (1 bit): 1-bit flag (0x0010). If b'1', server SHOULD NOT attempt to look up this user's e-mail address in the address book.

Pad (4 bits): Reserved (mask 0x000F), MUST be b'0000'.

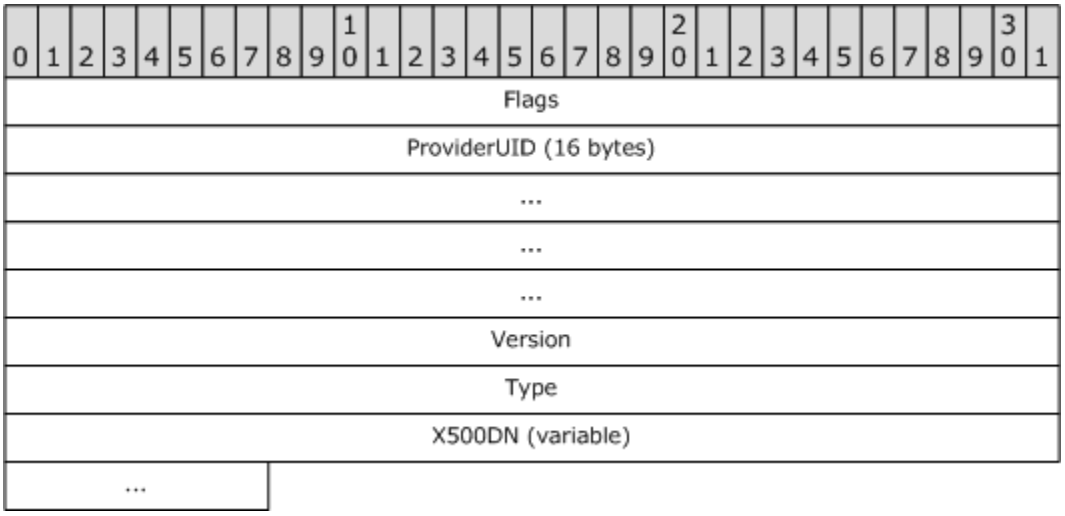
DisplayName (variable): The recipient's display name (in the recipient table, **PidTagDisplayName**) as a null-terminated string. If the U field is b'1', the null terminator is 2 bytes long; otherwise, 1 byte.

AddressType (variable): The recipient's e-mail address type (in the recipient table, **PidTagAddressType**) as a null-terminated string. If the U field is b'1', the null terminator is 2 bytes long; otherwise, 1 byte.

EmailAddress (variable): The recipient's e-mail address (in the recipient table, **PidTagEmailAddress**) as a null-terminated string. If the U field is b'1', the null terminator is 2 bytes long; otherwise, 1 byte.

2.2.5.2 Address Book EntryID

Address book EntryIDs can represent several types of address book objects including individual users, distribution lists, containers, and templates as specified in Table 4.



Flags (4 bytes): MUST be "0x00000000".

ProviderUID (16 bytes): MUST be "%xDC.A7.40.C8.C0.42.10.1A.B4.B9.08.00.2B.2F.E1.82". (Directory)

Version (4 bytes): MUST be set to "%x01.00.00.00".

Type (4 bytes): A 32-bit integer representing the type of the object. It MUST be one of the values from the following table. For more information, see [MS-OXABK].

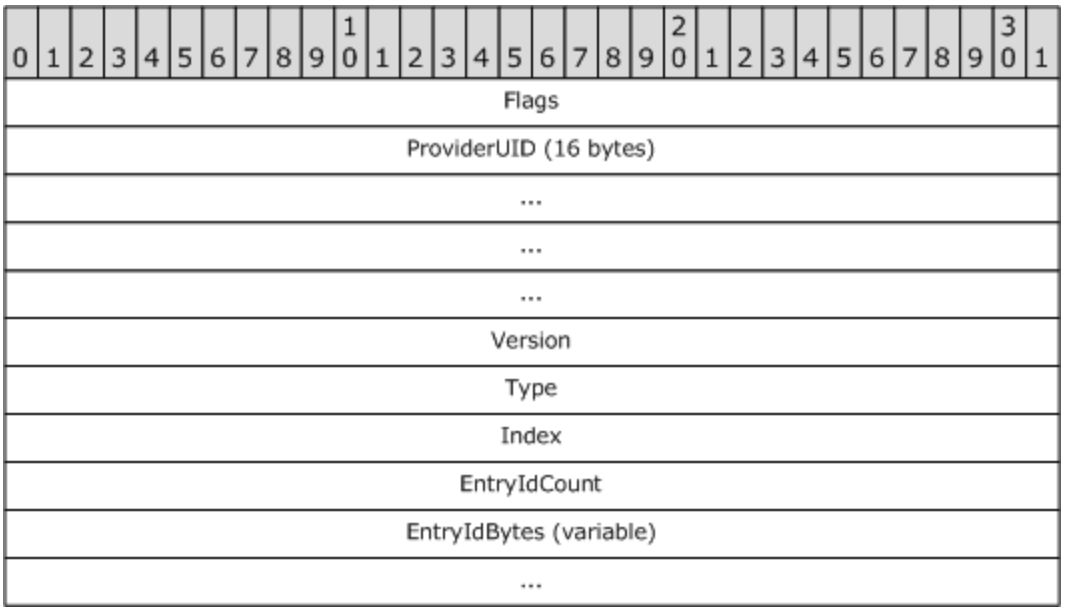
Value (hex bytes)	Address book EntryID type
0x00000000 %x00.00.00.00	Local mail user
0x00000001 %x01.00.00.00	Distribution list
0x00000002	Bulletin board or public folder

Value (hex bytes)	Address book EntryID type
%x02.00.00.00	
0x00000003 %x03.00.00.00	Automated mailbox
0x00000004 %x04.00.00.00	Organizational mailbox
0x00000005 %x05.00.00.00	Private distribution list
0x00000006 %x06.00.00.00	Remote mail user
0x00000100 %x00.01.00.00	Container
0x00000101 %x01.01.00.00	Template
0x00000102 %x02.01.00.00	One-off user
0x00000200 %x00.02.00.00	Search

X500DN (variable): The **X500 DN** of the address book object. X500DN is a null-terminated string of 8-bit characters.

2.2.5.3 Contact Address EntryID

Contact Address EntryIDs represent recipients whose information is stored in a Contact object, as specified in [MS-OXOCNTC].



Flags (4 bytes): MUST be "%x00.00.00.00".

ProviderUID (16 bytes): MUST be "%xFE.42.AA.0A.18.C7.1A.10.E8.85.0B.65.1C.24.00.00".

Version (4 bytes): MUST be "%x03.00.00.00".

Type (4 bytes): MUST be "%x04.00.00.00".

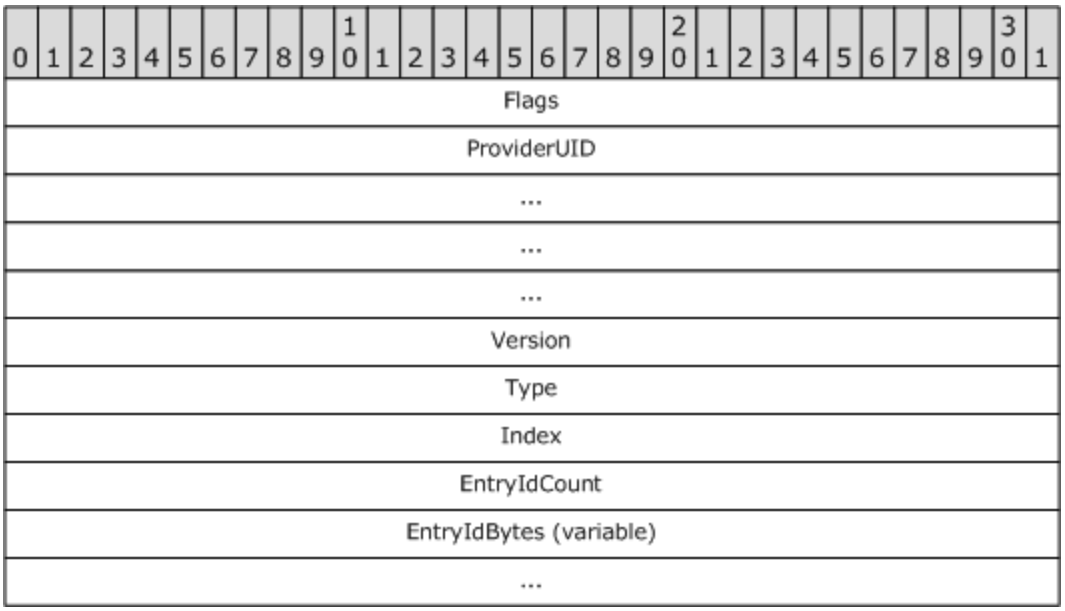
Index (4 bytes): 4-byte unsigned integer value. This value MUST be a number between "0" and "5" (inclusive) and represents which electronic address in the contact information to use. A value of "0", "1", and "2" represents Email1, Email2, and Email3 respectively, and a value of "3", "4", and "5" represents Fax1, Fax2 and Fax3 respectively. For more information, see [MS-OXOCNTC].

EntryIdCount (4 bytes): 4-byte unsigned integer value representing the count of bytes in the **EntryIdBytes** field.

EntryIdBytes (variable): EntryID of the Contact object that contains this address, which in turn has a format specified in section 2.2.4.2. The size of this structure is specified by the **EntryIdCount** field <5>.

2.2.5.4 Personal Distribution List EntryID

The Personal Distribution List **entry IDs** represents recipients whose information is stored in a Personal Distribution List object, as specified in [MS-OXOCNTC].



Flags (4 bytes): MUST be"%x00.00.00.00".

ProviderUID (16 bytes): MUST be "%xFE.42.AA.0A.18.C7.1A.10.E8.85.0B.65.1C.24.00.00".

Version (4 bytes): MUST be "%x03.00.00.00".

Type (4 bytes): MUST be "%x05.00.00.00".

Index (4 bytes): MUST be "%xFF.00.00.00".

EntryIdCount (4 bytes): 4-byte unsigned integer value representing the count of bytes in the **EntryIdBytes** field.

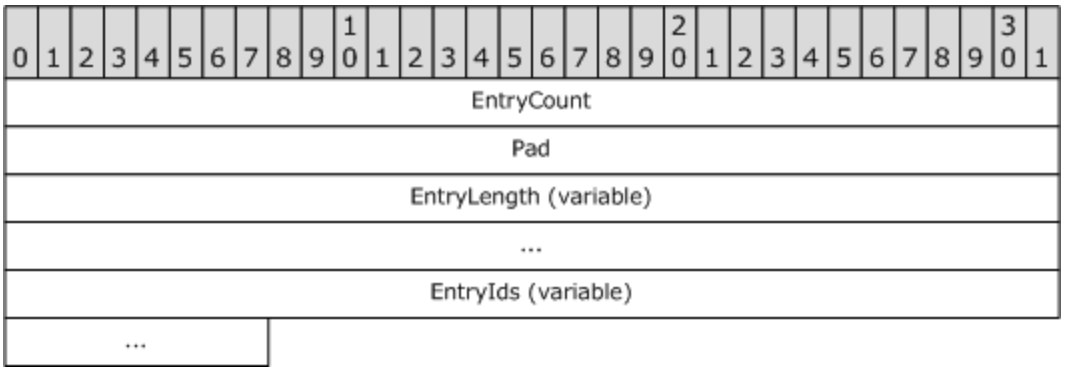
EntryIdBytes (variable): EntryID of the Personal Distribution List object to which this address refers, which in turn has the format specified in section 2.2.4.2. The size of this structure is specified by the **EntryIdCount** field <6>.

2.3 EntryID Lists

2.3.1 EntryList

EntryList is used in search folder criteria to serialize a list of EntryIDs. Briefly, there are three parts to this structure:

- The count of entries in the list
- "count" structures giving the length of individual entries
- Data for each of the individual entries



EntryCount (4 bytes): An unsigned 32-bit integer giving the number of EntryIDs in the list. It MUST be followed by that many **EntryLength** and that many **EntryID** structures.

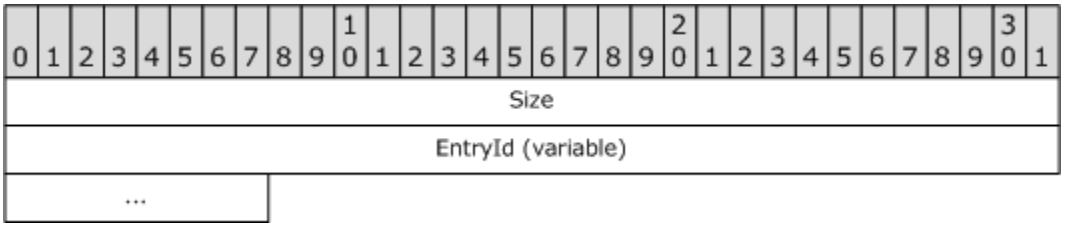
Pad (4 bytes): Can be any value; clients and servers MUST ignore the value.

EntryLength (EntryCount * 8 bytes): A series of **EntryCount** pairs: an unsigned 32-bit integer giving the size of one EntryID, followed by 4-byte pad that can have any value.

EntryIDs (variable size): A series of **EntryCount** EntryIDs. There is no padding between EntryIDs. The length of the i-th **EntryID** is specified by the first 32 bits of the i-th element of the **EntryLength**.

2.3.2 FlatEntry

A **FlatEntry** structure is simply the size of an EntryID, followed by the **EntryID** itself, for ease of serialization.

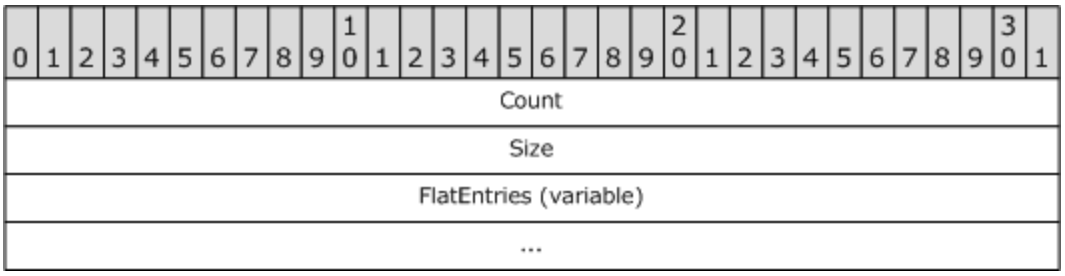


Size (4 bytes): An unsigned 32-bit integer giving the size of the following EntryID, not including the Size field itself.

EntryId: The **EntryID** itself. It MUST be exactly Size bytes long.

2.3.3 FlatEntryList

A **FlatEntryList** gives the number of EntryIDs and their total size, followed by a series of **FlatEntry** structures.



Count (4 bytes): An unsigned 32-bit integer giving the number of **FlatEntry** structures in the list.

Size (4 bytes): The total size of all the **FlatEntry** structures, not including the Count and Size fields themselves.

FlatEntries (variable size): A series of **FlatEntry** structures with the actual **EntryID** data. There MUST be exactly **Count** structures, and their total size MUST be exactly **Size**.

2.4 Error Codes

When encoded in **ROP** buffers, all error codes are transmitted as 32-bit integers in little-endian format. Error codes are presented in the following table.

Name	Description (alternate names)	Numeric value (hex)
Success	The operation succeeded. (S_OK, SUCCESS_SUCCESS)	00000000, %x00.00.00.00
GeneralFailure	The operation failed for an unspecified reason (E_FAIL, MAPI_E_CALL_FAILED, ecError, SYNC_E_ERROR)	80004005, %x05.40.00.80
OutOfMemory	Not enough memory was available to complete the operation (E_NOMEMORY, MAPI_E_NOT_ENOUGH_MEMORY, ecMAPIOOM, ecPropSize)	8007000E, %x0E.00.07.80
InvalidParameter	An invalid parameter was passed to a remote procedure call (E_INVALIDARG, MAPI_E_INVALID_PARAMETER, ecInvalidParam, ecInvalidSession, ecBadBuffer, SYNC_E_INVALID_PARAMETER)	80070057, %x57.00.07.80

Name	Description (alternate names)	Numeric value (hex)
NoInterface	The requested interface is not supported (E_NOINTERFACE, MAPI_E_INTERFACE_NOT_SUPPORTED, ecinterfacenotsupported)	80004002 %x02.40.00.80
AccessDenied	The caller does not have sufficient access rights to perform the operation (E_ACCESSDENIED, MAPI_E_NO_ACCESS, ecaccessdenied, ecpropsecurityviolation)	80070005, %x05.00.07.80
NotSupported	The server does not support this method call. (MAPI_E_NO_SUPPORT, ecNotSupported, ecNotImplemented)	80040102, %x02.01.04.80
InvalidCharacterWidth	Unicode characters were requested when only 8-bit characters are supported, or vice versa. (MAPI_E_BAD_CHARWIDTH, ecBadCharwidth)	80040103, %x03.01.04.80
StringTooLong	In the context of this method call, a string exceeds the maximum permitted length. (MAPI_E_STRING_TOO_LONG, ecStringTooLarge)	80040105, %x05.01.04.80
InvalidFlag	An unrecognized flag bit was passed to a method call. (MAPI_E_UNKNOWN_FLAGS, ecUnknownFlags, SYNC_E_UNKNOWN_FLAGS)	80040106, %x06.01.04.80
InvalidEntryID	An incorrectly formatted **EntryID** was passed to a method call. (MAPI_E_INVALID_ENTRYID, ecInvalidEntryId)	80040107, %x07.01.04.80

Name	Description (alternate names)	Numeric value (hex)
InvalidObject	A method call was made using a reference to an object that has been destroyed or is not in a viable state. (MAPI_E_INVALID_OBJECT, ecInvalidObject)	80040108, %x08.01.04.80
ObjectChanged	An attempt to commit changes failed because the object was changed separately. (MAPI_E_OBJECT_CHANGED, ecObjectModified)	80040109, %x09.01.04.80
ObjectDeleted	An operation failed because the object was deleted separately. (MAPI_E_OBJECT_DELETED, ecObjectDeleted)	8004010A, %x0A.01.04.80
ServerBusy	A table operation failed because a separate operation was in progress at the same time. (MAPI_E_BUSY, ecBusy)	8004010B, %x0B.01.04.80
OutOfDisk	Not enough disk space was available to complete the operation. (MAPI_E_NOT_ENOUGH_DISK, ecDiskFull)	8004010D, %x0D.01.04.80
OutOfResources	Not enough of an unspecified resource was available to complete the operation. (MAPI_E_NOT_ENOUGH_RESOURCES, ecInsufficientResrc)	8004010E, %x0E.01.04.80
NotFound	The requested object could not be found at the server. (MAPI_E_NOT_FOUND, ecNotFound, ecAttachNotFound, ecUnknownRecip, ecPropNotExistent)	8004010F, %x0F.01.04.80

Name	Description (alternate names)	Numeric value (hex)
VersionMismatch	Client and server versions are not compatible. (MAPI_E_VERSION, ecVersionMismatch, ecVersion)	80040110, %x10.01.04.80
LogonFailed	A client was unable to log on to the server. (MAPI_E_LOGON_FAILED, ecLoginFailure)	80040111, %x11.01.04.80
TooManySessions	A server or service is unable to create any more sessions. (MAPI_E_SESSION_LIMIT, ecTooManySessions)	80040112, %x12.01.04.80
UserCanceled	An operation failed because a user cancelled it. (MAPI_E_USER_CANCEL, ecUserAbort)	80040113, %x13.01.04.80
AbortFailed	A **RopAbort** <7> or **RopAbortSubmit** <8> request was unsuccessful. (MAPI_E_UNABLE_TO_ABORT, ecUnableToAbort)	80040114, %x14.01.04.80
NetworkError	An operation was unsuccessful because of a problem with network operations or services. (MAPI_E_NETWORK_ERROR, ecNetwork)	80040115, %x15.01.04.80
DiskError	There was a problem writing to or reading from disk. (MAPI_E_DISK_ERROR, ecWriteFault, ecReadFault)	80040116, %x16.01.04.80
TooComplex	The operation requested is too complex for the server to handle; often applied to restrictions. (MAPI_E_TOO_COMPLEX, ecTooComplex)	80040117, %x17.01.04.80

Name	Description (alternate names)	Numeric value (hex)
InvalidColumn	The column requested is not allowed in this type of table. (MAPI_E_BAD_COLUMN)	80040118, %x18.01.04.80
ComputedValue	A property cannot be updated because it is read-only, computed by the server. (MAPI_E_COMPUTED, ecComputed)	8004011A, %x1A.01.04.80
CorruptData	There is an internal inconsistency in a database, or in a complex property value. (MAPI_E_CORRUPT_DATA, ecCorruptData)	8004011B, %x1B.01.04.80
InvalidCodepage	The server is not configured to support the code page requested by the client. (MAPI_E_UNKNOWN_CPID)	8004011E, %x1E.01.04.80
InvalidLocale	The server is not configured to support the locale requested by the client. (MAPI_E_UNKNOWN_LCID)	8004011F, %x1F.01.04.80
TimeSkew	The operation failed due to clock skew between servers. (MAPI_E_INVALID_ACCESS_TIME, ecTimeSkew)	80040123, %x23.01.04.80
EndOfSession	Indicates that the server session has been destroyed, possibly by a server restart. (MAPI_E_END_OF_SESSION)	80040200, %x00.02.04.80
UnknownEntryId	Indicates that the **EntryID** passed to OpenEntry was created by a different MAPI provider. (MAPI_E_UNKNOWN_ENTRYID)	80040201, %x01.02.04.80
NotCompleted	A complex operation such as building a table row set could not be completed. (MAPI_E_UNABLE_TO_COMPLETE, ecUnableToComplete)	80040400, %x00.04.04.80

Name	Description (alternate names)	Numeric value (hex)
Timeout	An asynchronous operation did not succeed within the specified timeout. (MAPI_E_TIMEOUT, ecTimeout)	80040401, %x01.04.04.80
EmptyTable	A table essential to the operation is empty. (MAPI_E_TABLE_EMPTY, ecTableEmpty)	80040402, %x02.04.04.80
TableTooBig	The table is too big for the requested operation to complete. (MAPI_E_TABLE_TOO_BIG, ecTableTooBig)	80040403, %x03.04.04.80
InvalidBookmark	The bookmark passed to a table operation was not created on the same table. (MAPI_E_INVALID_BOOKMARK, ecInvalidBookmark)	80040405, %x05.04.04.80
ErrorWait	A wait timeout has expired. (MAPI_E_WAIT, ecWait)	80040500, %x00.05.04.80
ErrorCancel	The operation had to be canceled, (MAPI_E_CANCEL, ecCancel)	80040501, %x01.05.04.80
NoSuppress	The server does not support the suppression of read receipts. (MAPI_E_NO_SUPPRESS)	80040602, %x02.06.04.80
CollidingNames	A folder or item cannot be created because one with the same name or other criteria already exists. (MAPI_E_COLLISION, ecDuplicateName)	80040604, %x04.06.04.80
NotInitialized	The subsystem is not ready. (MAPI_E_NOT_INITIALIZED, ecNotInitialized)	80040605, %x05.06.04.80

Name	Description (alternate names)	Numeric value (hex)
NoRecipients	A message cannot be sent because it has no recipients. (MAPI_E_NO_RECIPIENTS)	80040607, %x07.06.04.80
AlreadySent	A message cannot be opened for modification because it has already been sent. (MAPI_E_SUBMITTED, ecSubmitted)	80040608, %x08.06.04.80
HasFolders	A folder cannot be deleted because it still contains subfolders. (MAPI_E_HAS_FOLDERS, ecFolderHasChildren)	80040609, %x09.06.04.80
HasMessages	A folder cannot be deleted because it still contains messages. (MAPI_E_HAS_MESSAGES, ecFolderHasContents)	8004060A, %x0A.06.04.80
FolderCycle	A folder move or copy operation would create a cycle (typically when the request is to copy a parent folder to one of its subfolders). (MAPI_E_FOLDER_CYCLE, ecRootFolder)	8004060B, %x0B.06.04.80
TooManyLocks	Too many locks have been requested. (MAPI_E_LOCKID_LIMIT, ecLockIdLimit)	8004060D, %x0D.06.04.80
AmbiguousRecipient	An unresolved recipient matches more than one entry in the directory. (MAPI_E_AMBIGUOUS_RECIP, ecAmbiguousRecip)	80040700, %x00.07.04.80
ObjectDeleted	The requested object was previously deleted. (SYNC_E_OBJECT_DELETED)	80040800, %x00.08.04.80

Name	Description (alternate names)	Numeric value (hex)
IgnoreFailure	An error occurred but it's safe to ignore the error, perhaps because the change in question has been superseded. (SYNC_E_IGNORE)	80040801 %x01.08.04.80
SyncConflict	Conflicting changes to an object have been detected. (SYNC_E_CONFLICT)	80040802 %x02.08.04.80
NoParentFolder	The parent folder could not be found. (SYNC_E_NO_PARENT)	80040803 %x03.08.04.80
CycleDetected	An operation would create a cycle (for instance, by copying a parent folder to one of its subfolders).	80040804 %x04.08.04.80
NotSynchronized	A sync operation did not take place, possibly due to a conflicting change. (SYNC_E_UNSYNCHRONIZED)	80040805 %x05.08.04.80
NamedPropertyQuota	The message database cannot store any more named property mappings. (MAPI_E_NAMED_PROP_QUOTA_EXCEEDED, ecNPQuotaExceeded)	80040900, %x00.09.04.80

2.4.1 Additional Error Codes

When encoded in **ROP** buffers, all error codes are transmitted as 32-bit integers in little-endian format. Additional error codes are presented in the following table.

Name	Description (alternate names)	Numeric value (hex)
IsamError	Unspecified database failure. (ecJetError)	0x000003EA
UnknownUser	Unable to identify a home message database for this user. (ecUnknownUser)	0x000003EB

Name	Description (alternate names)	Numeric value (hex)
Exiting	The server is in the process of stopping. (ecExiting)	0x000003ED
BadConfiguration	Protocol settings for this user are incorrect. (ecBadConfig)	0x000003EE
UnknownCodePage	The specified code page is not installed on the server. (ecUnknownCodePage)	0x000003EF
ServerMemory	The server is out of memory. (ecServerOOM, ecMemory)	0x000003F0
LoginPermission	This user does not have access rights to the mailbox. (ecLoginPerm)	0x000003F2
DatabaseRolledBack	The database has been restored and needs fixup, but cannot be fixed up. (ecDatabaseRolledBack)	0x000003F3
DatabaseCopiedError	The database file has been copied from another server. (ecDatabaseCopiedError)	0x000003F4
AuditNotAllowed	Auditing of security operations is not permitted. (ecAuditNotAllowed)	0x000003F5
ZombieUser	User has no security identifier. (ecZombieUser)	0x000003F6
UnconvertableACL	An access control list cannot be converted to NTFS format. (ecUnconvertableACL)	0x000003F7
NoFreeJetSessions	No Jet session is available. (ecNoFreeJses)	0x0000044C
DifferentJetSession	Warning, a Jet session other than the one requested was returned.	0x0000044D

Name	Description (alternate names)	Numeric value (hex)
	(ecDifferentJses)	
FileRemove	An error occurred when attempting to remove a database file. (ecFileRemove)	0x0000044F
ParameterOverflow	Parameter value overflow. (ecParameterOverflow)	0x00000450
BadVersion	Bad message store database version number. (ecBadVersion)	0x00000451
TooManyColumns	Too many columns requested in SetColumns. (ecTooManyCols)	0x00000452
HaveMore	A ROP has more data to return. (ecHaveMore)	0x00000453
DatabaseError	General database problem (ecDatabaseError)	0x00000454
IndexNameTooBig	An index name is larger than what Jet allows (ecIndexNameTooBig)	0x00000455
UnsupportedProperty	The property data type is not supported. (ecUnsupportedProp)	0x00000456
MessageNotSaved	During AbortSubmit, a message was not saved. (ecMsgNotSaved)	0x00000457
UnpublishedNotification	A notification could not be published at this time. (ecUnpubNotif)	0x00000459
DifferentRoot	Moving or copying folders to a different top-level hierarchy is not supported. (ecDifferentRoot)	0x0000045B
BadFolderName	Invalid folder name. (ecBadFolderName)	0x0000045C

Name	Description (alternate names)	Numeric value (hex)
AttachmentOpen	The attachment is open. (ecAttachOpen)	0x0000045D
InvalidCollapseState	The collapse state given to SetCollapseState is invalid. (ecInvClpsState)	0x0000045E
SkipMyChildren	While walking a folder tree, do not consider children of this folder. (ecSkipMyChildren)	0x0000045F
SearchFolder	The operation is not supported on a search folder. (ecSearchFolder)	0x00000460
NotSearchFolder	The operation is valid only on a search folder. (ecNotSearchFolder)	0x00000461
FolderSetReceive	This is a receive folder and cannot be deleted. (ecFolderSetReceive)	0x00000462
NoReceiveFolder	No receive folder is available (even no default). (ecNoReceiveFolder)	0x00000463
DeleteSubmittedMessage	Deleting a message that has been submitted for sending is not permitted. (ecNoDelSubmitMsg)	0x00000465
InvalidRecipients	It was impossible to deliver to this recipient. (ecInvalidRecips)	0x00000467
NoReplicaHere	No replica of the public folder in this message database. (ecNoReplicaHere)	0x00000468
NoReplicaAvailable	No available message database has a replica of this public folder. (ecNoReplicaAvailable)	0x00000469

Name	Description (alternate names)	Numeric value (hex)
PublicDatabase	The operation is invalid on a public message database. (ecPublicMDB)	0x0000046A
NotPublicDatabase	The operation is valid only on a public message database. (ecNotPublicMDB)	0x0000046B
RecordNotFound	The record was not found. (ecRecordNotFound)	0x0000046C
ReplicationConflict	A replication conflict was detected. (ecReplConflict)	0x0000046D
FXBufferOverrun	Prevented an overrun while reading a fast transfer buffer. (ecFxBufferOverrun)	0x00000470
FXBufferEmpty	No more in a fast transfer buffer. (ecFxBufferEmpty)	0x00000471
FXPartialValue	Partial long value in a fast transfer buffer. (ecFxPartialValue)	0x00000472
FxNoRoom	No room for an atomic value in a fast transfer buffer. (ecFxNoRoom)	0x00000473
TimeExpired	Housekeeping functions have exceeded their time window. (ecMaxTimeExpired)	0x00000474
DestinationError	An error occurred on the destination folder during a copy operation. (ecDstError)	0x00000475
DatabaseNotInitialized	The message database was not properly initialized. (ecMDBNotInit)	0x00000476

Name	Description (alternate names)	Numeric value (hex)
WrongServer	This server does not host the user's mailbox database. (ecWrongServer)	0x00000478
BufferTooSmall	A buffer passed to this function is not big enough. (ecBufferTooSmall)	0x0000047D
AttachmentResolutionRequired	Linked attachments could not be resolved to actual files. (ecRequiresRefResolve)	0x0000047E
ServerPaused	The service is in a paused state. (ecServerPaused)	0x0000047F
ServerBusy	The server is too busy to complete an operation. (ecServerBusy)	0x00000480
NoSuchLogon	No such logon exists in the message database's Logon list. (ecNoSuchLogon)	0x00000481
LoadLibraryFailed	Internal error: the service cannot load a required DLL. (ecLoadLibFailed)	0x00000482
AlreadyConfigured	A synchronization object has already been configured. (ecObjAlreadyConfig)	0x00000483
NotConfigured	A synchronization object has not yet been configured. (ecObjNotConfig)	0x00000484
DataLoss	A code page conversion incurred when data loss. (ecDataLoss)	0x00000485
MaximumSendThreadEx	The maximum number of send threads has been exceeded.	0x00000488

Name	Description (alternate names)	Numeric value (hex)
ceeded	(ecMaxSendThreadExceeded)	
FxErrorMarker	A fast transfer error marker was found, and recovery is necessary. (ecFxErrorMarker)	0x00000489
NoFreeJtabs	There are no more free Jet tables. (ecNoFreeJtabs)	0x0000048A
NotPrivateDatabase	The operation is only valid on a private mailbox database. (ecNotPrivateMDB)	0x0000048B
IsintegMDB	The message database has been locked by the ISINTEG utility. (ecIsintegMDB)	0x0000048C
RecoveryMismatch	A recovery storage group operation was attempted on a non-RSG message database, or vice-versa. (ecRecoveryMDBMismatch)	0x0000048D
TableMayNotBeDeleted	Attempt to delete a critical table, such as the Messages or Attachments table. (ecTableMayNotBeDeleted)	0x0000048E
RpcRegisterIf	Error in registering RPC interfaces. (ecRpcRegisterIf)	0x000004B1
RpcListen	Error in starting the RPC listener. (ecRpcListen)	0x000004B2
RpcFormat	A badly formatted RPC buffer was detected. (ecRpcFormat)	0x000004B6
NoCopyTo	Single instance storage cannot be used in this case. (ecNoCopyTo)	0x000004B7
NullObject	An object handle reference in the RPC buffer could not be resolved.	0x000004B9

Name	Description (alternate names)	Numeric value (hex)
	(ecNullObject)	
RpcAuthentication	Server requests client to use authentication. (ecRpcAuthentication)	0x000004BC
RpcBadAuthenticationLevel	The server doesn't recognize a client's authentication level. (ecRpcBadAuthenticationLevel)	0x000004BD
NullCommentRestriction	The sub-restriction of a comment restriction is empty. (ecNullCommentRestriction)	0x000004BE
RulesLoadError	Rule data was unavailable for this folder. (ecRulesLoadError)	0x000004CC
RulesDeliverErr	Delivery-time failure in rule execution. (ecRulesDeliverErr)	0x000004CD
RulesParsingErr	Invalid syntax in a stored rule condition or action. (ecRulesParsingErr)	0x000004CE
RulesCreateDAE	Failure creating a deferred rule action error message. (ecRulesCreateDaeErr)	0x000004CF
RulesCreateDAM	Failure creating a deferred rule action message. (ecRulesCreateDamErr)	0x000004D0
RulesNoMoveCopyFolder	A move or copy rule action could not be performed due to a problem with the target folder. (ecRulesNoMoveCopyFolder)	0x000004D1
RulesNoFolderRights	A move or copy rule action could not be performed due to a permissions problem with the target folder. (ecRulesNoFolderRights)	0x000004D2

Name	Description (alternate names)	Numeric value (hex)
MessageTooBig	A message could not be delivered because it exceeds a size limit. (ecMessageTooBig)	0x000004D4
FormNotValid	There is a problem with the form mapped to the message's message class. (ecFormNotValid)	0x000004D5
NotAuthorized	Delivery to the desired folder was not authorized. (ecNotAuthorized)	0x000004D6
DeleteMessage	The message was deleted by a rule action. (ecDeleteMessage)	0x000004D7
BounceMessage	Delivery of the message was denied by a rule action. (ecBounceMessage)	0x000004D8
QuotaExceeded	The operation failed because it would have exceeded a resource quota. (ecQuotaExceeded)	0x000004D9
MaxSubmissionExceeded	A message could not be submitted because its size exceeds the defined maximum. (ecMaxSubmissionExceeded)	0x000004DA
MaxAttachmentExceeded	The maximum number of message attachments has been exceeded. (ecMaxAttachmentExceeded)	0x000004DB
SendAsDenied	The user account does not have permission to send mail as the owner of this mailbox. (ecSendAsDenied)	0x000004DC
ShutoffQuotaExceeded	The operation failed because it would have exceeded the mailbox's shutoff quota. (ecShutoffQuotaExceeded)	0x000004DD
TooManyOpenObjects	A client has opened too many objects of a specific type.	0x000004DE

Name	Description (alternate names)	Numeric value (hex)
	(ecMaxObjsExceeded)	
ClientVersionBlocked	The server is configured to block clients of this version. (ecClientVerDisallowed)	0x000004DF
RpcHttpDisallowed	The server is configured to block RPC connections via HTTP. (ecRpcHttpDisallowed)	0x000004E0
CachedModeRequired	The server is configured to block online mode connections; only cached mode connections are allowed. (ecCachedModeRequired)	0x000004E1
FolderNotCleanedUp	The folder has been deleted but not yet cleaned up. (ecFolderNotCleanedUp)	0x000004E3
FormatError	Part of a ROP buffer was incorrectly formatted. (ecFmtError)	0x000004ED
NotExpanded	Error in expanding or collapsing rows in a categorized view. (ecNotExpanded)	0x000004F7
NotCollapsed	Error in expanding or collapsing rows in a categorized view. (ecNotCollapsed)	0x000004F8
NoExpandLeafRow	Leaf rows cannot be expanded; only category header rows can be expanded. (ecLeaf)	0x000004F9
UnregisteredNameProp	An operation was attempted on a named property ID for which no name has been registered. (ecUnregisteredNameProp)	0x000004FA
FolderDisabled	Access to the folder is disabled, perhaps because form design is in progress.	0x000004FB

Name	Description (alternate names)	Numeric value (hex)
	(ecFolderDisabled)	
DomainError	There is an inconsistency in the message database's association with its server. (ecDomainError)	0x000004FC
NoCreateRight	The operation requires create access rights which the user does not have. (ecNoCreateRight)	0x000004FF
PublicRoot	The operation requires create access rights at a public folder root. (ecPublicRoot)	0x00000500
NoReadRight	The operation requires read access rights which the user does not have. (ecNoReadRight)	0x00000501
NoCreateSubfolderRight	The operation requires create subfolder access rights which the user does not have. (ecNoCreateSubfolderRight)	0x00000502
MessageCycle	The source message contains the destination message and cannot be attached to it. (ecMsgCycle)	0x00000504
NullDestinationObject	The RPC buffer contains a destination object handle that could not be resolved to a server object. (ecDstNullObject)	0x00000503
TooManyRecips	A hard limit on the number of recipients per message was exceeded. (ecTooManyRecips)	0x00000505
VirusScanInProgress	The operation failed because the target message is being scanned for viruses. (ecVirusScanInProgress)	0x0000050A
VirusDetected	The operation failed because the target message is infected with a virus.	0x0000050B

Name	Description (alternate names)	Numeric value (hex)
	(ecVirusDetected)	
MailboxInTransit	The mailbox is in transit and is not accepting mail. (ecMailboxInTransit)	0x0000050C
BackupInProgress	The operation failed because the message database is being backed up. (ecBackupInProgress)	0x0000050D
VirusMessageDeleted	The operation failed because the target message was infected with a virus and has been deleted. (ecVirusMessageDeleted)	0x0000050E
InvalidBackupSequence	Backup steps were performed out of sequence. (ecInvalidBackupSequence)	0x0000050F
InvalidBackupType	The requested backup type was not recognized. (ecInvalidBackupType)	0x00000510
TooManyBackups	Too many backups are already in progress. (ecTooManyBackupsInProgress)	0x00000511
RestoreInProgress	A restore is already in progress. (ecRestoreInProgress)	0x00000512
DuplicateObject	The object already exists. (ecDuplicateObject)	0x00000579
ObjectNotFound	An internal database object could not be found. (ecObjectNotFound)	0x0000057A
FixupReplyRule	The template message ID in a reply rule object is missing or incorrect. (ecFixupReplyRule)	0x0000057B
TemplateNotFound	The reply template could not be found for a	0x0000057C

Name	Description (alternate names)	Numeric value (hex)
	message that triggered an auto-reply rule. (ecTemplateNotFound)	
RuleExecution	An error occurred while executing a rule action. (ecRuleExecution)	0x0000057D
DSNoSuchObject	A server object could not be found in the directory. (ecDSNoSuchObject)	0x0000057E
AlreadyTombstoned	An attempt to tombstone a message already in the message tombstone list failed. (ecMessageAlreadyTombstoned)	0x0000057F
ReadOnlyTransaction	A write operation was attempted in a read-only transaction. (ecRequiresRWTransaction)	0x00000596
Paused	Attempt to pause a server that is already paused. (ecPaused)	0x0000060E
NotPaused	Attempt to unpause a server that is not paused. (ecNotPaused)	0x0000060F
WrongMailbox	The operation was attempted on the wrong mailbox. (ecWrongMailbox)	0x00000648
ChangePassword	The account password needs to be changed. (ecChgPassword)	0x0000064C
PasswordExpired	The account password has expired. (ecPwdExpired)	0x0000064D
InvalidWorkstation	The account has logged on from the wrong workstation. (ecInvWkstn)	0x0000064E

Name	Description (alternate names)	Numeric value (hex)
InvalidLogonHours	The account has logged on at the wrong time of day. (ecInvLogonHrs)	0x0000064F
AccountDisabled	The account is disabled. (ecAcctDisabled)	0x00000650
RuleVersion	The rule data contains an invalid rule version. (ecRuleVersion)	0x000006A4
RuleFormat	The rule condition or action was incorrectly formatted. (ecRuleFormat)	0x000006A5
RuleSendAsDenied	The rule is not authorized to send from this mailbox. (ecRuleSendAsDenied)	0x000006A6
NoServerSupport	A newer client requires functionality that an older server does not support. (ecNoServerSupport)	0x000006B9
LockTimedOut	An attempt to unlock a message failed because the lock had already timed out. (ecLockTimedOut)	0x000006BA
ObjectLocked	The operation failed because the target object is locked. (ecObjectLocked)	0x000006BB
InvalidLockNamespace	Attempt to lock a nonexistent object. (ecInvalidLockNamespace)	0x000006BD
MessageDeleted	Operation failed because the message has been deleted. (ecMessageDeleted)	0x000007D6
ProtocolDisabled	The requested protocol is disabled in the server configuration. (ecProtocolDisabled)	0x000007D8

Name	Description (alternate names)	Numeric value (hex)
CleartextLogonDisabled	Clear text logons were disabled. (ecCleartextLogonDisabled)	0x000007D9
Rejected	The operation was rejected, perhaps because it is not supported. (ecRejected)	0x000007EE
AmbiguousAlias	User account information did not uniquely identify a user. (ecAmbiguousAlias)	0x0000089A
UnknownMailbox	No mailbox object for this logon exists in the address book. (ecUnknownMailbox)	0x0000089B
ExpressionReserved	Internal error in evaluating an expression. (ecExpReserved)	0x000008FC
ExpressionParseDepth	The expression tree exceeds a defined depth limit. (ecExpParseDepth)	0x000008FD
ExpressionArgumentType	An argument to a function has the wrong type. (ecExpFuncArgType)	0x000008FE
ExpressionSyntax	Syntax error in expression. (ecExpSyntax)	0x000008FF
ExpressionBadStringToken	Invalid string token in expression. (ecExpBadStrToken)	0x00000900
ExpressionBadColToken	Invalid column name in expression. (ecExpBadColToken)	0x00000901
ExpressionTypeMismatch	Property types in, for example, a comparison expression, are incompatible. (ecExpTypeMismatch)	0x00000902
ExpressionOperatorNotS	The requested operator is not supported.	0x00000903

Name	Description (alternate names)	Numeric value (hex)
upported	(ecExpOpNotSupported)	
ExpressionDivideByZero	Divide by zero doesn't work. (ecExpDivByZero)	0x00000904
ExpressionUnaryArgument	The argument to a unary expression is of incorrect type. (ecExpUnaryArgType)	0x00000905
NotLocked	An attempt to lock a resource failed. (ecNotLocked)	0x00000960
ClientEvent	A client-suplied event has fired. (ecClientEvent)	0x00000961
CorruptEvent	Data in the event table is bad. (ecCorruptEvent)	0x00000965
CorruptWatermark	A watermark in the event table is bad. (ecCorruptWatermark)	0x00000966
EventError	General event processing error. (ecEventError)	0x00000967
WatermarkError	An event watermark is out of range or otherwise invalid. (ecWatermarkError)	0x00000968
NonCanonicalACL	A modification to an access control list failed because the existing ACL is not in canonical format. (ecNonCanonicalACL)	0x00000969
MailboxDisabled	Logon was unsuccessful because the mailbox is disabled. (ecMailboxDisabled)	0x0000096C
RulesFolderOverQuota	A move or copy rule action failed because the destination folder is over quota. (ecRulesFolderOverQuota)	0x0000096D

Name	Description (alternate names)	Numeric value (hex)
AddressBookUnavailable	The address book server could not be reached. (ecADUnavailable)	0x0000096E
AddressBookError	Unspecified error from the Address Book server. (ecADError)	0x0000096F
AddressBookObjectNotFound	An object was not found in the Address Book. (ecADNotFound)	0x00000971
AddressBookPropertyError	A property was not found in the Address Book. (ecADPropertyError)	0x00000972
NotEncrypted	The server is configured to force encrypted connections, but the client requested an unencrypted connection. (ecNotEncrypted)	0x00000970
RpcServerTooBusy	An external RPC call failed because the server was too busy. (ecRpcServerTooBusy)	0x00000973
RpcOutOfMemory	An external RPC call failed because the local server was out of memory. (ecRpcOutOfMemory)	0x00000974
RpcServerOutOfMemory	An external RPC call failed because the remote server was out of memory. (ecRpcServerOutOfMemory)	0x00000975
RpcOutOfResources	An external RPC call failed because the remote server was out of an unspecified resource. (ecRpcOutOfResources)	0x00000976
RpcServerUnavailable	An external RPC call failed because the remote server was unavailable.	0x00000977

Name	Description (alternate names)	Numeric value (hex)
	(ecRpcServerUnavailable)	
SecureSubmitError	A failure occurred while setting the secure submission state of a message. (ecSecureSubmitError)	0x0000097A
EventsDeleted	Requested events were already deleted from the queue. (ecEventsDeleted)	0x0000097C
SubsystemStopping	A component service is in the process of shutting down. (ecSubsystemStopping)	0x0000097D
AttendantUnavailable	The system attendant service is unavailable. (ecSAUnavailable)	0x0000097E
CIStopping	The content indexer service is stopping. (ecCIStopping)	0x00000A28
FxInvalidState	An internal fast transfer object has invalid state. (ecFxInvalidState)	0x00000A29
FxUnexpectedMarker	Fast Transfer parsing has hit an invalid marker. (ecFxUnexpectedMarker)	0x00000A2A
DuplicateDelivery	A copy of this message has already been delivered. (ecDuplicateDelivery)	0x00000A2B
ConditionViolation	The condition was not met for a conditional operation. (ecConditionViolation)	0x00000A2C
IsamErrorRfsFailure	The Resource Failure Simulator failed. (JET_errRfsFailure)	0xFFFFFF9C
IsamErrorRfsNotArmed	The Resource Failure Simulator has not been initialized. (JET_errRfsNotArmed)	0xFFFFFF9B

Name	Description (alternate names)	Numeric value (hex)
IsamErrorFileClose	The file could not be closed. (JET_errFileClose)	0xFFFFFF9A
IsamErrorOutOfThreads	The thread could not be started. (JET_errOutOfThreads)	0xFFFFFF99
IsamErrorTooManyIO	The system is busy due to too many IOs. (JET_errTooManyIO)	0xFFFFFF97
IsamErrorTaskDropped	The requested asynchronous task could not be executed. (JET_errTaskDropped)	0xFFFFFF96
IsamErrorInternalError	There was a fatal internal error. (JET_errInternalError)	0xFFFFFF95
IsamErrorDatabaseBufferDependenciesCorrupted	The buffer dependencies were set improperly and there was a recovery failure. (JET_errDatabaseBufferDependenciesCorrupted)	0xFFFFFF01
IsamErrorPreviousVersion	The version already existed and there was a recovery failure. (JET_errPreviousVersion)	0xFFFFFEBE
IsamErrorPageBoundary	The page boundary has been reached. (JET_errPageBoundary)	0xFFFFFEBD
IsamErrorKeyBoundary	The key boundary has been reached. (JET_errKeyBoundary)	0xFFFFFEBC
IsamErrorBadPageLink	The database is corrupt. (JET_errBadPageLink)	0xFFFFFEB9
IsamErrorBadBookmark	The bookmark has no corresponding address in the database. (JET_errBadBookmark)	0xFFFFFEB8
IsamErrorNTSystemCallFailed	The call to the operating system failed. (JET_errNTSystemCallFailed)	0xFFFFFEB2
IsamErrorBadParentPageLink	A parent database is corrupt. (JET_errBadParentPageLink)	0xFFFFFEAE

Name	Description (alternate names)	Numeric value (hex)
IsamErrorSPAvailExtCacheOutOfSync	The AvailExt cache does not match the B+ tree. (JET_errSPAvailExtCacheOutOfSync)	0xFFFFFEAC
IsamErrorSPAvailExtCorrupted	The AllAvailExt space tree is corrupt. (JET_errSPAvailExtCorrupted)	0xFFFFFEAB
IsamErrorSPAvailExtCacheOutOfMemory	An out of memory error occurred while allocating an AvailExt cache node. (JET_errSPAvailExtCacheOutOfMemory)	0xFFFFFEAA
IsamErrorSPOwnExtCorrupted	The OwnExt space tree is corrupt. (JET_errSPOwnExtCorrupted)	0xFFFFFEA9
IsamErrorDbTimeCorrupted	The Dbtime on the current page is greater than the global database dbtime. (JET_errDbTimeCorrupted)	0xFFFFFEA8
IsamErrorKeyTruncated	An attempt to create a key for an index entry failed because the key would have been truncated and the index definition disallows key truncation. (JET_errKeyTruncated)	0xFFFFFEA6
IsamErrorKeyTooBig	The key is too large. (JET_errKeyTooBig)	0xFFFFFE68
IsamErrorInvalidLoggedOperation	The logged operation cannot be redone. (JET_errInvalidLoggedOperation)	0xFFFFFE0C
IsamErrorLogFileCorrupt	The log file is corrupt. (JET_errLogFileCorrupt)	0xFFFFFE0B
IsamErrorNoBackupDirectory	A backup directory was not given. (JET_errNoBackupDirectory)	0xFFFFFE09
IsamErrorBackupDirectoryNotEmpty	The backup directory is not empty. (JET_errBackupDirectoryNotEmpty)	0xFFFFFE08
IsamErrorBackupInProgress	The backup is already active. (JET_errBackupInProgress)	0xFFFFFE07
IsamErrorRestoreInProgr	A restore is in progress.	0xFFFFFE06

Name	Description (alternate names)	Numeric value (hex)
ess	(JET_errRestoreInProgress)	
IsamErrorMissingPreviousLogFile	The log file is missing for the check point. (JET_errMissingPreviousLogFile)	0xFFFFFE03
IsamErrorLogWriteFail	There was a failure writing to the log file. (JET_errLogWriteFail)	0xFFFFFE02
IsamErrorLogDisabledDueToRecoveryFailure	The attempt to write to the log after recovery failed. (JET_errLogDisabledDueToRecoveryFailure)	0xFFFFFE01
IsamErrorCannotLogDuringRecoveryRedo	The attempt to write to the log during the recovery redo failed. (JET_errCannotLogDuringRecoveryRedo)	0xFFFFFE00
IsamErrorLogGenerationMismatch	The name of the log file does not match the internal generation number. (JET_errLogGenerationMismatch)	0xFFFFFDFF
IsamErrorBadLogVersion	The version of the log file is not compatible with the ESE version. (JET_errBadLogVersion)	0xFFFFFDFE
IsamErrorInvalidLogSequence	The timestamp in the next log does not match the expected timestamp. (JET_errInvalidLogSequence)	0xFFFFFDFD
IsamErrorLoggingDisabled	The log is not active. (JET_errLoggingDisabled)	0xFFFFFDFC
IsamErrorLogBufferTooSmall	The log buffer is too small for recovery. (JET_errLogBufferTooSmall)	0xFFFFFDFB
IsamErrorLogSequenceEnd	The maximum log file number has been exceeded. (JET_errLogSequenceEnd)	0xFFFFFDF9
IsamErrorNoBackup	There is no backup in progress. (JET_errNoBackup)	0xFFFFFDF8

Name	Description (alternate names)	Numeric value (hex)
IsamErrorInvalidBackupSequence	The backup call is out of sequence. (JET_errInvalidBackupSequence)	0xFFFFFDF7
IsamErrorBackupNotAllowedYet	A backup cannot be done at this time. (JET_errBackupNotAllowedYet)	0xFFFFFDF5
IsamErrorDeleteBackupFileFail	A backup file could not be deleted. (JET_errDeleteBackupFileFail)	0xFFFFFDF4
IsamErrorMakeBackupDirectoryFail	The backup temporary directory could not be created. (JET_errMakeBackupDirectoryFail)	0xFFFFFDF3
IsamErrorInvalidBackup	Circular logging is enabled; an incremental backup cannot be performed. (JET_errInvalidBackup)	0xFFFFFDF2
IsamErrorRecoveredWithErrors	The data was restored with errors. (JET_errRecoveredWithErrors)	0xFFFFFDF1
IsamErrorMissingLogFile	The current log file is missing. (JET_errMissingLogFile)	0xFFFFFDF0
IsamErrorLogDiskFull	The log disk is full. (JET_errLogDiskFull)	0xFFFFFDEF
IsamErrorBadLogSignature	There is a bad signature for a log file. (JET_errBadLogSignature)	0xFFFFFDEE
IsamErrorBadDbSignature	There is a bad signature for a database file. (JET_errBadDbSignature)	0xFFFFFDED
IsamErrorBadCheckpointSignature	There is a bad signature for a checkpoint file. (JET_errBadCheckpointSignature)	0xFFFFFDEC
IsamErrorCheckpointCorrupt	The checkpoint file was not found or was corrupt. (JET_errCheckpointCorrupt)	0xFFFFFDEB
IsamErrorMissingPatchPage	The database patch file page was not found during recovery. (JET_errMissingPatchPage)	0xFFFFFDEA
IsamErrorBadPatchPage	The database patch file page is not valid.	0xFFFFFDE9

Name	Description (alternate names)	Numeric value (hex)
	(JET_errBadPatchPage)	
IsamErrorRedoAbruptEnded	The redo abruptly ended due to a sudden failure while reading logs from the log file. (JET_errRedoAbruptEnded)	0xFFFFFDE8
IsamErrorBadSLVSignature	The signature in the SLV file does not agree with the database. (JET_errBadSLVSignature)	0xFFFFFDE7
IsamErrorPatchFileMissing	The hard restore detected that a database patch file is missing from the backup set. (JET_errPatchFileMissing)	0xFFFFFDE6
IsamErrorDatabaseLogSetMismatch	The database does not belong with the current set of log files. (JET_errDatabaseLogSetMismatch)	0xFFFFFDE5
IsamErrorDatabaseStreamingFileMismatch	This flag is reserved. (JET_errDatabaseStreamingFileMismatch)	0xFFFFFDE4
IsamErrorLogFileSizeMismatch	The actual log file size does not match the configured size. (JET_errLogFileSizeMismatch)	0xFFFFFDE3
IsamErrorCheckpointFileNotFound	The checkpoint file could not be located. (JET_errCheckpointFileNotFound)	0xFFFFFDE2
IsamErrorRequiredLogFilesMissing	The required log files for recovery are missing. (JET_errRequiredLogFilesMissing)	0xFFFFFDE1
IsamErrorSoftRecoveryOnBackupDatabase	A soft recovery is about to be used on a backup database when a restore should be used instead. (JET_errSoftRecoveryOnBackupDatabase)	0xFFFFFDE0
IsamErrorLogFileSizeMismatchDatabasesConsistent	The databases have been recovered, but the log file size used during recovery does not match JET_paramLogFileSize. (JET_errLogFileSizeMismatchDatabasesConsistent)	0xFFFFFDDF

Name	Description (alternate names)	Numeric value (hex)
IsamErrorLogSectorSizeMismatch	The log file sector size does not match the sector size of the current volume. (JET_errLogSectorSizeMismatch)	0xFFFFFDDE
IsamErrorLogSectorSizeMismatchDatabasesConsistent	The databases have been recovered, but the log file sector size (used during recovery) does not match the sector size of the current volume. (JET_errLogSectorSizeMismatchDatabasesConsistent)	0xFFFFFDDD
IsamErrorLogSequenceEndDatabasesConsistent	The databases have been recovered, but all possible log generations in the current sequence have been used. All log files and the checkpoint file must be deleted and databases must be backed up before continuing. (JET_errLogSequenceEndDatabasesConsistent)	0xFFFFFDDC
IsamErrorStreamingDataNotLogged	There was an illegal attempt to replay a streaming file operation where the data was not logged. This is probably caused by an attempt to rollforward with circular logging enabled. (JET_errStreamingDataNotLogged)	0xFFFFFDDB
IsamErrorDatabaseDirtyShutdown	The database was not shutdown cleanly. A recovery must first be run to properly complete database operations for the previous shutdown. (JET_errDatabaseDirtyShutdown)	0xFFFFFDDA
IsamErrorConsistentTimeMismatch	The last consistent time for the database has not been matched. (JET_errConsistentTimeMismatch)	0xFFFFFDD9
IsamErrorDatabasePatchFileMismatch	The database patch file is not generated from this backup. (JET_errDatabasePatchFileMismatch)	0xFFFFFDD8
IsamErrorEndingRestore	The starting log number is too low for the	0xFFFFFDD7

Name	Description (alternate names)	Numeric value (hex)
LogTooLow	restore. (JET_errEndingRestoreLogTooLow)	
IsamErrorStartingRestoreLogTooHigh	The starting log number is too high for the restore. (JET_errStartingRestoreLogTooHigh)	0xFFFFFDD6
IsamErrorGivenLogFileHasBadSignature	The restore log file has a bad signature. (JET_errGivenLogFileHasBadSignature)	0xFFFFFDD5
IsamErrorGivenLogFileIsNotContiguous	The restore log file is not contiguous. (JET_errGivenLogFileIsNotContiguous)	0xFFFFFDD4
IsamErrorMissingRestoreLogFiles	Some restore log files are missing. (JET_errMissingRestoreLogFiles)	0xFFFFFDD3
IsamErrorMissingFullBackup	The database missed a previous full backup before attempting to perform an incremental backup. (JET_errMissingFullBackup)	0xFFFFFDD0
IsamErrorBadBackupDatabaseSize	The backup database size is not a multiple of the database page size. (JET_errBadBackupDatabaseSize)	0xFFFFFDCF
IsamErrorDatabaseAlreadyUpgraded	The current attempt to upgrade a database has been stopped because the database is already current. (JET_errDatabaseAlreadyUpgraded)	0xFFFFFDCE
IsamErrorDatabaseIncompleteUpgrade	The database was only partially converted to the current format. The database must be restored from backup. (JET_errDatabaseIncompleteUpgrade)	0xFFFFFDCD
IsamErrorMissingCurrentLogFiles	Some current log files are missing for continuous restore. (JET_errMissingCurrentLogFiles)	0xFFFFFDCB
IsamErrorDbTimeTooOld	The dbtime on a page is smaller than the dbtimeBefore that is in the record. (JET_errDbTimeTooOld)	0xFFFFFDCA
IsamErrorDbTimeTooNe	The dbtime on a page is in advance of the	0xFFFFFDC9

Name	Description (alternate names)	Numeric value (hex)
w	dbtimeBefore that is in the record. (JET_errDbTimeTooNew)	
IsamErrorMissingFileToBackup	Some log or database patch files were missing during the backup. (JET_errMissingFileToBackup)	0xFFFFFDC7
IsamErrorLogTornWriteDuringHardRestore	A torn write was detected in a backup that was set during a hard restore. (JET_errLogTornWriteDuringHardRestore)	0xFFFFFDC6
IsamErrorLogTornWriteDuringHardRecovery	A torn write was detected during a hard recovery (the log was not part of a backup set). (JET_errLogTornWriteDuringHardRecovery)	0xFFFFFDC5
IsamErrorLogCorruptDuringHardRestore	Corruption was detected in a backup set during a hard restore. (JET_errLogCorruptDuringHardRestore)	0xFFFFFDC3
IsamErrorLogCorruptDuringHardRecovery	Corruption was detected during hard recovery (the log was not part of a backup set). (JET_errLogCorruptDuringHardRecovery)	0xFFFFFDC2
IsamErrorMustDisableLoggingForDbUpgrade	Logging cannot be enabled while attempting to upgrade a database. (JET_errMustDisableLoggingForDbUpgrade)	0xFFFFFDC1
IsamErrorBadRestoreTargetInstance	Either the TargetInstance that was specified for restore has not been found or the log files do not match. (JET_errBadRestoreTargetInstance)	0xFFFFFDBF
IsamErrorRecoveredWithoutUndo	The database engine successfully replayed all operations in the transaction log to perform a crash recovery but the caller elected to stop recovery without rolling back uncommitted	0xFFFFFDBD

Name	Description (alternate names)	Numeric value (hex)
	updates. (JET_errRecoveredWithoutUndo)	
IsamErrorDatabasesNotFromSameSnapshot	The databases to be restored are not from the same shadow copy backup. (JET_errDatabasesNotFromSameSnapshot)	0xFFFFFDBC
IsamErrorSoftRecoveryOnSnapshot	There is a soft recovery on a database from a shadow copy backup set. (JET_errSoftRecoveryOnSnapshot)	0xFFFFFDBB
IsamErrorCommittedLogFilesMissing	One or more logs that were committed to this database are missing. (JET_errCommittedLogFilesMissing)	0xFFFFFDBA
IsamErrorCommittedLogFilesCorrupt	One or more logs were found to be corrupt during recovery. (JET_errCommittedLogFilesCorrupt)	0xFFFFFDB6
IsamErrorUnicodeTranslationBufferTooSmall	The Unicode translation buffer is too small. (JET_errUnicodeTranslationBufferTooSmall)	0xFFFFFDA7
IsamErrorUnicodeTranslationFail	The Unicode normalization failed. (JET_errUnicodeTranslationFail)	0xFFFFFDA6
IsamErrorUnicodeNormalizationNotSupported	The operating system does not provide support for Unicode normalization and a normalization callback was not specified. (JET_errUnicodeNormalizationNotSupported)	0xFFFFFDA5
IsamErrorExistingLogFileHasBadSignature	The existing log file has a bad signature. (JET_errExistingLogFileHasBadSignature)	0xFFFFFD9E
IsamErrorExistingLogFileIsNotContiguous	An existing log file is not contiguous. (JET_errExistingLogFileIsNotContiguous)	0xFFFFFD9D
IsamErrorLogReadVerifyFailure	A checksum error was found in the log file during backup. (JET_errLogReadVerifyFailure)	0xFFFFFD9C

Name	Description (alternate names)	Numeric value (hex)
IsamErrorSLVReadVerifyFailure	A checksum error was found in the SLV file during backup. (JET_errSLVReadVerifyFailure)	0xFFFFFD9B
IsamErrorCheckpointDepthTooDeep	There are too many outstanding generations between the checkpoint and the current generation. (JET_errCheckpointDepthTooDeep)	0xFFFFFD9A
IsamErrorRestoreOfNonBackupDatabase	A hard recovery was attempted on a database that was not a backup database. (JET_errRestoreOfNonBackupDatabase)	0xFFFFFD99
IsamErrorInvalidGrbit	There is an invalid grbit parameter. (JET_errInvalidGrbit)	0xFFFFFC7C
IsamErrorTermInProgress	Termination is in progress. (JET_errTermInProgress)	0xFFFFFC18
IsamErrorFeatureNotAvailable	This API element is not supported. (JET_errFeatureNotAvailable)	0xFFFFFC17
IsamErrorInvalidName	An invalid name is being used. (JET_errInvalidName)	0xFFFFFC16
IsamErrorInvalidParameter	An invalid API parameter is being used. (JET_errInvalidParameter)	0xFFFFFC15
IsamErrorDatabaseFileReadOnly	There was an attempt to attach to a read-only database file for read/write operations. (JET_errDatabaseFileReadOnly)	0xFFFFFC10
IsamErrorInvalidDatabaseId	There is an invalid database ID. (JET_errInvalidDatabaseId)	0xFFFFFC0E
IsamErrorOutOfMemory	The system is out of memory. (JET_errOutOfMemory)	0xFFFFFC0D
IsamErrorOutOfDatabaseSpace	The maximum database size has been reached. (JET_errOutOfDatabaseSpace)	0xFFFFFC0C

Name	Description (alternate names)	Numeric value (hex)
IsamErrorOutOfCursors	The table is out of cursors. (JET_errOutOfCursors)	0xFFFFFC0B
IsamErrorOutOfBuffers	The database is out of page buffers. (JET_errOutOfBuffers)	0xFFFFFC0A
IsamErrorTooManyIndexes	There are too many indexes. (JET_errTooManyIndexes)	0xFFFFFC09
IsamErrorTooManyKeys	There are too many columns in an index. (JET_errTooManyKeys)	0xFFFFFC08
IsamErrorRecordDeleted	The record has been deleted. (JET_errRecordDeleted)	0xFFFFFC07
IsamErrorReadVerifyFailure	There is a checksum error on a database page. (JET_errReadVerifyFailure)	0xFFFFFC06
IsamErrorPageNotInitialized	There is a blank database page. (JET_errPageNotInitialized)	0xFFFFFC05
IsamErrorOutOfFileHandles	There are no file handles. (JET_errOutOfFileHandles)	0xFFFFFC04
IsamErrorDiskIO	There is a disk IO error. (JET_errDiskIO)	0xFFFFFC02
IsamErrorInvalidPath	There is an invalid file path. (JET_errInvalidPath)	0xFFFFFC01
IsamErrorInvalidSystemPath	There is an invalid system path. (JET_errInvalidSystemPath)	0xFFFFFC00
IsamErrorInvalidLogDirectory	There is an invalid log directory. (JET_errInvalidLogDirectory)	0xFFFFFBFF
IsamErrorRecordTooBig	The record is larger than maximum size. (JET_errRecordTooBig)	0xFFFFFBFE
IsamErrorTooManyOpenDatabases	There are too many open databases. (JET_errTooManyOpenDatabases)	0xFFFFFBFD

Name	Description (alternate names)	Numeric value (hex)
IsamErrorInvalidDatabase	This is not a database file. (JET_errInvalidDatabase)	0xFFFFFBFC
IsamErrorNotInitialized	The database engine has not been initialized. (JET_errNotInitialized)	0xFFFFFBFB
IsamErrorAlreadyInitialized	The database engine is already initialized. (JET_errAlreadyInitialized)	0xFFFFFBFA
IsamErrorInitInProgress	The database engine is being initialized. (JET_errInitInProgress)	0xFFFFFBF9
IsamErrorFileAccessDenied	The file cannot be accessed because the file is locked or in use. (JET_errFileAccessDenied)	0xFFFFFBF8
IsamErrorBufferTooSmall	The buffer is too small. (JET_errBufferTooSmall)	0xFFFFFBF2
IsamErrorTooManyColumns	Too many columns are defined. (JET_errTooManyColumns)	0xFFFFFBF0
IsamErrorContainerNotEmpty	The container is not empty. (JET_errContainerNotEmpty)	0xFFFFFBED
IsamErrorInvalidFilename	The filename is invalid. (JET_errInvalidFilename)	0xFFFFFBEC
IsamErrorInvalidBookmark	There is an invalid bookmark. (JET_errInvalidBookmark)	0xFFFFFBEB
IsamErrorColumnInUse	The column used is in an index. (JET_errColumnInUse)	0xFFFFFBEA
IsamErrorInvalidBufferSize	The data buffer does not match the column size. (JET_errInvalidBufferSize)	0xFFFFFBE9
IsamErrorColumnNotUpdatable	The column value cannot be set. (JET_errColumnNotUpdatable)	0xFFFFFBE8
IsamErrorIndexInUse	The index is in use. (JET_errIndexInUse)	0xFFFFFBE5

Name	Description (alternate names)	Numeric value (hex)
IsamErrorLinkNotSupported	The link support is unavailable. (JET_errLinkNotSupported)	0xFFFFFBE4
IsamErrorNullKeyDisallowed	Null keys are not allowed on an index. (JET_errNullKeyDisallowed)	0xFFFFFBE3
IsamErrorNotInTransaction	The operation must occur within a transaction. (JET_errNotInTransaction)	0xFFFFFBE2
IsamErrorTooManyActiveUsers	There are too many active database users. (JET_errTooManyActiveUsers)	0xFFFFFBDD
IsamErrorInvalidCountry	There is an invalid or unknown country code. (JET_errInvalidCountry)	0xFFFFFBDB
IsamErrorInvalidLanguageId	There is an invalid or unknown language ID. (JET_errInvalidLanguageId)	0xFFFFFBDA
IsamErrorInvalidCodePage	There is an invalid or unknown code page. (JET_errInvalidCodePage)	0xFFFFFBD9
IsamErrorInvalidLCMapStringFlags	There are invalid flags being used for LCMapString. (JET_errInvalidLCMapStringFlags)	0xFFFFFBD8
IsamErrorVersionStoreEntryTooBig	There was an attempt to create a version store entry (RCE) that was larger than a version bucket. (JET_errVersionStoreEntryTooBig)	0xFFFFFBD7
IsamErrorVersionStoreOutOfMemoryAndCleanupTimedOut	The version store is out of memory and the cleanup attempt failed to complete. (JET_errVersionStoreOutOfMemoryAndCleanupTimedOut)	0xFFFFFBD6
IsamErrorVersionStoreOutOfMemory	The version store is out of memory and a cleanup was already attempted. (JET_errVersionStoreOutOfMemory)	0xFFFFFBD3
IsamErrorCannotIndex	The escrow and SLV columns cannot be indexed. (JET_errCannotIndex)	0xFFFFFBD1

Name	Description (alternate names)	Numeric value (hex)
IsamErrorRecordNotDeleted	The record has not been deleted. (JET_errRecordNotDeleted)	0xFFFFFBD0
IsamErrorTooManyMempoolEntries	Too many mempool entries have been requested. (JET_errTooManyMempoolEntries)	0xFFFFFBCF
IsamErrorOutOfObjectIDs	The database is out of B+ tree ObjectIDs so an offline defragmentation must be performed to reclaim freed or unused ObjectIDs. (JET_errOutOfObjectIDs)	0xFFFFFBCE
IsamErrorOutOfLongValueIDs	The Long-value ID counter has reached the maximum value. An offline defragmentation must be performed to reclaim free or unused LongValueIDs. (JET_errOutOfLongValueIDs)	0xFFFFFBCD
IsamErrorOutOfAutoincrementValues	The auto-increment counter has reached the maximum value. An offline defragmentation will not be able to reclaim free or unused auto-increment values). (JET_errOutOfAutoincrementValues)	0xFFFFFBCC
IsamErrorOutOfDbtimeValues	The Dbtime counter has reached the maximum value. An offline defragmentation must be performed to reclaim free or unused Dbtime values. (JET_errOutOfDbtimeValues)	0xFFFFFBCB
IsamErrorOutOfSequentialIndexValues	A sequential index counter has reached the maximum value. An offline defragmentation must be performed to reclaim free or unused SequentialIndex values. (JET_errOutOfSequentialIndexValues)	0xFFFFFBCA
IsamErrorRunningInOneInstanceMode	This multi-instance call has the single-instance mode enabled. (JET_errRunningInOneInstanceMode)	0xFFFFFBC8

Name	Description (alternate names)	Numeric value (hex)
IsamErrorRunningInMultiInstanceMode	This single-instance call has the multi-instance mode enabled. (JET_errRunningInMultiInstanceMode)	0xFFFFFBC7
IsamErrorSystemParamsAlreadySet	The global system parameters have already been set. (JET_errSystemParamsAlreadySet)	0xFFFFFBC6
IsamErrorSystemPathInUse	The system path is already being used by another database instance. (JET_errSystemPathInUse)	0xFFFFFBC5
IsamErrorLogFilePathInUse	The log file path is already being used by another database instance. (JET_errLogFilePathInUse)	0xFFFFFBC4
IsamErrorTempPathInUse	The path to the temporary database is already being used by another database instance. (JET_errTempPathInUse)	0xFFFFFBC3
IsamErrorInstanceNameInUse	The instance name is already in use. (JET_errInstanceNameInUse)	0xFFFFFBC2
IsamErrorInstanceUnavailable	This instance cannot be used because it encountered a fatal error. (JET_errInstanceUnavailable)	0xFFFFFBBE
IsamErrorDatabaseUnavailable	This database cannot be used because it encountered a fatal error. (JET_errDatabaseUnavailable)	0xFFFFFBBD
IsamErrorInstanceUnavailableDueToFatalLogDiskFull	This instance cannot be used because it encountered a log-disk-full error while performing an operation (such as a transaction rollback) that could not tolerate failure. (JET_errInstanceUnavailableDueToFatalLogDiskFull)	0xFFFFFBBC
IsamErrorOutOfSessions	The database is out of sessions. (JET_errOutOfSessions)	0xFFFFFBB3

Name	Description (alternate names)	Numeric value (hex)
IsamErrorWriteConflict	The write lock failed due to the existence of an outstanding write lock. (JET_errWriteConflict)	0xFFFFFBB2
IsamErrorTransTooDeep	The transactions are nested too deeply. (JET_errTransTooDeep)	0xFFFFFBB1
IsamErrorInvalidSesid	There is an invalid session handle. (JET_errInvalidSesid)	0xFFFFFBB0
IsamErrorWriteConflictPrimaryIndex	An update was attempted on an uncommitted primary index. (JET_errWriteConflictPrimaryIndex)	0xFFFFFBAF
IsamErrorInTransaction	The operation is not allowed within a transaction. (JET_errInTransaction)	0xFFFFFBAC
IsamErrorRollbackRequired	The current transaction must be rolled back. It cannot be committed and a new one cannot be started. (JET_errRollbackRequired)	0xFFFFFBAB
IsamErrorTransReadOnly	A read-only transaction tried to modify the database. (JET_errTransReadOnly)	0xFFFFFBAA
IsamErrorSessionWriteConflict	There was an attempt to replace the same record by two different cursors in the same session. (JET_errSessionWriteConflict)	0xFFFFFBA9
IsamErrorRecordTooBigForBackwardCompatibility	The record would be too big if represented in a database format from a previous version of Jet. (JET_errRecordTooBigForBackwardCompatibility)	0xFFFFFBA8
IsamErrorCannotMaterializeForwardOnlySort	The temporary table could not be created due to parameters that conflict with JET_bitTTForwardOnly. (JET_errCannotMaterializeForwardOnlySort)	0xFFFFFBA7

Name	Description (alternate names)	Numeric value (hex)
IsamErrorSesidTableIdMismatch	The session handle cannot be used with the table id because it was not used to create it. (JET_errSesidTableIdMismatch)	0xFFFFFBA6
IsamErrorInvalidInstance	The instance handle is invalid or refers to an instance that has been shut down. (JET_errInvalidInstance)	0xFFFFFBA5
IsamErrorDatabaseDuplicate	The database already exists. (JET_errDatabaseDuplicate)	0xFFFFFB4F
IsamErrorDatabaseInUse	The database in use. (JET_errDatabaseInUse)	0xFFFFFB4E
IsamErrorDatabaseNotFound	There is no such database. (JET_errDatabaseNotFound)	0xFFFFFB4D
IsamErrorDatabaseInvalidName	The database name is invalid. (JET_errDatabaseInvalidName)	0xFFFFFB4C
IsamErrorDatabaseInvalidPages	There are an invalid number of pages. (JET_errDatabaseInvalidPages)	0xFFFFFB4B
IsamErrorDatabaseCorrupted	There is a non-database file or corrupt database. (JET_errDatabaseCorrupted)	0xFFFFFB4A
IsamErrorDatabaseLocked	The database is exclusively locked. (JET_errDatabaseLocked)	0xFFFFFB49
IsamErrorCannotDisableVersioning	The versioning for this database cannot be disabled. (JET_errCannotDisableVersioning)	0xFFFFFB48
IsamErrorInvalidDatabaseVersion	The database engine is incompatible with the database. (JET_errInvalidDatabaseVersion)	0xFFFFFB47
IsamErrorDatabase200Format	The database is in an older (200) format. (JET_errDatabase200Format)	0xFFFFFB46
IsamErrorDatabase400Format	The database is in an older (400) format. (JET_errDatabase400Format)	0xFFFFFB45

Name	Description (alternate names)	Numeric value (hex)
IsamErrorDatabase500Format	The database is in an older (500) format. (JET_errDatabase500Format)	0xFFFFFB44
IsamErrorPageSizeMismatch	The database page size does not match the engine. (JET_errPageSizeMismatch)	0xFFFFFB43
IsamErrorTooManyInstances	No more database instances can be started. (JET_errTooManyInstances)	0xFFFFFB42
IsamErrorDatabaseSharingViolation	A different database instance is using this database. (JET_errDatabaseSharingViolation)	0xFFFFFB41
IsamErrorAttachedDatabaseMismatch	An outstanding database attachment has been detected at the start or end of the recovery, but the database is missing or does not match attachment info. (JET_errAttachedDatabaseMismatch)	0xFFFFFB40
IsamErrorDatabaseInvalidPath	The specified path to the database file is illegal. (JET_errDatabaseInvalidPath)	0xFFFFFB3F
IsamErrorDatabaseIdInUse	A database is being assigned an ID that is already in use. (JET_errDatabaseIdInUse)	0xFFFFFB3E
IsamErrorForceDetachNotAllowed	The force detach is allowed only after the normal detach was stopped due to an error. (JET_errForceDetachNotAllowed)	0xFFFFFB3D
IsamErrorCatalogCorrupted	Corruption was detected in the catalog. (JET_errCatalogCorrupted)	0xFFFFFB3C
IsamErrorPartiallyAttachedDB	The database is only partially attached and the attach operation cannot be completed. (JET_errPartiallyAttachedDB)	0xFFFFFB3B
IsamErrorDatabaseSignInUse	The database with the same signature is already in use. (JET_errDatabaseSignInUse)	0xFFFFFB3A
IsamErrorDatabaseCorru	The database is corrupted but a repair is not allowed.	0xFFFFFB38

Name	Description (alternate names)	Numeric value (hex)
ptedNoRepair	(JET_errDatabaseCorruptedNoRepair)	
IsamErrorInvalidCreateDbVersion	The database engine attempted to replay a Create Database operation from the transaction log but failed due to an incompatible version of that operation. (JET_errInvalidCreateDbVersion)	0xFFFFFB37
IsamErrorTableLocked	The table is exclusively locked. (JET_errTableLocked)	0xFFFFFAEA
IsamErrorTableDuplicate	The table already exists. (JET_errTableDuplicate)	0xFFFFFAE9
IsamErrorTableInUse	The table is in use and cannot be locked. (JET_errTableInUse)	0xFFFFFAE8
IsamErrorObjectNotFound	There is no such table or object. (JET_errObjectNotFound)	0xFFFFFAE7
IsamErrorDensityInvalid	There is a bad file or index density. (JET_errDensityInvalid)	0xFFFFFAE5
IsamErrorTableNotEmpty	The table is not empty. (JET_errTableNotEmpty)	0xFFFFFAE4
IsamErrorInvalidTableId	The table ID is invalid. (JET_errInvalidTableId)	0xFFFFFAE2
IsamErrorTooManyOpenTables	No more tables can be opened, even after the internal cleanup task has run. (JET_errTooManyOpenTables)	0xFFFFFAE1
IsamErrorIllegalOperation	The operation is not supported on the table. (JET_errIllegalOperation)	0xFFFFFAE0
IsamErrorTooManyOpenTablesAndCleanupTimedOut	No more tables can be opened because the cleanup attempt failed to complete. (JET_errTooManyOpenTablesAndCleanupTimedOut)	0xFFFFFADF

Name	Description (alternate names)	Numeric value (hex)
IsamErrorObjectDuplicate	The table or object name is in use. (JET_errObjectDuplicate)	0xFFFFFADE
IsamErrorInvalidObject	The object is invalid for operation. (JET_errInvalidObject)	0xFFFFFADC
IsamErrorCannotDeleteTempTable	JetCloseTable must be used instead of JetDeleteTable to delete a temporary table. (JET_errCannotDeleteTempTable)	0xFFFFFADB
IsamErrorCannotDeleteSystemTable	There was an illegal attempt to delete a system table. (JET_errCannotDeleteSystemTable)	0xFFFFFADA
IsamErrorCannotDeleteTemplateTable	There was an illegal attempt to delete a template table. (JET_errCannotDeleteTemplateTable)	0xFFFFFAD9
IsamErrorExclusiveTableLockRequired	There must be an exclusive lock on the table. (JET_errExclusiveTableLockRequired)	0xFFFFFAD6
IsamErrorFixedDDL	DDL operations are prohibited on this table. (JET_errFixedDDL)	0xFFFFFAD5
IsamErrorFixedInheritedDDL	On a derived table, DDL operations are prohibited on the inherited portion of the DDL. (JET_errFixedInheritedDDL)	0xFFFFFAD4
IsamErrorCannotNestDDL	Nesting the hierarchical DDL is not currently supported. (JET_errCannotNestDDL)	0xFFFFFAD3
IsamErrorDDLNotInheritable	There was an attempt to inherit a DDL from a table that is not marked as a template table. (JET_errDDLNotInheritable)	0xFFFFFAD2
IsamErrorInvalidSettings	The system parameters were set improperly. (JET_errInvalidSettings)	0xFFFFFAD0
IsamErrorClientRequestToStopJetService	The client has requested that the service be stopped.	0xFFFFFACF

Name	Description (alternate names)	Numeric value (hex)
	(JET_errClientRequestToStopJetService)	
IsamErrorCannotAddFixedVarColumnToDerivedTable	The Template table was created with the NoFixedVarColumnsInDerivedTables flag set. (JET_errCannotAddFixedVarColumnToDerivedTable)	0xFFFFFACE
IsamErrorIndexCantBuild	The index build failed. (JET_errIndexCantBuild)	0xFFFFFA87
IsamErrorIndexHasPrimary	The primary index is already defined. (JET_errIndexHasPrimary)	0xFFFFFA86
IsamErrorIndexDuplicate	The index is already defined. (JET_errIndexDuplicate)	0xFFFFFA85
IsamErrorIndexNotFound	There is no such index. (JET_errIndexNotFound)	0xFFFFFA84
IsamErrorIndexMustStay	The clustered index cannot be deleted. (JET_errIndexMustStay)	0xFFFFFA83
IsamErrorIndexInvalidDef	The index definition is invalid. (JET_errIndexInvalidDef)	0xFFFFFA82
IsamErrorInvalidCreateIndex	The creation of the index description was invalid. (JET_errInvalidCreateIndex)	0xFFFFFA7F
IsamErrorTooManyOpenIndexes	The database is out of index description blocks. (JET_errTooManyOpenIndexes)	0xFFFFFA7E
IsamErrorMultiValuedIndexViolation	Non-unique inter-record index keys have been generated for a multi-valued index. (JET_errMultiValuedIndexViolation)	0xFFFFFA7D
IsamErrorIndexBuildCorrupted	A secondary index that properly reflects the primary index failed to build. (JET_errIndexBuildCorrupted)	0xFFFFFA7C
IsamErrorPrimaryIndexC	The primary index is corrupt and the database	0xFFFFFA7B

Name	Description (alternate names)	Numeric value (hex)
orrupted	must be defragmented. (JET_errPrimaryIndexCorrupted)	
IsamErrorSecondaryIndexCorrupted	The secondary index is corrupt and the database must be defragmented. (JET_errSecondaryIndexCorrupted)	0xFFFFFA7A
IsamErrorInvalidIndexId	The index ID is invalid. (JET_errInvalidIndexId)	0xFFFFFA78
IsamErrorIndexTuplesSecondaryIndexOnly	The tuple index can only be set on a secondary index. (JET_errIndexTuplesSecondaryIndexOnly)	0xFFFFFA6A
IsamErrorIndexTuplesTooManyColumns	The index definition for the tuple index contains more key columns that the database engine can support. (JET_errIndexTuplesTooManyColumns)	0xFFFFFA69
IsamErrorIndexTuplesNonUniqueOnly	The tuple index must be a non-unique index. (JET_errIndexTuplesNonUniqueOnly)	0xFFFFFA68
IsamErrorIndexTuplesTextBinaryColumnsOnly	A tuple index definition can only contain key columns that have text or binary column types. (JET_errIndexTuplesTextBinaryColumnsOnly)	0xFFFFFA67
IsamErrorIndexTuplesVarSegMacNotAllowed	The tuple index does not allow setting cbVarSegMac. (JET_errIndexTuplesVarSegMacNotAllowed)	0xFFFFFA66
IsamErrorIndexTuplesInvalidLimits	The minimum/maximum tuple length or the maximum number of characters that are specified for an index are invalid. (JET_errIndexTuplesInvalidLimits)	0xFFFFFA65
IsamErrorIndexTuplesCannotRetrieveFromIndex	JetRetrieveColumn cannot be called with the JET_bitRetrieveFromIndex flag set while retrieving a column on a tuple index.	0xFFFFFA64

Name	Description (alternate names)	Numeric value (hex)
	(JET_errIndexTuplesCannotRetrieveFromIndex)	
IsamErrorIndexTuplesKeyTooSmall	The specified key does not meet the minimum tuple length. (JET_errIndexTuplesKeyTooSmall)	0xFFFFFA63
IsamErrorColumnLong	The column value is long. (JET_errColumnLong)	0xFFFFFA23
IsamErrorColumnNoChunk	There is no such chunk in a long value. (JET_errColumnNoChunk)	0xFFFFFA22
IsamErrorColumnDoesNotFit	The field will not fit in the record. (JET_errColumnDoesNotFit)	0xFFFFFA21
IsamErrorNullInvalid	Null is not valid. (JET_errNullInvalid, JET_errColumnIllegalNull)	0xFFFFFA20
IsamErrorColumnIndexed	The column is indexed and cannot be deleted. (JET_errColumnIndexed)	0xFFFFFA1F
IsamErrorColumnTooBig	The field length is greater than maximum allowed length. (JET_errColumnTooBig)	0xFFFFFA1E
IsamErrorColumnNotFound	There is no such column. (JET_errColumnNotFound)	0xFFFFFA1D
IsamErrorColumnDuplicate	This field is already defined. (JET_errColumnDuplicate)	0xFFFFFA1C
IsamErrorMultiValuedColumnMustBeTagged	An attempt was made to create a multi-valued column, but the column was not tagged. (JET_errMultiValuedColumnMustBeTagged)	0xFFFFFA1B
IsamErrorColumnRedundant	There was a second auto-increment or version column. (JET_errColumnRedundant)	0xFFFFFA1A
IsamErrorInvalidColumn	The column data type is invalid.	0xFFFFFA19

Name	Description (alternate names)	Numeric value (hex)
Type	(JET_errInvalidColumnType)	
IsamErrorTaggedNotNULL	There are no non-NULL tagged columns. (JET_errTaggedNotNULL)	0xFFFFFA16
IsamErrorNoCurrentIndex	The database is invalid because it does not contain a current index. (JET_errNoCurrentIndex)	0xFFFFFA15
IsamErrorKeyIsMade	The key is completely made. (JET_errKeyIsMade)	0xFFFFFA14
IsamErrorBadColumnId	The column ID is incorrect. (JET_errBadColumnId)	0xFFFFFA13
IsamErrorBadItagSequence	There is a bad itagSequence for the tagged column. (JET_errBadItagSequence)	0xFFFFFA12
IsamErrorColumnInRelationship	A column cannot be deleted because it is part of a relationship. (JET_errColumnInRelationship)	0xFFFFFA11
IsamErrorCannotBeTagged	The auto increment and version cannot be tagged. (JET_errCannotBeTagged)	0xFFFFFA0F
IsamErrorDefaultValueTooBig	The default value exceeds the maximum size. (JET_errDefaultValueTooBig)	0xFFFFFA0C
IsamErrorMultiValuedDuplicate	A duplicate value was detected on a unique multi-valued column. (JET_errMultiValuedDuplicate)	0xFFFFFA0B
IsamErrorLVCorrupted	Corruption was encountered in a long-value tree. (JET_errLVCorrupted)	0xFFFFFA0A
IsamErrorMultiValuedDuplicateAfterTruncation	A duplicate value was detected on a unique multi-valued column after the data was normalized, and it is normalizing truncated the data before comparison. (JET_errMultiValuedDuplicateAfterTruncation)	0xFFFFFA08

Name	Description (alternate names)	Numeric value (hex)
IsamErrorDerivedColumnCorruption	There is an invalid column in derived table. (JET_errDerivedColumnCorruption)	0xFFFFFA07
IsamErrorInvalidPlaceholderColumn	An attempt was made to convert a column to a primary index placeholder, but the column does not meet the necessary criteria. (JET_errInvalidPlaceholderColumn)	0xFFFFFA06
IsamErrorRecordNotFound	The key was not found. (JET_errRecordNotFound)	0xFFFFF9BF
IsamErrorRecordNoCopy	There is no working buffer. (JET_errRecordNoCopy)	0xFFFFF9BE
IsamErrorNoCurrentRecord	There is no current record. (JET_errNoCurrentRecord)	0xFFFFF9BD
IsamErrorRecordPrimaryChanged	The primary key might not change. (JET_errRecordPrimaryChanged)	0xFFFFF9BC
IsamErrorKeyDuplicate	There is an illegal duplicate key. (JET_errKeyDuplicate)	0xFFFFF9BB
IsamErrorAlreadyPrepared	An attempt was made to update a record while a record update was already in progress. (JET_errAlreadyPrepared)	0xFFFFF9B9
IsamErrorKeyNotMade	A call was not made to JetMakeKey. (JET_errKeyNotMade)	0xFFFFF9B8
IsamErrorUpdateNotPrepared	A call was not made to JetPrepareUpdate. (JET_errUpdateNotPrepared)	0xFFFFF9B7
IsamErrorDataHasChanged	The data has changed and the operation was aborted. (JET_errDataHasChanged)	0xFFFFF9B5
IsamErrorLanguageNotSupported	The operating system does not support the selected language. (JET_errLanguageNotSupported)	0xFFFFF9AD

Name	Description (alternate names)	Numeric value (hex)
IsamErrorTooManySorts	There are too many sort processes. (JET_errTooManySorts)	0xFFFFF95B
IsamErrorInvalidOnSort	An invalid operation occurred during a sort. (JET_errInvalidOnSort)	0xFFFFF95A
IsamErrorTempFileOpenError	The temporary file could not be opened. (JET_errTempFileOpenError)	0xFFFFF8F5
IsamErrorTooManyAttachedDatabases	Too many databases are open. (JET_errTooManyAttachedDatabases)	0xFFFFF8F3
IsamErrorDiskFull	There is no space left on disk. (JET_errDiskFull)	0xFFFFF8F0
IsamErrorPermissionDenied	Permission is denied. (JET_errPermissionDenied)	0xFFFFF8EF
IsamErrorFileNotFound	The file was not found. (JET_errFileNotFound)	0xFFFFF8ED
IsamErrorFileInvalidType	The file type is invalid. (JET_errFileInvalidType)	0xFFFFF8EC
IsamErrorAfterInitialization	A restore cannot be started after initialization. (JET_errAfterInitialization)	0xFFFFF8C6
IsamErrorLogCorrupted	The logs could not be interpreted. (JET_errLogCorrupted)	0xFFFFF8C4
IsamErrorInvalidOperation	The operation is invalid. (JET_errInvalidOperation)	0xFFFFF88E
IsamErrorAccessDenied	Access is denied. (JET_errAccessDenied)	0xFFFFF88D
IsamErrorTooManySplits	An infinite split. (JET_errTooManySplits)	0xFFFFF88B
IsamErrorSessionSharingViolation	Multiple threads are using the same session. (JET_errSessionSharingViolation)	0xFFFFF88A

Name	Description (alternate names)	Numeric value (hex)
IsamErrorEntryPointNotFound	An entry point in a required DLL could not be found. (JET_errEntryPointNotFound)	0xFFFFF889
IsamErrorSessionContextAlreadySet	The specified session already has a session context set. (JET_errSessionContextAlreadySet)	0xFFFFF888
IsamErrorSessionContextNotSetByThisThread	An attempt was made to reset the session context, but the current thread was not the original one that set the session context. (JET_errSessionContextNotSetByThisThread)	0xFFFFF887
IsamErrorSessionInUse	An attempt was made to terminate the session currently in use. (JET_errSessionInUse)	0xFFFFF886
IsamErrorRecordFormatConversionFailed	An internal error occurred during a dynamic record format conversion. (JET_errRecordFormatConversionFailed)	0xFFFFF885
IsamErrorOneDatabasePerSession	Only one open user database per session is allowed. (JET_errOneDatabasePerSession)	0xFFFFF884
IsamErrorRollbackError	There was an error during rollback. (JET_errRollbackError)	0xFFFFF883
IsamErrorCallbackFailed	A callback function call failed. (JET_errCallbackFailed)	0xFFFFF7CB
IsamErrorCallbackNotResolved	A callback function could not be found. (JET_errCallbackNotResolved)	0xFFFFF7CA
IsamErrorOSSnapshotInvalidSequence	The operating system shadow copy API was used in an invalid sequence. (JET_errOSSnapshotInvalidSequence)	0xFFFFF69F
IsamErrorOSSnapshotTimeOut	The operating system shadow copy ended with a time-out. (JET_errOSSnapshotTimeOut)	0xFFFFF69E

Name	Description (alternate names)	Numeric value (hex)
IsamErrorOSSnapshotNotAllowed	The operating system shadow copy is not allowed because a backup or recovery in is progress. (JET_errOSSnapshotNotAllowed)	0xFFFFF69D
IsamErrorOSSnapshotInvalidSnapId	The operation failed because the specified operating system shadow copy handle was invalid. (JET_errOSSnapshotInvalidSnapId)	0xFFFFF69C
IsamErrorLSCallbackNotSpecified	An attempt was made to use local storage without a callback function being specified. (JET_errLSCallbackNotSpecified)	0xFFFFF448
IsamErrorLSAlreadySet	An attempt was made to set the local storage for an object which already had it set. (JET_errLSAlreadySet)	0xFFFFF447
IsamErrorLSNotSet	An attempt was made to retrieve local storage from an object which did not have it set. (JET_errLSNotSet)	0xFFFFF446
IsamErrorFileIOSparse	An I/O operation failed because it was attempted against an unallocated region of a file. (JET_errFileIOSparse)	0xFFFFF060
IsamErrorFileIOBeyondEOF	A read was issued to a location beyond the EOF (writes will expand the file). (JET_errFileIOBeyondEOF)	0xFFFFF05F
IsamErrorFileCompressed	Read/write access is not supported on compressed files. (JET_errFileCompressed)	0xFFFFF05B

2.4.2 Property Error Codes

Property errors appear in two different contexts. When an error occurs in getting a property of an object, or a column of a table, from the server, then the type of the returned property value is ErrorCode (0x000A) and the property value itself is the error code. When an error occurs in setting a property of an object on the server, then the **RopSetProperties** returns an array of **PropertyProblem** structures that includes the error code.

Most property error codes are also used as general error codes, but they have a special meaning in the context of a property operation.

Property Error Codes are presented in the following table.

Name	Description (alternate names)	Numeric value (hex)
NotEnoughMemory	On get, indicates that the property or column value is too large to be retrieved by the request, and the property value needs to be accessed with **RopOpenStream** <9>. (E_NOMEMORY, MAPI_E_NOT_ENOUGH_MEMORY)	8007000E, %x0E.00.07.80
NotFound	On get, indicates that the property or column has no value for this object. (MAPI_E_NOT_FOUND)	8004010F, %x0F.01.04.80
BadValue	On set, indicates that the property value is not acceptable to the server. (MAPI_E_BAD_VALUE, ecPropBadValue)	80040301, %x01.03.04.80
InvalidType	On get or set, indicates that the data type passed with the property or column is undefined. (MAPI_E_INVALID_TYPE, ecInvalidType)	80040302, %x02.03.04.80
UnsupportedType	On get or set, indicates that the data type passed with the property or column is not acceptable to the server. (MAPI_E_TYPE_NO_SUPPORT, ecTypeNotSupported)	80040303, %x03.0.04.80
UnexpectedType	On get or set, indicates that the data type passed with the property or column is not the type expected by the server. (MAPI_E_UNEXPECTED_TYPE, ecPropType)	80040304, %x04.03.04.80
TooBig	Indicates that the result set of the operation is too big for the server to return. (MAPI_E_TOO_BIG, ecTooBig)	80040305, %x05.03.04.80

Name	Description (alternate names)	Numeric value (hex)
DeclineCopy	On a copy operation, indicates that the server cannot copy the object – possibly because the source and destination are on different types of servers – and wishes to delegate the copying to client code. (MAPI_E_DECLINE_COPY)	80040306, %x06.03.04.80
UnexpectedId	On get or set, indicates that the server does not support property IDs in this range, usually the named property ID range (0x8000-0xFFFF). (MAPI_E_UNEXPECTED_ID)	80040307, %x07.03.04.80

2.4.3 Warning Codes

Warning codes indicate that while the operation as a whole was processed successfully by the server, individual items or properties were not processed successfully. For example, if three properties are requested from a **Message object** in a **RopGetPropertiesSpecific** operation and one of the three properties does not exist on the Message object, then in the return buffer:

a) The **ROP** returns an **ErrorsReturned** warning.

b) The type in the property tag of the missing property is errorcode.

c) The property value of the missing property is notfound.

Warning codes are presented in the following table.

Name	Description (alternate names)	Numeric value (hex)
ErrorsReturned	A request involving multiple properties failed for one or more individual properties, while succeeding overall. (MAPI_W_ERRORS_RETURNED, ecWarnWithErrors)	00040380, %x80.03.04.00
PositionChanged	A table operation succeeded, but the bookmark specified is no longer set at the same row as when it was last used. (MAPI_W_POSITION_CHANGED, ecWarnPositionChanged)	00040481, %x81.04.04.00

Name	Description (alternate names)	Numeric value (hex)
ApproximateCount	The row count returned by a table operation is approximate, not exact. (MAPI_W_APPROX_COUNT, ecWarnApproxCount)	00040482, %x82.04.04.00
PartiallyComplete	A move, copy, or delete operation succeeded for some messages but not for others. (MAPI_W_PARTIAL_COMPLETION, ecPartialCompletion)	00040680, %x80.06.04.00
SyncProgress	The operation succeeded but there is more to do. (SYNC_W_PROGRESS)	00040820, %x20.08.04.00
NewerClientChange	In a change conflict, the client has the more recent change. (SYNC_W_CLIENT_CHANGE_NEWER)	00040821, %x21.08.04.00
IsamWarningRemainingVersions	The version store is still active. (JET_wrnRemainingVersions)	00000141, %x41.01.00.00
IsamWarningUniqueKey	A seek on a non-unique index yielded a unique key. (JET_wrnUniqueKey)	00000159, %x59.01.00.00
IsamWarningSeparateLongValue	A database column is a separated long value. (JET_wrnSeparateLongValue)	00000196, %x96.01.00.00
IsamWarningExistingLogFileHasBadSignature	The existing log file has a bad signature. (JET_wrnExistingLogFileHasBadSignature)	0000022E, %x2E.02.00.00
IsamWarningExistingLogFileIsNotContiguous	The existing log file is not contiguous. (JET_wrnExistingLogFileIsNotContiguous)	0000022F, %x2F.02.00.00
IsamWarningSkipThisRecord	This error is for internal use only. (JET_wrnSkipThisRecord)	00000234, %x34.02.00.00
IsamWarningTargetInstanceRunning	The TargetInstance specified for the restore is running. (JET_wrnTargetInstanceRunning)	00000242, %x42.02.00.00

Name	Description (alternate names)	Numeric value (hex)
IsamWarningDatabaseRepaired	The database corruption has been repaired. (JET_wrnDatabaseRepaired)	00000253, %x53.02.00.00
IsamWarningColumnNull	The column has a NULL value. (JET_wrnColumnNull)	000003EC, %xEC.03.00.00
IsamWarningBufferTruncated	The buffer is too small for the data. (JET_wrnBufferTruncated)	000003EE, %xEE.03.00.00
IsamWarningDatabaseAttached	The database is already attached. (JET_wrnDatabaseAttached)	000003EF, %xEF.03.00.00
IsamWarningSortOverflow	The sort that is being attempted does not have enough memory to complete. (JET_wrnSortOverflow)	000003F1, %xF1.03.00.00
IsamWarningSeekNotEqual	An exact match was not found during a seek. (JET_wrnSeekNotEqual, JET_wrnRecordFoundGreater, JET_wrnRecordFoundLess)	0000040F, %x0F.04.00.00
IsamWarningNoErrorInfo	There is no extended error information. (JET_wrnNoErrorInfo)	0000041F, %x1F.04.00.00
IsamWarningNoIdleActivity	No idle activity occurred. (JET_wrnNoIdleActivity)	00000422, %x22.04.00.00
IsamWarningNoWriteLock	There is a no write lock at transaction level 0. (JET_wrnNoWriteLock)	0000042B, %x2B.04.00.00
IsamWarningColumnSetNull	The column is set to a NULL value. (JET_wrnColumnSetNull)	0000042C, %x2C.04.00.00
IsamWarningTableEmpty	An empty table was opened. (JET_wrnTableEmpty)	00000515, %x15.05.00.00
IsamWarningTableInUseBySystem	The system cleanup has a cursor open on the table. (JET_wrnTableInUseBySystem)	0000052F, %x2F.05.00.00
IsamWarningCorrup	The out-of-date index must be removed.	00000587,

Name	Description (alternate names)	Numeric value (hex)
tIndexDeleted	(JET_wrnCorruptIndexDeleted)	%x87.05.00.00
IsamWarningColumnMaxTruncated	The max length is too large and has been truncated. (JET_wrnColumnMaxTruncated)	000005E8, %xE8.05.00.00
IsamWarningCopyLongValue	A BLOB value has been moved from the record into a separate storage of large BLOBs. (JET_wrnCopyLongValue)	000005F0, %xF0.05.00.00
IsamWarningColumnSkipped	The column values were not returned because the corresponding column ID or itagSequence member from the JET_ENUMCOLUMNVALUE structure that was requested for enumeration was null. (JET_wrnColumnSkipped)	000005FB, %xFB.05.00.00
IsamWarningColumnNotLocal	The column values were not returned because they could not be reconstructed from the existing data. (JET_wrnColumnNotLocal)	000005FC, %xFC.05.00.00
IsamWarningColumnMoreTags	The existing column values were not requested for enumeration. (JET_wrnColumnMoreTags)	000005FD, %xFD.05.00.00
IsamWarningColumnTruncated	The column value was truncated at the requested size limit during enumeration. (JET_wrnColumnTruncated)	000005FE, %xFE.05.00.00
IsamWarningColumnPresent	The column values exist but were not returned by the request. (JET_wrnColumnPresent)	000005FF, %xFF.05.00.00
IsamWarningColumnSingleValue	The column value was returned in JET_COLUMNENUM as a result of the JET_bitEnumerateCompressOutput being set. (JET_wrnColumnSingleValue)	00000600, %x00.06.00.00
IsamWarningColumnDefault	The column value is set to the default value of the column. (JET_wrnColumnDefault)	00000601, %x01.06.00.00
IsamWarningDataHasChanged	The data has changed. (JET_wrnDataHasChanged)	0000064A, %x4A.06.00.00

Name	Description (alternate names)	Numeric value (hex)
IsamWarningKeyChanged	A new key is being used. (JET_wrnKeyChanged)	00000652, %x52.06.00.00
IsamWarningFileOpenReadOnly	The database file is read only. (JET_wrnFileOpenReadOnly)	00000715, %x15.07.00.00
IsamWarningIdleFull	The idle registry is full. (JET_wrnIdleFull)	00000774, %x74.07.00.00
IsamWarningDefragAlreadyRunning	There was an online defragmentation already running on the specified database. (JET_wrnDefragAlreadyRunning)	000007D0, %xD0.07.00.00
IsamWarningDefragNotRunning	An online defragmentation is not running on the specified database. (JET_wrnDefragNotRunning)	000007D1, %xD1.07.00.00
IsamWarningCallbackNotRegistered	A non-existent callback function was unregistered. (JET_wrnCallbackNotRegistered)	00000834, %x34.08.00.00
IsamWarningNotYetImplemented	The function is not yet implemented. (JET_wrnNyi)	FFFFFFFF, %xFF.FF.FF.FF

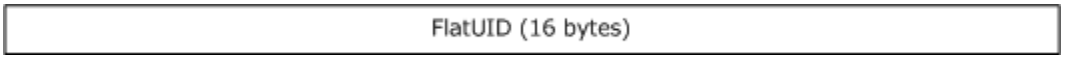
2.5 Flat UID

The **FlatUID** structure is a byte-order independent version of a **GUID** structure and is used to uniquely identify a service provider. It appears in EntryIDs.

The **FlatUID_r** structure is an encoding of the **FlatUID** data structure. The semantic meaning is unchanged from the **FlatUID** data structure.

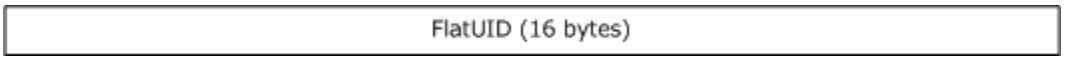
2.5.1 FlatUID

A **FlatUID** is a **GUID** structure put into little-endian byte order. That is, **FlatUID** and **GUID** structures have the same byte order when used on a little-endian processor. However, on a big-endian processor, the **FlatUID** has the same byte order as on the little-endian machine, but the **GUID** uses big-endian format for certain fields



FlatUID (16 bytes): A flat 16-byte little-endian sequence used as a unique identifier in various structures.

2.5.2 FlatUID_r



FlatUID (16 bytes): A flat 16-byte little-endian sequence used as a unique identifier in various structures.

2.6 Notifications

A client can use **RopRegisterNotification** to request a server to notify it when one of the following events occurs:

- New mail delivery
- Object creation
- Object modification
- Object deletion
- Search completion
- Contents or hierarchy table change

In addition a client can use **RopRegisterSynchronizationNotifications** to request a server to notify it when the following event occurs:

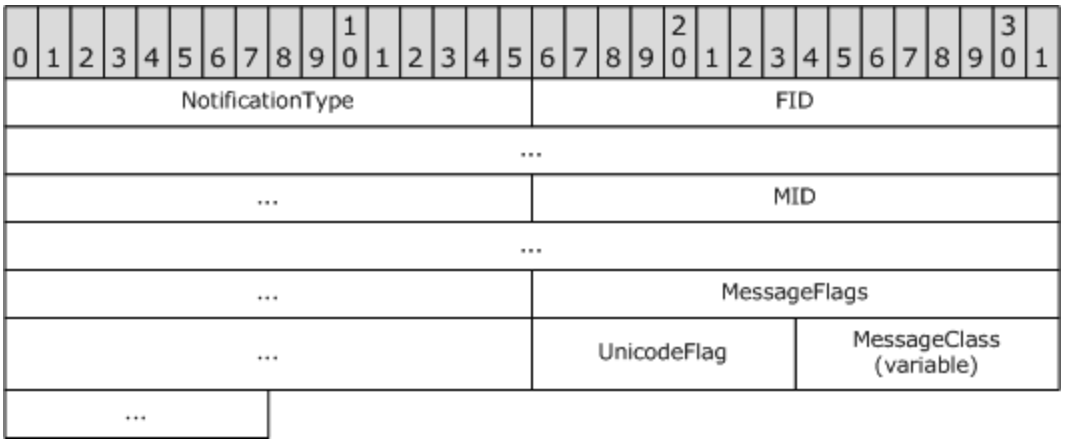
- Folder(s) need to be resynched

The server queues notifications for the client as events occur, and when the client makes an RPC call (of any sort), the pending notifications are returned as NotificationData structures in individual **RopNotify** packets, as specified in [MS-OXCROPS], as part of the response to the RPC call.

This section describes the formats of the **NotificationData** structures returned by servers.

2.6.1 New Mail Delivery

A client can request notification of new mail delivery to a mailbox store or to a specified folder within a mailbox store or the public store. When a new message is delivered, the server creates a **NewMailNotification** structure for the client.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and in this case MUST be set to "0x0002" by the server.

FID (8 bytes): FID structure**.** The value identifies the folder where the new mail was received.

MID (8 bytes): MID structure**.** The value identifies the new mail message.

MessageFlags (4 bytes): Unsigned 4-byte integer giving the value of the **PidTagMessageFlags** property for the new mail message.

UnicodeFlag (1 byte): Unsigned 1-byte integer. If TRUE ("0x01"), indicates that the **MessageClass** field which follows is a Unicode (UTF-16) string; otherwise, the **MessageClass** field is an **MBCS** string.

MessageClass (Variable): A null-terminated string which is in Unicode if the value of **UnicodeFlag** is TRUE ("0x01") or in MBCS if the value of **UnicodeFlag** is FALSE ("0x00").

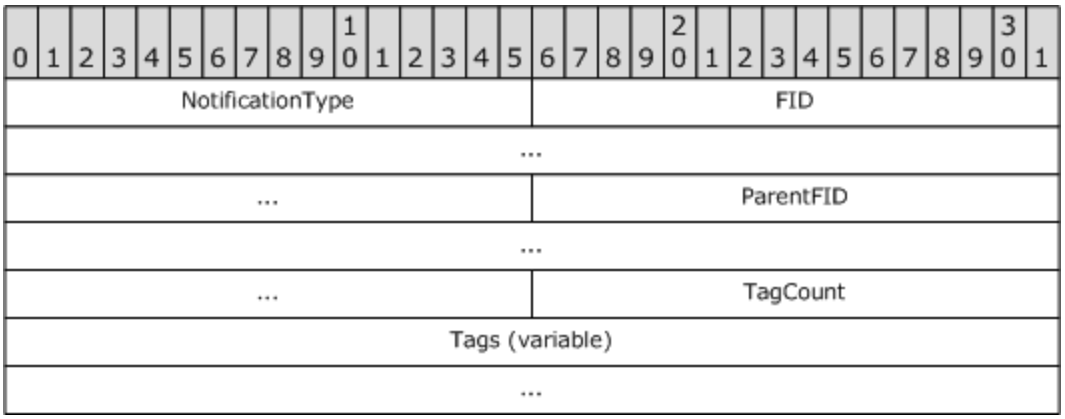
2.6.2 Object Creation

A client can request notification when objects are created within an entire mailbox store or as immediate child objects of a specified folder. Note: Move and Copy operations generate object creation notifications for the destination folder.

The next subsections describe the three different formats for object creation notifications.

2.6.2.1 FolderCreatedNotification

This structure is used to notify a client that a new folder has been created.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x0004" by the server.

FID (8 bytes): FID structure**.** The value identifies the new folder which was created.

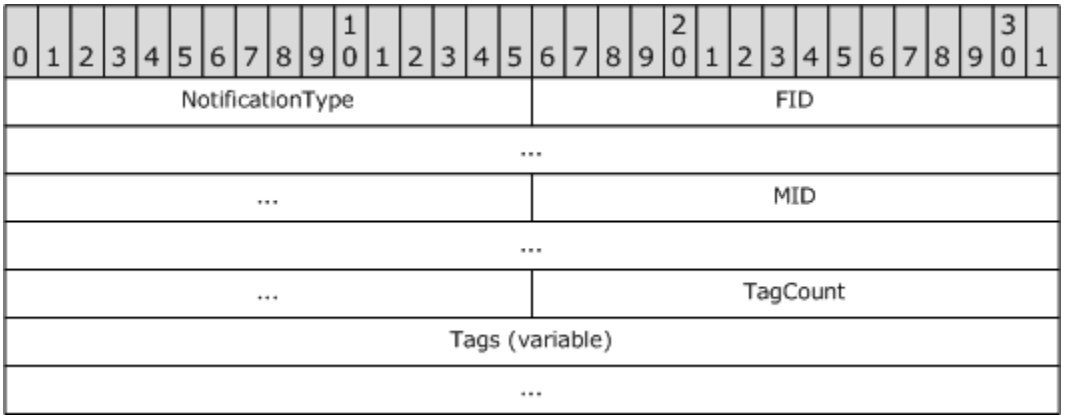
ParentFID (8 bytes): FID structure**.** The value identifies the parent folder which contains the new folder.

TagCount (2 bytes): Unsigned 16-bit integer. When it has the value "0x0000" or "0xFFFF", the **Tags** field is not present. Otherwise, it indicates how many **PropertyTag** elements are present in **Tags**.

Tags (variable): Array of **PropertyTag** structures. This field MUST contain **TagCount** tags; it simply lists properties that were set on the new folder, without specifying their values.

2.6.2.2 MessageCreatedNotification

This structure is used to notify a client when a new message is created in a normal folder. There is a different notification type for search folders.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x8004" by the server.

FID (8 bytes): FID structure**.** The value identifies the folder containing the message.

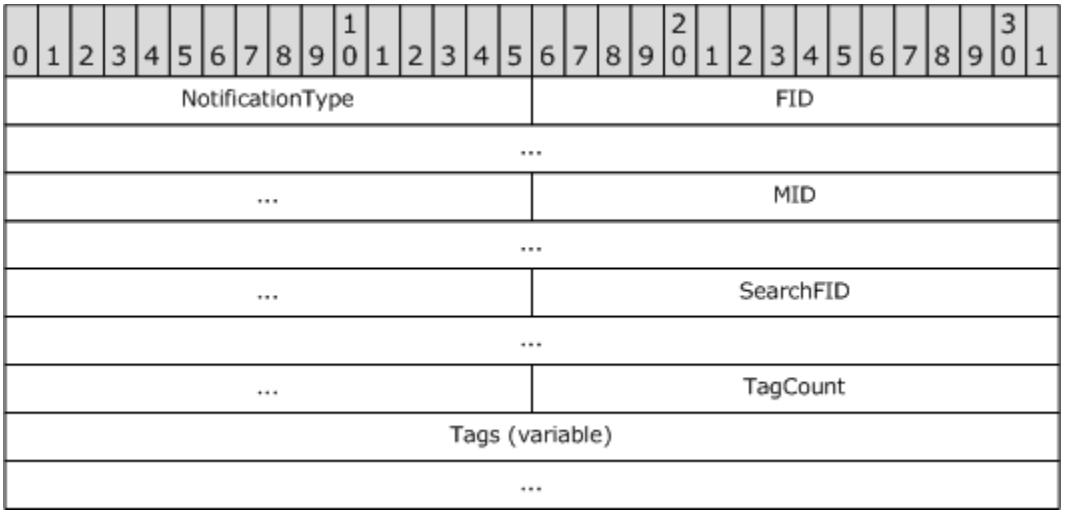
MID (8 bytes): MID structure. The value identifies the message.

TagCount (2 bytes): Unsigned 16-bit integer. When it has the value "0xFFFF", the **Tags** field is not present. Otherwise, it indicates how many **PropertyTag** elements are present in **Tags**.

Tags (variable): Array of **PropertyTag** structures. This field MUST contain **TagCount** structures. It lists properties that were initially set or updated on the message.

2.6.2.3 SearchMessageAddedNotification

This structure is used to notify when a new message is added to the search results in a search folder. When the server discovers a message that meets the folder's search criteria, it inserts a link to the message into the search folder's contents table and generates this notification for the client.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0xC004" by the server.

FID (8 bytes): FID structure**.** The value identifies the folder the message is actually stored in, and not the search folder itself.

MID (8 bytes): MID structure. The value identifies the message.

SearchFID (8 bytes): FID structure**.** The value identifies the search folder the message was added to.

TagCount (2 bytes): Unsigned 16-bit integer. When it has the value 0xFFFF, the **Tags** field is not present. Otherwise, it indicates how many **PropertyTag** elements are present in **Tags**.

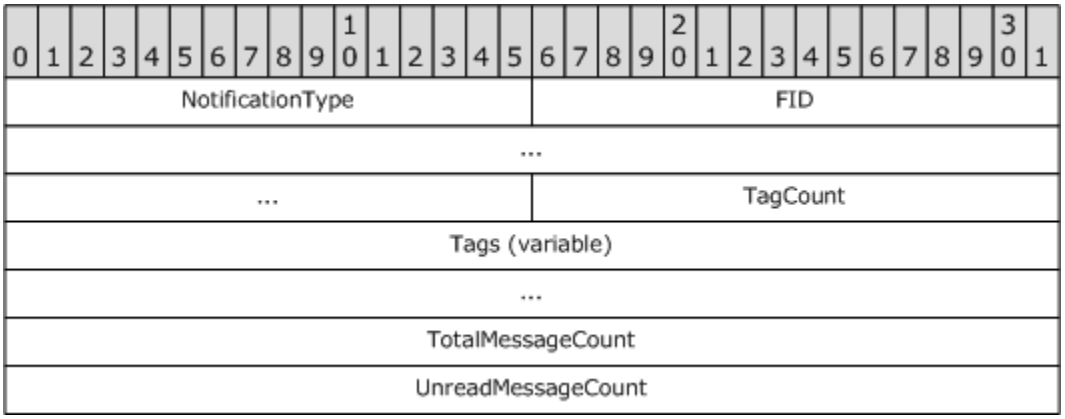
Tags (variable): Array of **PropertyTag** structures. This field MUST contain **TagCount** tags. It lists properties that were initially set or updated on the message.

2.6.3 Object Modification

A client can request notification about the changes to properties of objects. The following subsections describe the three different formats for object modification notifications.

2.6.3.1 FolderModifiedNotification

This structure is used to notify a client when the properties of a folder change.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to one of four values: '0x0010", "0x1010", "0x2010", or "0x3010" by the server. These different values indicate the presence or absence of the **TotalMessageCount** and **UnreadMessageCount** fields.

FID (8 bytes): FID structure**.** The value identifies the folder which was modified.

TagCount (2 bytes): Unsigned 16-bit integer. When it has the value "0xFFFF", the **Tags** field is not present. Otherwise, it indicates how many **PropertyTag** elements are present in **Tags**.

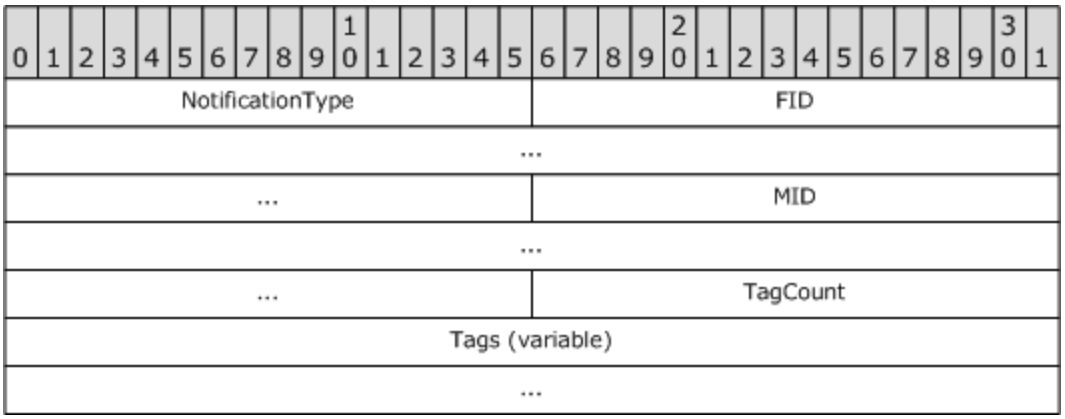
Tags (variable): Array of **PropertyTag** structures. This field MUST contain **TagCount** structures. This field gives a list of properties that were changed on the folder.

TotalMessageCount (4 bytes): Unsigned 32-bit integer. This field is ONLY present when **NotificationType** is "0x1010" or "0x3010". This value gives the new number of messages in the folder.

UnreadMessageCount (4 bytes): Unsigned 32-bit integer. This field is ONLY present when **NotificationType** is "0x2010" or "0x3010". This value gives the new number of unread messages in the folder.

2.6.3.2 MessageModifiedNotification

This structure is used to notify a client when the properties of a message in a normal, non-search folder change. A different type of notification is issued for search folders.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x8010" by the server.

FID (8 bytes): FID structure**.** The value identifies the folder containing the message.

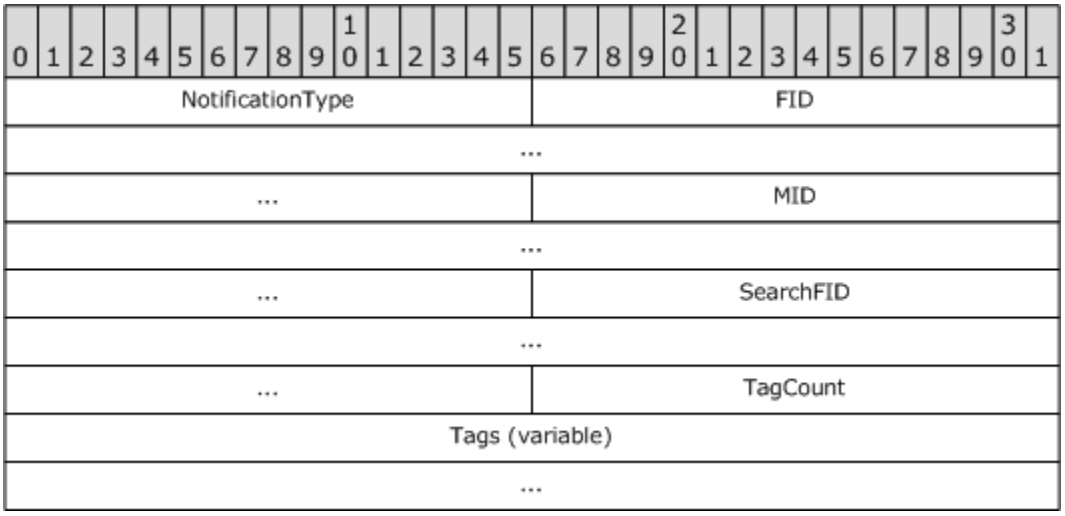
MID (8 bytes): MID structure. The value identifies the message.

TagCount (2 bytes): Unsigned 16-bit integer. When it has the value "0xFFFF", the **Tags** field is not present. Otherwise, it indicates how many **PropertyTag** elements are present in **Tags**.

Tags (variable): Array of **PropertyTag** structures. This field MUST contain **TagCount** structures. This field gives a list of properties that were initially set or updated on the message.

2.6.3.3 SearchMessageModifiedNotification

This structure is used to notify a client when the properties of a message in a search folder change (but the message still meets the folder's search criteria).



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0xC010" by the server.

FID (8 bytes): FID structure**.** The value identifies the folder the message is actually stored in.

MID (8 bytes): MID structure. The value identifies the message.

SearchFID (8 bytes): FID structure**.** The value identifies the search folder the message is in.

TagCount (2 bytes): Unsigned 16-bit integer. When it has the value "0xFFFF", the **Tags** field is not present. Otherwise, it indicates how many **PropertyTag** elements are present in **Tags**.

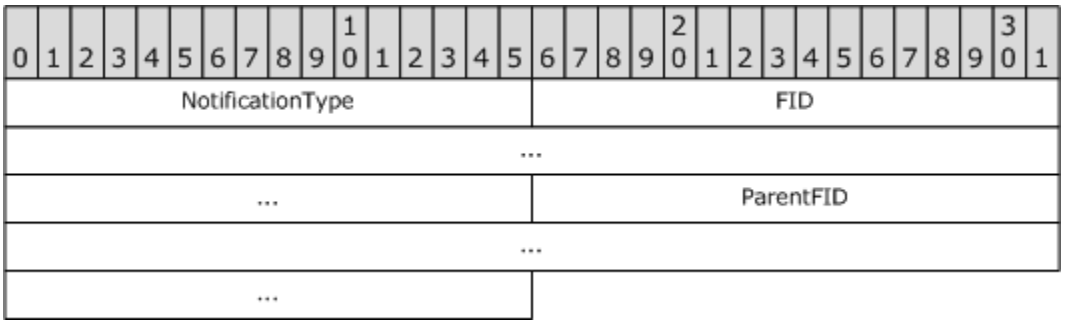
Tags (variable): Array of **PropertyTag** structures. This field MUST contain **TagCount** structures. This field gives a list of properties that were initially set or updated on the message.

2.6.4 Object Deletion

A client can request notification about deletion of objects. The following subsections describe the three different formats for object deletion notifications. Note: Move operations generate object deletion notifications for the source folder.

2.6.4.1 FolderDeletedNotification

This structure is used to notify a client when a folder has been deleted.



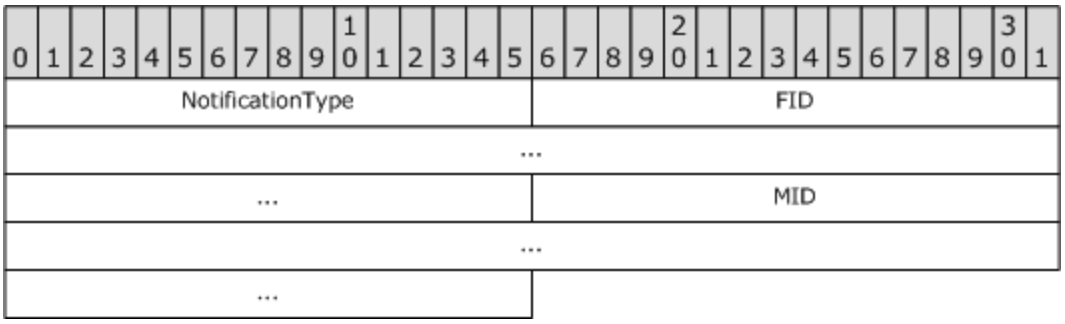
NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and in this case MUST be set to "0x0008" by the server.

FID (8 bytes): FID structure**.** The value identifies the folder which was deleted.

ParentFID (8 bytes): FID structure**.** The value identifies the parent folder which used to contain the deleted folder.

2.6.4.2 MessageDeletedNotification

This structure is used to notify a client when a message has been deleted.



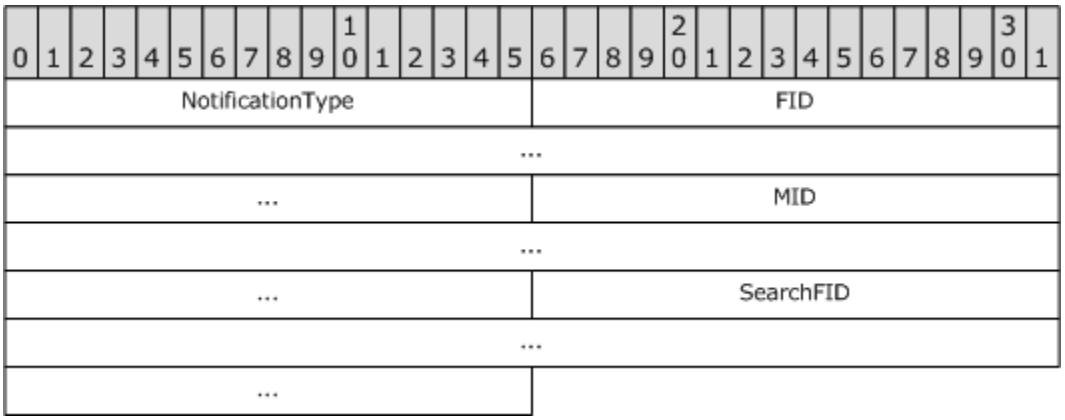
NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and in this case MUST be set to "0x8008" by the server.

FID (8 bytes): FID structure**.** The value identifies the folder containing the message which was deleted.

MID (8 bytes): MID structure**.** The value identifies the message which was deleted.

2.6.4.3 SearchMessageRemovedNotification

This structure is used to notify clients that a message is no longer part of a search folder. This can occur because the message was actually deleted, or because properties of the message have changed in such a way that it no longer meets the search criteria.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and in this case MUST be set to "0xC008" by the server.

FID (8 bytes): FID structure**.** The value identifies the folder that contained the message (if it was deleted) or still contains the message (if its properties have changed in such a way that it no longer meets the search criteria).

MID (8 bytes): MID structure. The value identifies the message.

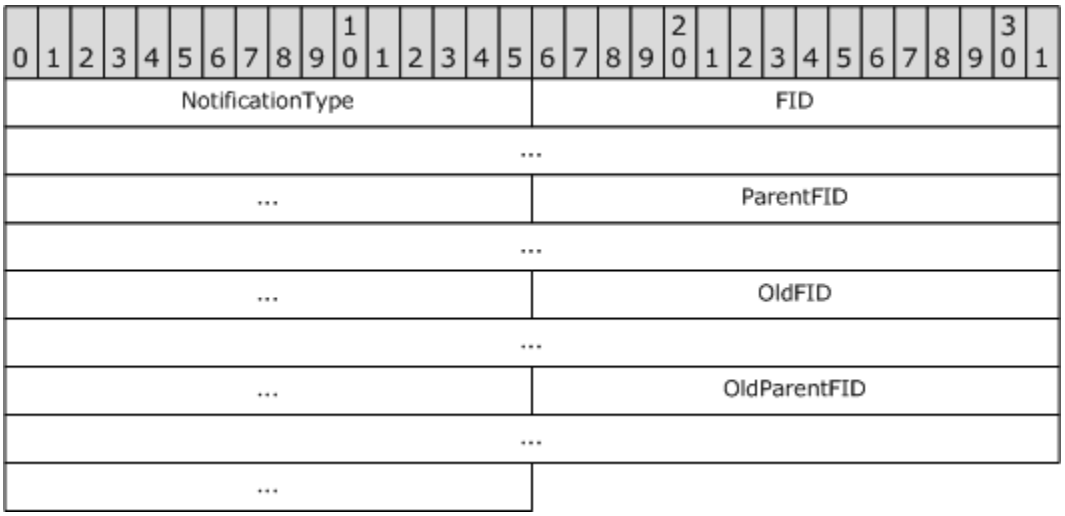
SearchFID (8 bytes): FID structure**.** The value identifies the search folder the message has been removed from.

2.6.5 Object Moved or Copied

A client can request notification about objects that are moved or copied. The following subsections describe the two different formats for object modification notifications.

2.6.5.1 FolderMoveCopyNotification

This structure is used to notify clients when a folder is moved or copied.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set by the server to "0x0020" to indicate a move notification, or "0x0040" to indicate a copy notification.

FID (8 bytes): FID structure**.** The value gives the new **FID** of the folder which was moved or copied.

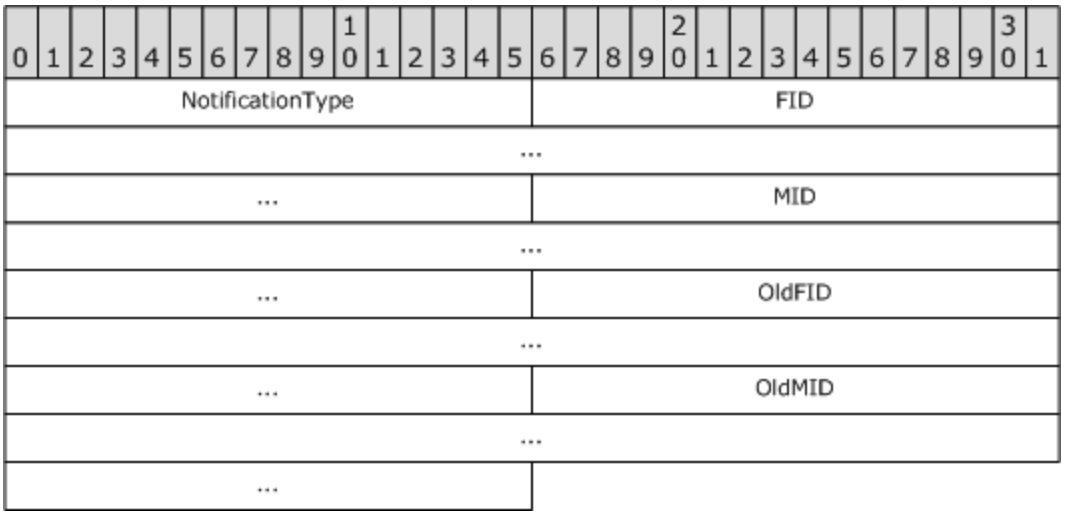
ParentFID (8 bytes): FID structure**.** The value identifies the parent folder which now contains the folder which was moved or copied.

OldFID (8 bytes): FID structure**.** In the case of a move notification, this gives the **FID** of the folder before it was moved. In the case of copy notification, this gives the **FID** of the folder which was copied.

OldParentFID (8 bytes): FID structure**.** The value identifies the parent folder from which the folder was moved or copied.

2.6.5.2 MessageMoveCopyNotification

This structure is used to notify clients when a message is moved or copied.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set by the server to "0x8020" to indicate a move notification, or "0x8040" to indicate a copy notification.

FID (8 bytes): FID structure**.** The value identifies the new parent folder of the message which was moved or copied.

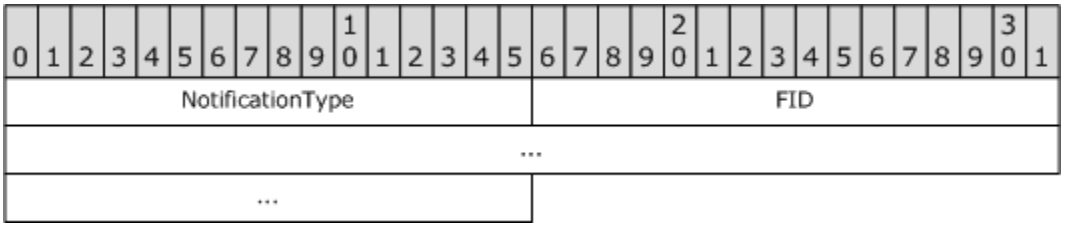
MID (8 bytes): MID structure**.** The value gives the new **MID** of the message that was moved or copied.

OldFID (8 bytes): FID structure**.** The value identified the parent folder that the message was moved or copied from.

OldMID (8 bytes): MID structure**.** In the case of a move notification, this gives the **MID** of the message before it was moved. In the case of copy notification, this gives the **MID** of the message which was copied.

2.6.6 Search Complete

A client can request notification when a search is complete, that is, when all messages within the scope of the search have been evaluated. When this occurs, a **SearchCompleteNotification** structure is used to notify the client.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x0080" by the server.

FID (8 bytes): FID structure**.** The value identifies the search folder where the search has completed.

2.6.7 Contents or Hierarchy Table Change

A client can register for notification on changes to an open hierarchy or contents table object. Servers can generate rich table notifications, such as **TableRowAdded**, **TableRowDeleted**, or **TableRowModified**, which allow the client to update its view of the table without making additional queries for row information. Servers can also generate the **TableChanged** notification instead of a rich notification, or can generate no notification at all. For more information regarding table notifications, see [MS-OXCNOTIF].

The following table lists table notification types:

Name	Value	Description	Alternate names
TableRowAdded	3	A new row has been added to the table.	TABLE_ROW_ADDED
TableRowDeleted	4	A row has been removed from the table	TABLE_ROW_DELETED
TableRowModified	5	One or more property values in a row have been changed.	TABLE_ROW_MODIFIED
TableChanged	1	When it is not possible to generate a rich notification, the server can generate this notification. Indicates at a high level that something about the table has changed. The table's state is as it was before the event, meaning that the values of the instance key	TABLE_CHANGED

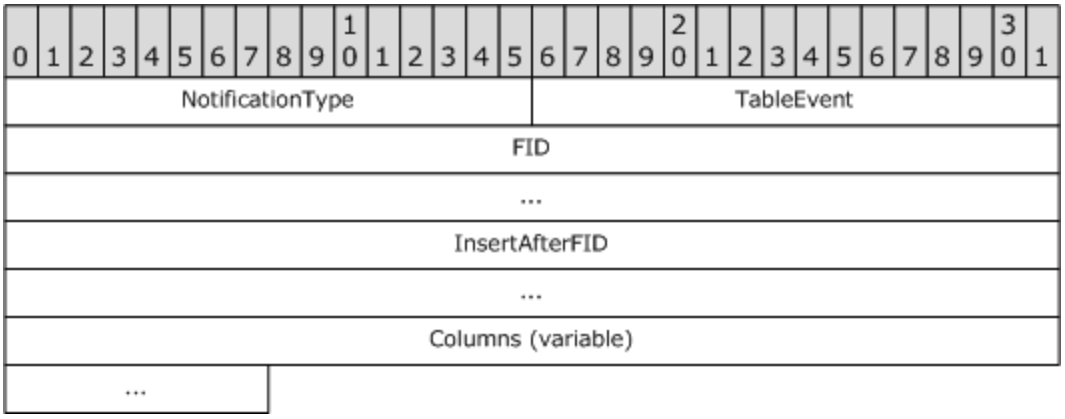
Name	Value	Description	Alternate names
		property, bookmarks, current positioning, and user interface selections are still valid, but the table needs to be reread from the server.	
TableRestrictDone	7	Servers MUST generate this table event after the computation of a new view has been completed: Indicates that an asynchronous restriction operation has completed.	TABLE_RESTRICT_DONE
TableReload	9	Servers generate this notification when the database containing the underlying table data is replaced. Clients re-read the entire table in response to this notification.	TABLE_RELOAD

2.6.7.1 TableRowAdded Notifications

A client can use a **TableRowAdded** notification to directly update its row cache without pulling new data from the server.

There are two formats for **TableRowAdded** notifications, one for hierarchy tables and another for contents tables.

2.6.7.1.1 HierarchyRowAdded Notification



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x0100" by the server.

TableEvent (2 bytes): Unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0003" by the server.

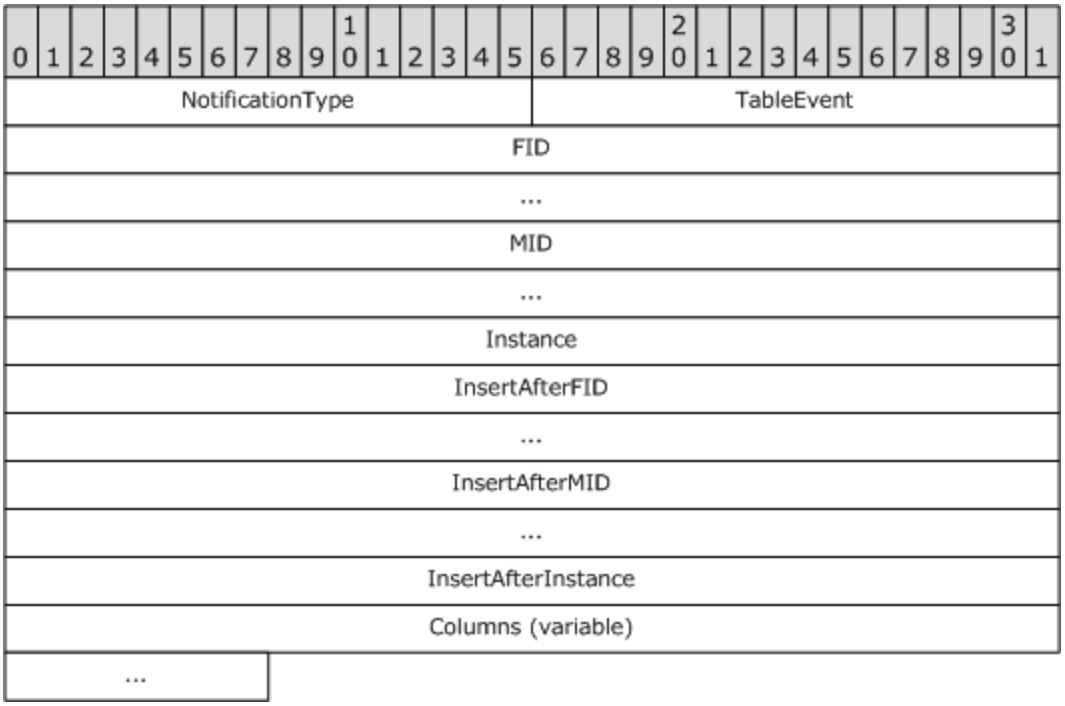
FID (8 bytes): FID structure. This value gives the **FID** of the folder that was added.

InsertAfterFID (8 bytes): FID structure. This value gives the **FID** of the folder row that precedes the new row. If the new folder row occurs first, then this field consists of "0x0000000000000000".

Columns (variable): PropertyRow structure, as specified in section 2.10. This field gives the values for the columns of the new row.

The **FID** value is the unique identifier for a row of a hierarchy table. In order to update its view of a hierarchy table when a new row notification arrives, the client can cache the rows it is currently displaying, and store the **FID** with each row.

2.6.7.1.2 ContentsRowAdded Notification



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x8100" by the server.

TableEvent (2 bytes): Unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0003" by the server.

FID (8 bytes): FID structure. This value gives the **FID** of the row that was added.

MID (8 bytes): MID structure. When the table is categorized, this gives the category id of the new row. In other cases it gives the **MID** of the new row.

Instance (4 bytes): Unsigned 32-bit integer. When the table is categorized and one of the columns is multi-valued and specified as **MultivalueInstance**, this gives the instance number of the new row. In other cases it will be "0x00000000".

InsertAfterFID (8 bytes): FID structure. This value gives the **FID** of the row that precedes the new row. If the new folder row occurs first, then this field consists of "0x0000000000000000".

InsertAfterMID (8 bytes): MID structure. This value gives the **MID** (or category id) of the row that precedes the new row. If the new folder row occurs first, then this field consists of "0x0000000000000000".

InsertAfterInstance (4 bytes): Unsigned 32-bit integer. This value gives the instance value for the row that precedes the new row. If the new folder row occurs first, then this value is "0x00000000".

Columns (variable): PropertyRowSet structure. This field gives the values for the columns of the new row.

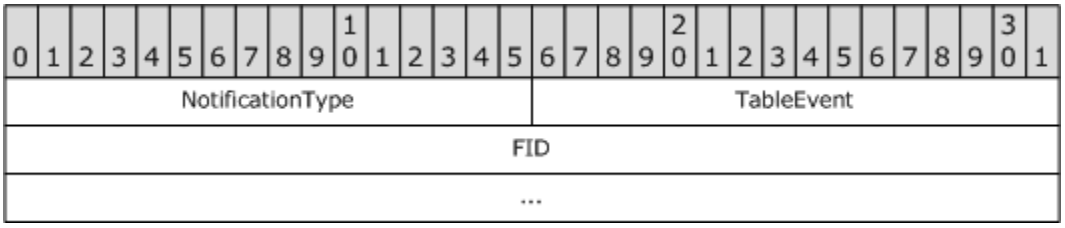
The combination of the **FID, MID**, and Instance makes a unique identifier for a row of a contents table. In order to update its view of a contents table when a new row notification arrives, a client can cache the rows it is currently displaying, and store the **FID**, **MID**, and **Instance** values with each row.

2.6.7.2 TableRowDeleted Notifications

A client can use a **TableRowDeleted** notification to directly update its row cache without pulling new data from the server.

There are two formats for **TableRowDeleted** notifications: one for hierarchy tables and another for contents tables.

2.6.7.2.1 HierarchyRowDeleted Notification



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x0100" by the server.

TableEvent (2 bytes): Unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0004" by the server.

FID (8 bytes): FID structure. This value gives the **FID** of the folder row that was deleted.

The **FID** value is the unique identifier for a row of a hierarchy table. In order to update its view of a hierarchy table when a new row notification arrives, the client can cache the rows it is currently displaying, and store the **FID** with each row.

2.6.7.2.2 ContentsRowDeleted Notification

NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x8100" by the server.

TableEvent (2 bytes): Unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0004" by the server.

FID (8 bytes): FID structure. This value gives the **FID** of the row that was deleted.

MID (8 bytes): MID structure. When the table is categorized, this gives the category id of the row that was deleted. In other cases, it gives the **MID** of the deleted row.

Instance (4 bytes): Unsigned 32-bit integer. When the table is categorized and one of the columns is multi-valued and specified as **MultivalueInstance**, this gives the instance number of the deleted row; the instance number is the value of **PidTagInstanceKey** column in that row. In other cases it will be "0x00000000".

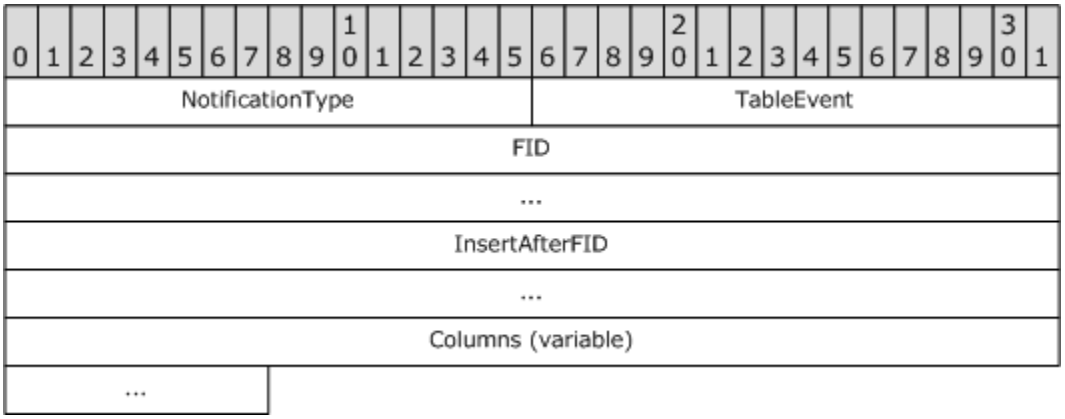
The combination of the **FID, MID**, and Instance makes a unique identifier for a row of a contents table. In order to update its view of a contents table when a new row notification arrives, the client can cache the rows it is currently displaying, and store the **FID**, **MID**, and **Instance** values with each row.

2.6.7.3 TableRowModified Notifications

A client can use a **TableRowModified** notification to directly update its row cache without pulling new data from the server.

There are two formats for **TableRowModified** notifications: one for hierarchy tables and another for contents tables.

2.6.7.3.1 HierarchyRowModified Notification



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x0100" by the server.

TableEvent (2 bytes): Unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0005" by the server.

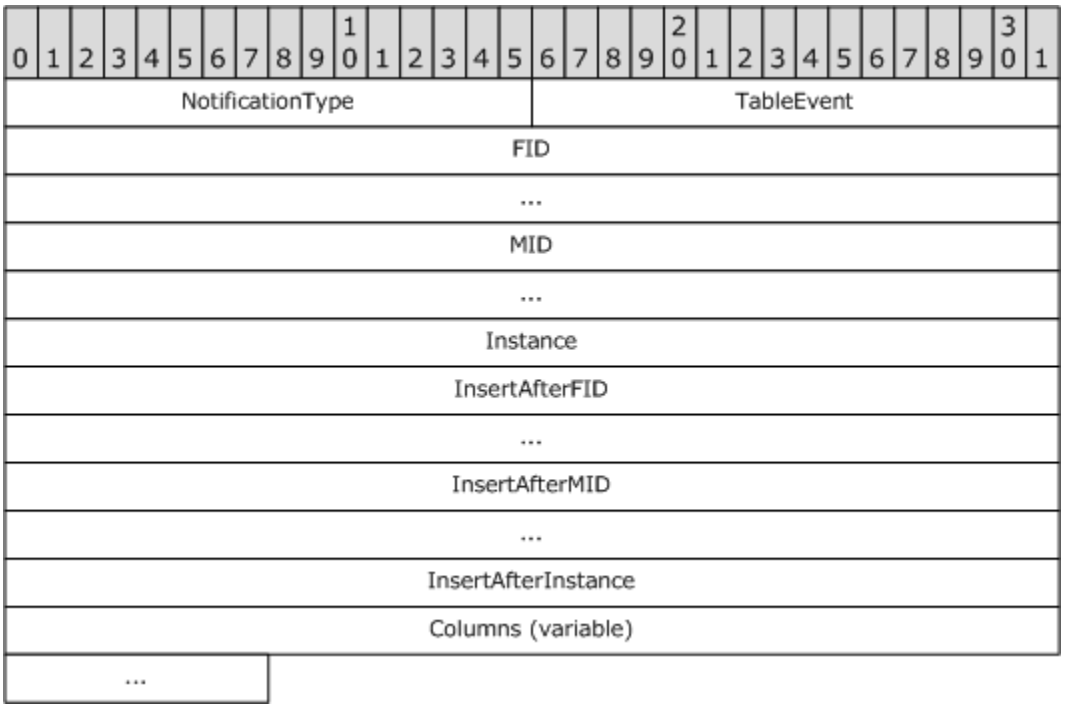
FID (8 bytes): FID structure. This value gives the **FID** of the row that was modified.

InsertAfterFID (8 bytes): FID structure. This value gives the **FID** of the folder row that precedes the modified row. If the modified folder row occurs first, then this field consists of "0x0000000000000000".

Columns (variable): PropertyRow structure, as specified in section 2.10. This field gives the new values for the columns of the modified row.

The **FID** is the unique identifier for a row of a hierarchy table. In order to update its view of a hierarchy table when a new row notification arrives, a client can cache the rows it is currently displaying and store the **FID** with each row.

2.6.7.3.2 ContentsRowModified Notification



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x8100" by the server.

TableEvent (2 bytes): Unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0005" by the server.

FID (8 bytes): FID structure. This value gives the **FID** of the folder whose contents table has been modified.

MID (8 bytes): MID structure. When the table is categorized, this gives the category id of the modified row. In other cases, it gives the **MID** of the modified **Message object**.

Instance (4 bytes): Unsigned 32-bit integer. When the table is categorized and one of the columns is multi-valued and specified as MultivalueInstance, this gives the instance number of the modified row. In other cases it will be "0x00000000".

InsertAfterFID (8 bytes): FID structure. This value gives the **FID** of the row that precedes the modified row. If the modified folder row occurs first, then this field consists of "0x0000000000000000".

InsertAfterMID (8 bytes): MID structure. This value gives the **MID** (or category id) of the row that precedes the modified row. If the modified folder row occurs first, then this field consists of "0x0000000000000000".

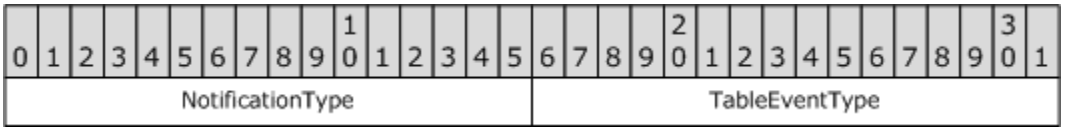
InsertAfterInstance (4 bytes): Unsigned 32-bit integer. This value gives the instance value (the value of **PidTagInstanceKey**) of the row after which the modified row SHOULD be inserted. If the modified folder row occurs first, then this value is "0x00000000".

Columns (variable): PropertyRow structure. This field gives the new values for the columns of the modified row.

The combination of the **FID, MID**, and **Instance** makes a unique identifier for a row of a contents table. In order to update its view of a contents table when a new row notification arrives, the client can cache the rows it is currently displaying, and store the **FID**, **MID**, and **Instance** values with each row.

2.6.7.4 TableChanged Notification

When a client receives a **TableChanged** notification, it MUST discard its current rendering of the table and any cached data from the server, reread that data from the server, and recreate the rendering.

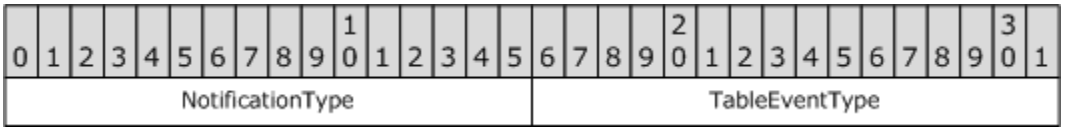


NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set by the server to either "0x0100" (for a hierarchy table) or "0x8100" (for a contents table).

TableEventType (2 bytes): An unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0001" by the server.

2.6.7.5 TABLE_RESTRICT_DONE Notification

The **TABLE_RESTRICT_DONE** notification tells a client that an asynchronous Restrict operation has completed on the server.

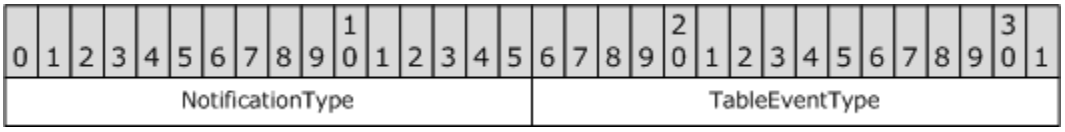


NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x0100" by the server.

TableEventType (2 bytes): Unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0007".

2.6.7.6 TableReload Notification

The **TableReload** notification tells a client that the database containing the underlying table data has been replaced.

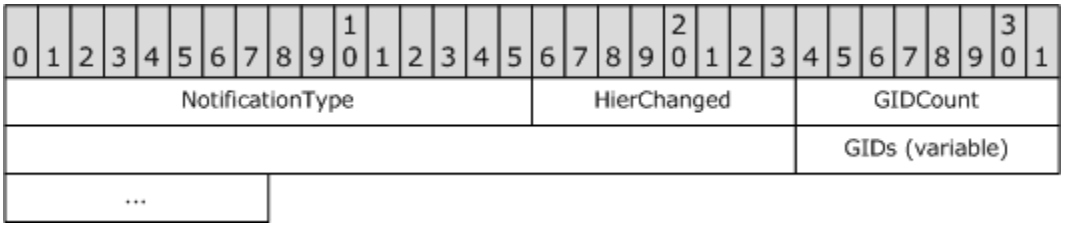


NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set by the server to either "0x0100" (for a hierarchy table) or "0x8100" (for a contents table).

TableEventType (2 bytes): Unsigned 16-bit integer. This value indicates the type of table event and MUST be set to "0x0009".

2.6.8 ICS Notification

An **IcsNotification** signals the client that one or more folders have changed on the server.



NotificationType (2 bytes): Unsigned 16-bit integer. This value indicates the type of notification and MUST be set to "0x0200" by the server.

HierChanged (1 byte): Unsigned 8-bit integer. This value will be either **TRUE** ("0x01") or **FALSE** ("0x00") and indicates whether the folder hierarchy information has changed since the last ICS synchronization.

GIDCount (4 bytes): Unsigned 32-bit integer. This value indicates how many **GID** elements are present in **GIDs**.

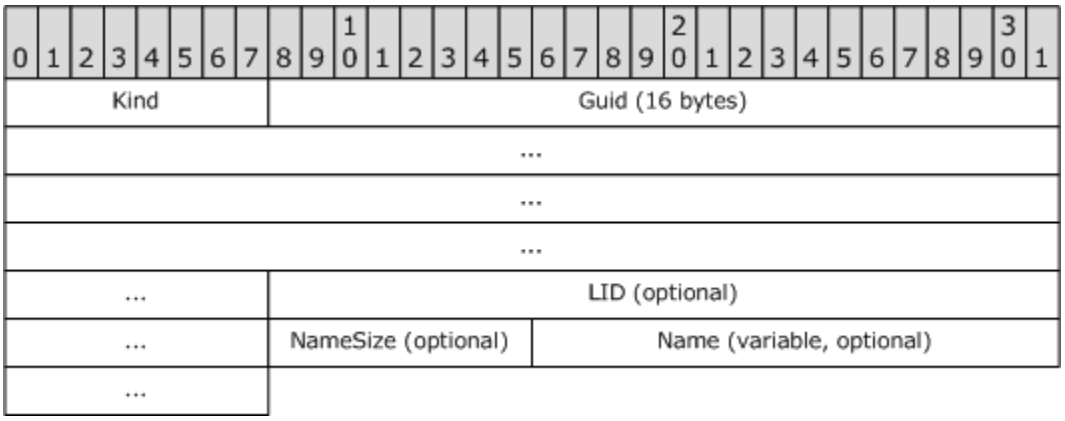
GIDs (Variable): Array of **GID** structures. Each **GID** in this array specifies a folder whose contents have changed since the last ICS synchronization.

2.7 PropertyName

The **PropertyName** structure describes a named property. It is used in **RopGetPropertyIdsFromNames** and **RopGetNamesFromPropertyIds** requests.

The **PropertyName_r** structure, specified in [MS-NSPI], is an encoding of the **PropertyName** data structure, as specified in section 2.7.1. Strictly speaking, **PropertyName_r** and **PropertyName** are distinct encodings off the same abstract data structure rather than **PropertyName_r** being an encoding of **PropertyName**. In this case, the semantics of the **PropertyName_r** structure is different from the **PropertyName** structure; **PropertyName_r** uses no string names, only **LIDs**. The packet diagrams in sections 2.7.1 and 2.7.2 illustrate the differences between the two structures.

2.7.1 PropertyName



Kind (1 byte): "0x00" if the property is identified by a **LID**, and "0x01" if the property is identified by a name.

Guid (16 bytes): The **GUID** that identifies the property set for the named property.
Note: Servers MUST NOT swap bytes for this **GUID**; it is treated as a **FLATUID**. Client code on big-endian systems MUST therefore place **GUID** fields in little-endian byte order in the request buffer.

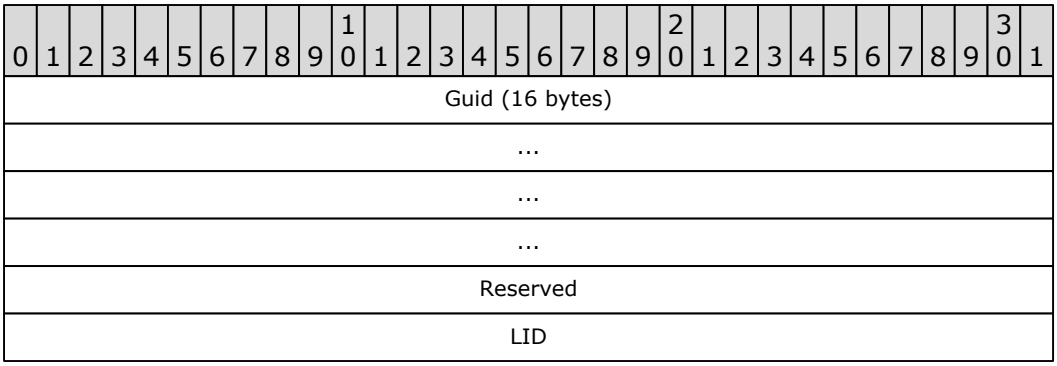
LID (4 bytes, optional): Present only if Kind = "0x00". An unsigned 32-bit integer that identifies the named property within its property set.

NameSize (1 byte, optional): Present only if Kind = "0x01". A single byte giving the number of bytes in the **Name** string that follows it.

Name (variable, optional): Present only if Kind = "0x01". A Unicode (UTF-16) string, followed by two zero bytes as a null terminator, that identifies the property within its property set.

2.7.2 PropertyName_r

The **PropertyName_r** structure does not support string names for named properties. **PropertyName_r** only supports **LID**s.



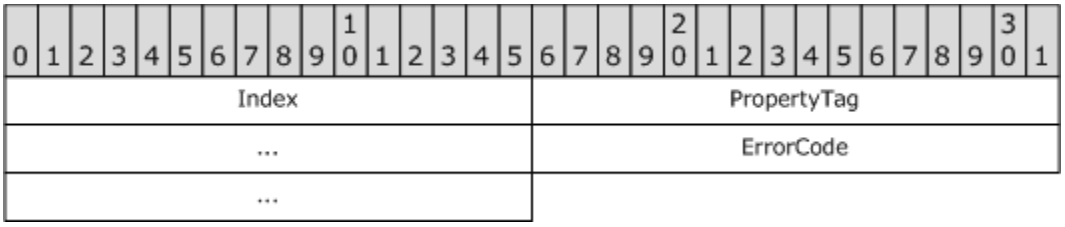
Guid (16 bytes): Encodes the **Guid** field of the **PropertyName** structure. For more details, see section 2.7.1.

Reserved (4 bytes): All clients and servers MUST set this value to "0x00000000".

LID (4 bytes):Encodes the **LID** field in the **PropertyName** structure. For more details, see section 2.7.1. Unlike the **LID** field in the **PropertyName** structure, the **LID** field is always present in the **PropertyName_r** structure. It is not optional. Also, string names for named properties are not allowed.

2.8 PropertyProblem

A **PropertyProblem** describes an error relating to an operation involving a property. It is often used in an array; see **PropertyProblemArray**.



Index (2 bytes): Unsigned 16-bit integer. This value specifies an index into an array of property tags.

PropertyTag (4 bytes): PropertyTag structure. This value specifies the property for which there was an error.

ErrorCode (4 bytes): Unsigned 32-bit integer. This value specifies the error that occurred when processing this property.

An array of **PropertyProblem** structures is returned from the following **ROPs**:

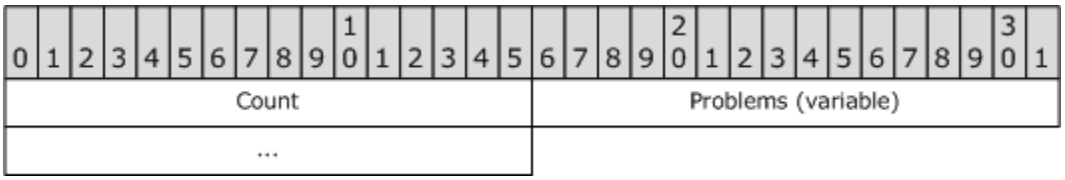
- **RopDeleteProperties**
- **RopDeletePropertiesNoReplicate** <10>
- **RopSetProperties**
- **RopSetPropertiesNoReplicate** <11>

- **RopCopyProperties**
- **RopCopyTo**

A **PropertyProblem** structure contains an error value that is a result of an operation attempting to modify or delete a property, as specified in Table 7. That property is identified by its **PropertyTag**, and also by its index in the property array passed to the request.

2.9 PropertyProblemArray

A **PropertyProblemArray** is a set of **PropertyProblems** that describe errors relating to an operation involving one or more properties.



Count (2 bytes): Unsigned 16-bit integer, specifying the number of **PropertyProblems** to follow.

Problems: Count PropertyProblem structures, as specified in section 2.8.

2.10 PropertyRows

2.10.1 PropertyRow

A **PropertyRow** structure is used to pass back a list of property values without including the property tag values that correspond to them. It is used to format property data returned to the client when the list of property tags is known in advance.

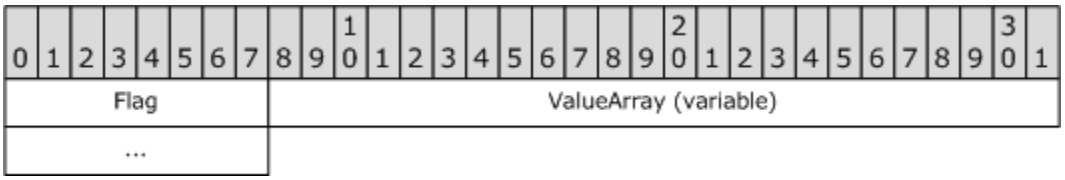
For instance, this data structure is used to format the response buffers of **RopGetPropertiesSpecific**, **RopFindRow**, and **RopGetReceiveFolderTable**. In addition, an array of **PropertyRow** structures makes up the key part of the **PropertyRowSet** structure returned in the response buffer for **RopQueryRows**. Finally, **PropertyRow** structures used in table notification structures to indicate the column values of a new added or modified row.

Since the property tags are not returned, clients interpret the property values based on the context of the request. For **RopGetPropertiesSpecific**, property values are returned in the order that the properties were requested. For **RopFindRow**, **RopGetReceiveFolderTable**, and **RopQueryRows**, property values are returned in the order of the properties in the table, set by a prior call to **RopSetColumns**.

There are three **PropertyRow** variants. A **StandardPropertyRow** contains no error values and no type data; it is simply a sequence of property values. A **FlaggedPropertyRow** contains type data, if the request included **PtypUnspecified** for any property or column, and it contains error values if a property value is missing or there was a problem retrieving the value. By examining the first byte of the property row, the client can identify the variant. A

PropertyRow_r, as specified in [MS-NSPI], is an encoding of the **StandardPropertyRow** data structure, as specified in section 2.10.1.1. The semantic meaning is unchanged from the **StandardPropertyRow** structure.

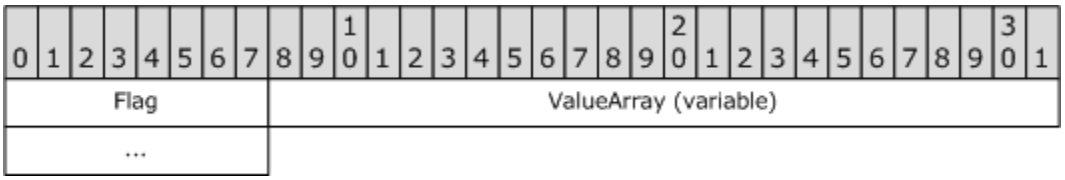
2.10.1.1 StandardPropertyRow



Flag (1 byte): Unsigned 8-bit integer. This MUST be set to "0x00" to indicate that all property values are present and without error.

ValueArray (Variable): An array of variable-sized structures. At each position of the array, the structure will either be a **PropertyValue** structure (see section 2.13.2) if the type of the corresponding property tag was specified, or a **TypedPropertyValue** structure (see section 2.13.3) if the type of the corresponding property tag was **PtypUnspecified**.

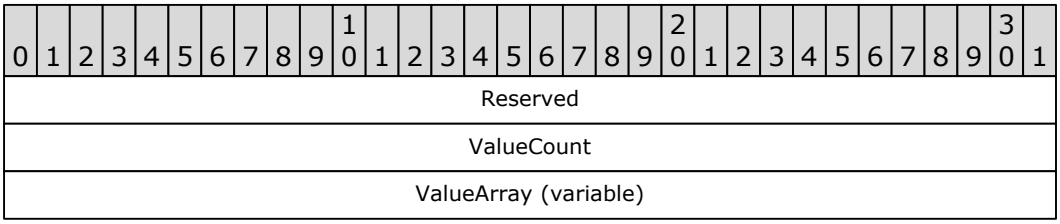
2.10.1.2 FlaggedPropertyRow



Flag (1 byte): Unsigned 8-bit integer. This MUST be set to "0x01" to indicate that there are errors or some property values are missing. This MUST also be set to "0x01" to indicate when **PtypUnspecified** was used in the ROP request and the ROP response includes a type.

ValueArray (Variable): An array of variable-sized structures. At each position of the array, the structure will either be a **FlaggedPropertyValue** structure (see section 2.13.5) if the type of the corresponding property tag was previously specified, or a **FlaggedPropertyValueWithTypeSpecified** structure (see section 2.13.6) if the type of the corresponding property tag was **PtypUnspecified**.

2.10.1.3 PropertyRow_r



Reserved (4 bytes): All clients and servers MUST set this value to "0x00000000".

ValueCount (4 bytes): The number of property values represented in the **ValueArray** field. This value MUST NOT exceed 100,000.

ValueArray (variable size): Encodes the **ValueArray** field of **StandardPropertyRow** structure. For more details, see section 2.10.1.1.

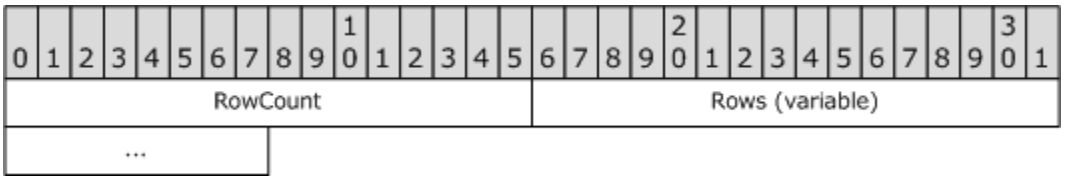
2.10.2 PropertyRowSet

A **PropertyRowSet** is a counted series of **PropertyRows**. As for **PropertyRow**, the number of columns in each **PropertyRow** is not included in the **PropertyRowSet**..

In table operations, such as in the response to a **RopQueryRows** request, servers SHOULD truncate long column values to a maximum of 255 bytes (for binary types) or 255 characters (for string types). <12> Clients analyzing data returned from table operations can assume that if the length of such a value is exactly 255 bytes or characters, then the value of the same property obtained by opening the message and issuing a **RopGetPropertiesSpecific** request is likely to be larger.

The **PropertyRowSet_r** structure, as specified in [MS-NSPI], is an encoding of the **PropertyRowSet** data structure, as specified in section 2.10.2.1. The permissible number of **PropertyRows** in the **PropertyRowSet_r** data structure exceeds that of the **PropertyRowSet** data structure. For more details, see section 2.10.2.2. The semantic meaning is otherwise unchanged from the **PropertyRowSet** data structure.

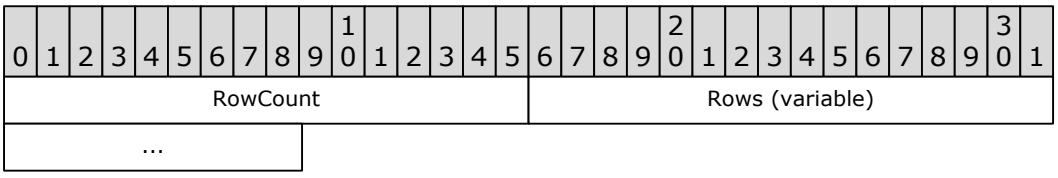
2.10.2.1 PropertyRowSet



RowCount (2 bytes): An unsigned 16-bit integer specifying the number of **PropertyRows** that follow.

Rows (variable size): A series of **RowCount PropertyRow** structures.

2.10.2.2 PropertyRowSet_r



RowCount (2 bytes): Encodes the **RowCount** field of the **PropertyRowSet** structure. For more details, see section 2.10.21. This value MUST NOT exceed 100,000.

Rows (variable size): Encodes the **Rows** field of the **PropertyRowSet** structure. For more details, see section 2.10.2.1.

2.10.3 RecipientRow

A **RecipientRow** structure represents a single recipient belonging to a **Message object**. It is rather complex, but can be considered as a sequence of three different parts:

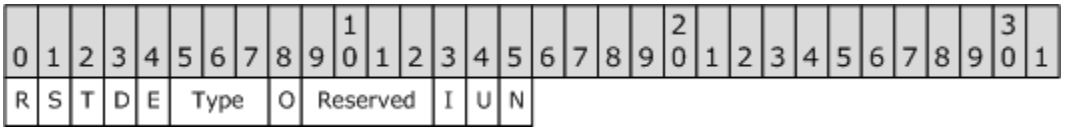
- A flags field indicating which of several standard properties are present
- Standard property values
- Arbitrary property values outside the standard set

This structure is used by several ROPs including:

- **RopFlushRecipients**
- **RopReadRecipients**
- **RopOpenMessage**
- **RopOpenEmbeddedMessage**
- **RopRefreshCache**

First, we specify the **RecipientFlags** field.

2.10.3.1 RecipientFlags



R (1 bit): 1-bit flag (mask 0x0080). If b'1', a different transport is responsible for delivery to this recipient.

S (1 bit): 1-bit flag (mask 0x0040). If b'1', the Transmittable Display Name is the same as the Display Name.

T (1 bit): 1-bit flag (mask 0x0020). If b'1', the **TransmittableDisplayName** field is included.

D (1 bit): 1-bit flag (mask 0x0010). If b'1', the **DisplayName** field is included.

E (1 bit): 1-bit flag (mask 0x0008). If b'1', the **EmailAddress** field is included.

Type (3 bits): 3-bit enumeration (mask 0x0007). This enumeration specifies the type of address. The valid types are:

- NoType ("0x0")
- X500DN ("0x1")
- MsMail ("0x2")
- SMTP ("0x3")
- Fax ("0x4")
- ProfessionalOfficeSystem ("0x5")
- PersonalDistributionList1 ("0x6")
- PersonalDistributionList2 ("0x7")

O (1 bit): 1-bit flag (mask 0x8000). If b'1',this recipient has a non-standard address type and the AddressType field is included.

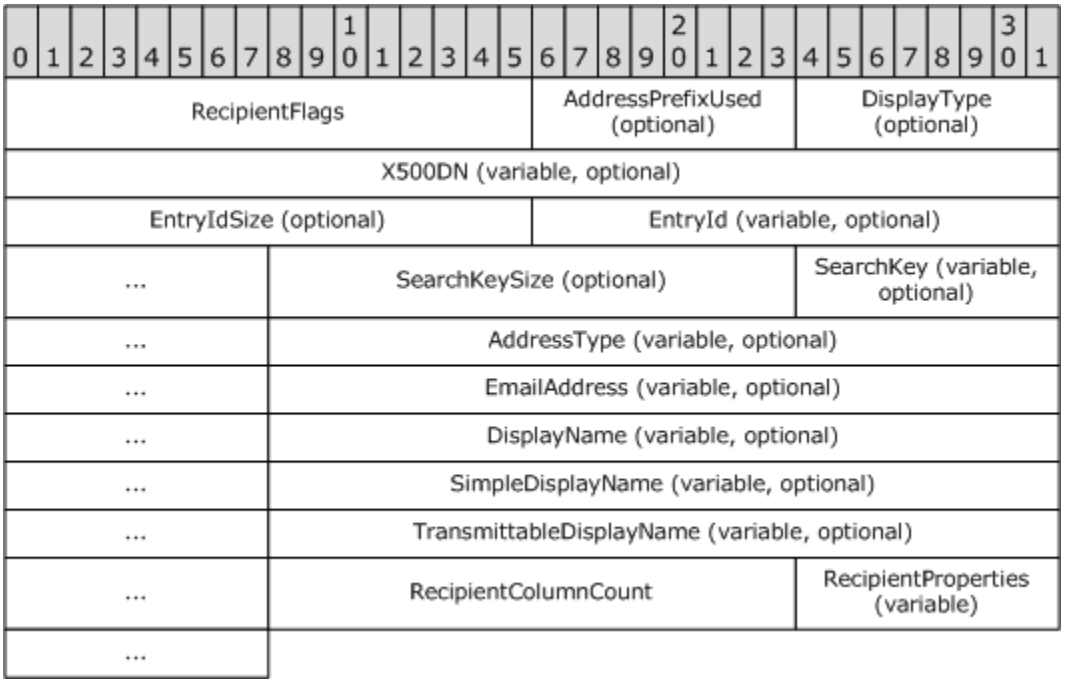
Reserved (4 bits): (mask 0x7800) The server MUST set this to b'0000'.

I (1 bit): 1-bit flag (mask 0x0400). If b'1', the **SimpleDisplayName** is included.

U (1 bit): 1-bit flag (mask 0x0200). If b'1', the associated string properties are in Unicode with a 2-byte null terminator; if b'0', string properties are **MBCS** with a single null terminator, in the code page sent to the server in **EcDoConnect** (as specified in [MS-OXCRPC]).

N (1 bit): 1-bit flag (mask 0x0100). This flag specifies that the recipient does not support receiving rich text messages.

2.10.3.2 RecipientRow



RecipientFlags (2 bytes): RecipientFlags structure. The format of this structure is defined in section 2.10.3.1. This value specifies the type of recipient and which standard properties are included.

AddressPrefixUsed (1 byte, optional): Unsigned 8-bit integer. This field MUST be present when the **Type** field of the **RecipientFlags** field is set to **X500DN** ("0x1") and MUST NOT be present otherwise. This value specifies the amount of the Address Prefix is used for this X500 DN.

DisplayType (1 byte, optional): 8-bit enumeration. This field MUST be present when the **Type** field of the **RecipientFlags** field is set to **X500DN** ("0x1") and MUST NOT be present otherwise. This value specifies the display type of this address.

X500DN (variable, optional): Null-terminated ASCII string. This field MUST be present when the **Type** field of the **RecipientFlags** field is set to **X500DN** ("0x1") and MUST NOT be present otherwise. This value specifies the X500 DN of this recipient.

EntryIdSize (2 bytes, optional): Unsigned 16-bit integer. This field MUST be present when the **Type** field of the **RecipientFlags** field is set to **PersonalDistributionList1** ("0x6") or **PersonalDistributionList2** ("0x7"). This field MUST NOT be present otherwise. This value specifies the size of the **EntryID** field.

EntryId (variable, optional): Array of bytes. This field MUST be present when the **Type** field of the **RecipientFlags** field is set to PersonalDistributionList1 ("0x6") or **PersonalDistributionList2** ("0x7"). This field MUST NOT be present otherwise. The number of bytes in this field MUST be the same as specified in the **EntryIdSize** field. This array specifies the Address Book **EntryID** of the Distribution List.

SearchKeySize (2 bytes, optional): Unsigned 16-bit integer. This field MUST be present when the **Type** field of the **RecipientFlags** field is set to **PersonalDistributionList1** ("0x6") or **PersonalDistributionList2** ("0x7"). This field MUST NOT be present otherwise. This value specifies the size of the **SearchKey** field.

SearchKey (variable, optional): Array of bytes. This field MUST be present when the **Type** field of the **RecipientFlags** field is set to **PersonalDistributionList1** ("0x6") or **PersonalDistributionList2** ("0x7"). This field MUST NOT be present otherwise. The number of bytes in this field MUST be the same as specified in the **SearchKeySize** field. This array specifies the Search Key of the Distribution List.

AddressType (variable, optional): Null-terminated ASCII string. This field MUST be present when the **Type** field of the **RecipientFlags** field is set to **NoType** ("0x0") and the **O** flag of the **RecipientsFlags** field is set. This field MUST NOT be present otherwise. This string specifies the address type of the recipient.

EmailAddress (variable, optional): Null-terminated string. This field MUST be present when the **E** flag of the **RecipientsFlags** field is set and MUST NOT be present otherwise. This field MUST be specified in Unicode characters if the **U** flag of the **RecipientsFlags** field is set and 8-bit character set otherwise. This string specifies the Email Address of the recipient.

DisplayName (variable, optional): Null-terminated string. This field MUST be present when the **D** flag of the **RecipientsFlags** field is set and MUST NOT be present otherwise. This field MUST be specified in Unicode characters if the **U** flag of the **RecipientsFlags** field is set and 8-bit character set otherwise. This string specifies the Email Address of the recipient.

SimpleDisplayName (variable, optional): Null-terminated string. This field MUST be present when the **I** flag of the **RecipientsFlags** field is set and MUST NOT be present otherwise. This field MUST be specified in Unicode characters if the **U** flag of the **RecipientsFlags** field is set and 8-bit character set otherwise. This string specifies the Email Address of the recipient.

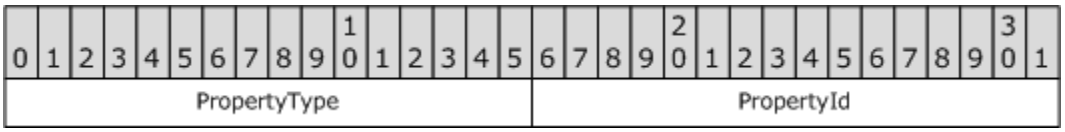
TransmittableDisplayName (variable, optional): Null-terminated string. This field MUST be present when the **T** flag of the **RecipientsFlags** field is set and MUST NOT be present otherwise. This field MUST be specified in Unicode characters if the **U** flag of the **RecipientsFlags** field is set and 8-bit character set otherwise. This string specifies the Email Address of the recipient.

RecipientColumnCount (2 bytes): Unsigned 16-bit integer. This value specifies the number of columns from the **RecipientColumns** field that are included in **RecipientProperties.**

RecipientProperties (variable): PropertyRow structures. The format of the **PropertyRow** structure is defined in section 2.10 and the columns used for this row are those specified in **RecipientProperties**.

2.11 PropertyTag, PropertyId

A property tag both identifies a property and gives the data type of its value. Please refer to [MS-OXPROPS] and other sections of this document for further information about **PropertyIds** and **PropertyValues**.



PropertyType (2 bytes): A 16-bit unsigned integer that identifies the data type of the property value, as specified by the table in section 2.13.3.

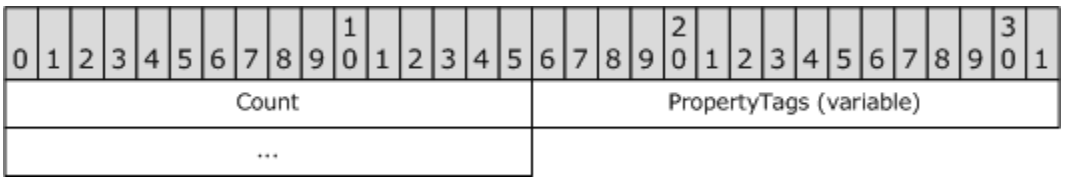
PropertyId (2 bytes): A 16-bit unsigned integer that identifies the property.

2.12 PropertyTagArray

A **PropertyTagArray** is simply a counted set of property tags, as specified in section 2.12.1

The **PropertyTagArray_r** structure is an encoding of the **PropTagArray** data structure. The permissible number of proptag values in the **PropertyTagArray_r** structure exceeds that of the **PropertyTagArray** data structure. The semantic meaning is otherwise unchanged from the **PropTagArray** data structure.

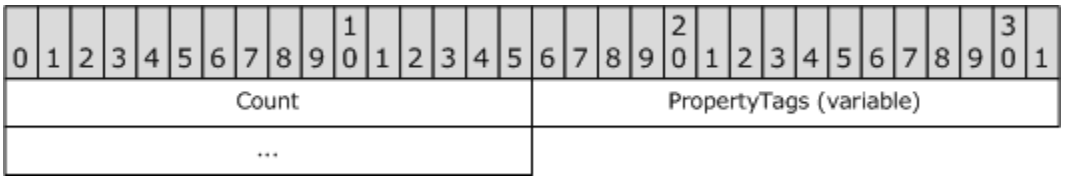
2.12.1 PropertyTagArray



Count (2 bytes): Unsigned 16-bit integer, specifying the number of property tags to follow.

PropertyTags: Count unsigned 32-bit integers representing property tags.

2.12.2 PropertyTagArray_r



Count (2 bytes): Encodes the **Count** Field in **PropTagArray**. For more details, see section 2.12.1. This field MUST NOT exceed 100,000.

PropertyTags (variable size): Encodes the **PropertyTags** field of **PropTagArray**. For more details, see section 2.12.1.

2.13 Property Values

There are a variety of structures used for conveying the value of a property to and from the server. Some variants contain only the value, because the usage context dictates the type. Other variants include the type, or the full property tag. Still others include an indication of whether an error occurred.

2.13.1 Property Value Types

For all variants, the structure of a property value is the same and is specified by the property value type, whether or not the property value type is actually encoded in the buffer. The following table lists both the property value type identifiers and the format of the property values themselves. WebDAV protocol property value type identifiers are specified in section 2.13.1.5.

There is one variation in the width of count fields. In the context of **ROP** buffers, such as **RopGetPropertiesSpecific**, byte counts for **PtypBinary** property values and value counts for all **PtypMultiple** property values are 16 bytes wide. But in the context of Extended Rules, as specified in [MS-OXRULE], byte counts and property value counts are 32 bits wide (for example, **COUNT** in the table below represents a 32-bit integer). Such count fields have a width designation of **COUNT**, rather than an explicit 1-byte width, throughout section 2.13.

In the context of a table operation, properties are referred to as columns. The format of property identifiers, types, and values in table operations such as **RopQueryRows** is the same as in property operations such as **RopGetPropertiesSpecific**.Property value types are presented in the following table. The property value type values specified are 16-bit integers. The NSPI protocol uses the same numeric values, but expresses them as 32-bit integers, with the high-order 16 bits of the 32-bit representation used by the NSPI protocol always set to "0x0000." For more information, see [MS-NSPI].

Property Type Name	Property Type Value	Property Type Specification	Alternate Names

Property Type Name	Property Type Value	Property Type Specification	Alternate Names
PtypInteger16	0x0002, %x02.00	2 bytes, a 16-bit integer [MS-DTYP]: INT16	PT_SHORT, PT_I2, i2, ui2
PtypInteger32	0x0003, %x03.00	4 bytes, a 32-bit integer [MS-DTYP]: INT32	PT_LONG, PT_I4, int, ui4
PtypFloating32	0x0004, %x04.00	4 bytes, a 32-bit floating point number [MS-DTYP]: FLOAT	PT_FLOAT, PT_R4, float, r4
PtypFloating64	0x0005, %x05.00	8 bytes, a 64-bit floating point number [MS-DTYP]: DOUBLE	PT_DOUBLE, PT_R8, r8
PtypCurrency	0x0006, %x06.00	8 bytes, a 64-bit signed, scaled integer representation of a decimal currency value, with 4 places to the right of the decimal point [MS-DTYP]: LONGLONG [MS-OAUT]: CURRENCY	PT_CURRENCY, fixed.14.4
PtypFloatingTime	0x0007, %x07.00	8 bytes, a 64-bit floating point number in which the whole number part represents the number of days since December 30, 1899, and the fractional part represents the fraction of a day since midnight [MS-DTYP]: DOUBLE [MS-OAUT]: DATE	PT_APPTIME
PtypErrorCode	0x000A, %x0A.00	4 bytes, a 32-bit integer encoding error information as specified in 2.4.1	PT_ERROR
PtypBoolean	0x000B, %x0B.00	1 byte, restricted to 1 or 0 [MS-DTYP]: BOOLEAN	PT_BOOLEAN. bool

Property Type Name	Property Type Value	Property Type Specification	Alternate Names
PtypInteger64	0x0014, %x14.00	8 bytes, a 64-bit integer [MS-DTYP]: LONGLONG	PT_LONGLONG, PT_I8, i8, ui8
PtypString	0x001F, %x1F.00	Variable size, a string of Unicode characters in UTF-16LE encoding with terminating null character (2 bytes of zero)	PT_UNICODE, string
PtypString8	0x001E, %z1E.00	Variable size, a string of multi-byte characters in externally specified encoding with terminating null character (single 0 byte)	PT_STRING8
PtypTime	0x0040, %x40.00	8 bytes, a 64-bit integer representing the number of 100-nanosecond intervals since January 1, 1601 [MS-DTYP]: FILETIME	PT_SYSTIME, time, datetime, datetime.tz, datetime.rfc1123, Date, time, time.tz
PtypGuid	0x0048, %x48.00	16 bytes, a GUID with Data1, Data2, and Data3 fields in little-endian format [MS-DTYP]: GUID	PT_CLSID, uuid
PtypServerId	0x00FB, %xFB.00	Variable size, a 16-bit count followed a structure specified in section 2.13.1.3.	PT_SVREID
PtypRestriction	0x00FD, %xFD.00	Variable size, a byte array representing one or more Restriction structures as specified in section 2.14	PT_SRESTRICT
PtypRuleAction	0x00FE, %xFE.00	Variable size, a 16-bit count of actions (not bytes) followed by that many Rule Action structures, as specified in [MS-OXORULE]	PT_ACTIONS

Property Type Name	Property Type Value	Property Type Specification	Alternate Names
PtypBinary	0x0102, %x02.01	Variable size, a COUNT followed by that many bytes	PT_BINARY
PtypMultipleInteger16	0x1002, %x02.10	Variable size, a COUNT followed by that many **PtypInteger16** values	PT_MV_SHORT, PT_MV_I2, mv.i2
PtypMultipleInteger32	0x1003, %x03.10	Variable size, a COUNT followed by that many **PtypInteger32** values	PT_MV_LONG, PT_MV_I4, mv.i4
PtypMultipleFloating32	0x1004, %x04.10	Variable size, a COUNT followed by that many **PtypFloating32** values	PT_MV_FLOAT, PT_MV_R4, mv.float
PtypMultipleFloating64	0x1005, %x05.10	Variable size, a COUNT followed by that many **PtypFloating64** values	PT_MV_DOUBLE, PT_MV_R8
PtypMultipleCurrency	0x1006, %x06.10	Variable size, a COUNT followed by that many **PtypCurrency** values	PT_MV_CURRENCY, mv.fixed.14.4
PtypMultipleFloatingTime	0x1007, %x07.10	Variable size, a COUNT followed by that many **PtypFloatingTime** values	PT_MV_APPTIME
PtypMultipleInteger64	0x1014, %x14.10	Variable size, a COUNT followed by that many **PtypInteger64** values	PT_MV_I8, PT_MV_LONGLONG
PtypMultipleString	0x101F, %x1F.10	Variable size, a COUNT followed by that **PtypString** values	PT_MV_UNICODE
PtypMultipleString8	0x101E, %x1E.10	Variable size, a COUNT followed by that many **PtypString8** values	PT_MV_STRING8, mv.string

Property Type Name	Property Type Value	Property Type Specification	Alternate Names
PtypMultipleTime	0x1040, %x40.10	Variable size, a COUNT followed by that many **PtypTime** values	PT_MV_SYSTIME
PtypMultipleGuid	0x1048, %x48.10	Variable size, a COUNT followed by that many **PtypGuid** values	PT_MV_CLSID, mv.uuid
PtypMultipleBinary	0x1102, %x02.11	Variable size, a COUNT followed by that many **PtypBinary** values	PT_MV_BINARY, mv.bin.hex
PtypUnspecified	0x0000, %x00.00	Any: this property type value matches any type; a server MUST return the actual type in its response. Servers MUST NOT return this type in response to a client request other than **NspiGetIDsFromNames** or **RopGetPropertyIdsFromNames**.	PT_UNSPECIFIED
PtypNull	0x0001, %x01.00	None: This property is a placeholder	PT_NULL
PtypObject or PtypEmbeddedTable	0x000D, %x0d.00	The property value is a COM object, as specified in section 2.13.1.4	PT_OBJECT

2.13.1.1 String Property Values

Clients SHOULD work with **PtypString** and **PtypMultipleString** properties in Unicode format. When working with strings in Unicode format, string data MUST be encoded as UTF-16LE, and property data types MUST be specified as "0x001F" (**PtypString**) and "0x101F" (**PtypMultipleString**).

Clients can, instead, work with **PtypString8** and **PtypMultipleString8** properties in a specific 8-bit or multibyte code page. In this case, property data types MUST be formatted as "0x001E"(**PtypString8**) and "0x101E" (**PtypMultipleString8**).

In requests sent to a store server, the code page of strings MUST match the code page sent to the server in **EcDoConnect** or similar RPC, as specified in [MS-OXCRPC]. Address book server rules for working with **PtypString8** properties are somewhat more involved, and are specified in [MS-NSPI].

2.13.1.2 Multi-Valued Property Value Instances

When working with multi-valued columns in the context of table operations, clients set the "0x2000" (**MultivalueInstance**, "%x00.20") flag bit in the column's **PropertyType** field to indicate that the multi-valued column is to be treated as individual values. The **MultivalueInstance** flag MUST NOT be set for any column that does not also set the "0x1000" (**Multivalue**) bit in its property type. All **PtypMultiple** types in Table 10 let the "0x1000" bit.

The **MultivalueInstance** flag causes table operations to treat multi-valued columns as if they were multiple instances of a single-valued column. Please refer to [MS-OXCTABL] for table **ROP** specifications.

2.13.1.3 The PtypServerId Type

This property type encapsulates a message database EntryID. A **ServerId** identifies either a folder object or a **Message object**.

Ours (1 byte): "0x01" indicates the remaining bytes conform to this structure; "0x00" indicates this is a client-defined value, and has whatever size and structure the client has defined.

folder ID (8 bytes): A **FID**, as specified in section 2.2.1.1, identifying a folder.

message ID (8 bytes): A **MID**, as specified in section 2.2.1.2, identifying a message in the folder identified by folder ID. If the object is a folder, then this field MUST be all zeros.

Instance (4 bytes): A 32-bit unsigned instance number within an array of **ServerIds** to compare against. This field is used only for searches against multi-value properties and MUST be zero in any other context.

2.13.1.4 PtypObject and PtypEmbeddedTable

Store and address book servers treat this property type somewhat differently, but in both cases a property of this type represents a complex structure. Access to properties of this type requires the server to construct an object, and the client to issue requests similar to those used for top-level objects.

- Store servers do not allow access to properties of type **PtypObject** through **RopGetPropertiesSpecific** or **RopGetPropertiesAll**. Instead, properties of this type MUST be accessed with **RopOpenStream** or **RopOpenEmbeddedMessage** requests, as specified in [MS-OXCROPS].

- Address book servers use **PtypEmbeddedTable** to designate properties whose value is a table, for example, the members of a distribution list. The necessary methods are specified in [MS-NSPI].

2.13.1.5 WebDAV Property Value Types

WebDAV property value types are specified for a property by using the "dt" attribute from the namespace "urn:uuid:c2f41010-65b3-11d1-a29f-00aa00c14882/".

The WebDAV property types are listed in the following table. Unless their formats are specified elsewhere, all property type formats are as specified in **Augmented Backus-Naur Form (ABNF)** notation [RFC4234].

Server Property Type Name	WebDAV Property Type Name	Description	Format
PtypBinary	i1	The Unicode value of the element is interpreted as an optionally signed 1 byte, 8-bit decimal integer.	As a **byte**, as specified in [W3C-XML] **Example:** `<element ... d:dt="i1">3</element>`
PtypInteger16	i2	The Unicode value of the element is interpreted as a optionally signed 2 byte, 16-bit decimal integer.	As a **short**, as specified in [W3C-XML] **Example:** `<element ... d:dt="i2">-255</element>`
PtypInteger32	int	The Unicode value of the element is interpreted as a optionally signed 4 byte, 32-bit decimal integer.	As an **int**, as specified in [W3C-XML] **Example:** `<element ... d:dt="int">-53496</element>`
PtypInteger64	i8	The Unicode value of the element is interpreted as a optionally signed 8 byte, 64-bit decimal integer.	As a **long**, as specified in [W3C-XML] Example: `<element ... d:dt="i8">-32415</element>`

Server Property Type Name	WebDAV Property Type Name	Description	Format

PtypBinary	ui1	The Unicode value of the element is interpreted as an unsigned 1 byte, 8-bit decimal integer.	As an **unsignedByte,** as specified in [W3C-XML]
			`Example:`
			`<element ... d:dt="ui1">255</element>`

PtypInteger16	ui2	The Unicode value of the element is interpreted as an unsigned 2 byte, 16-bit decimal integer.	As an **unsignedShort**, as specified in [W3C-XML]
			`Example:`
			`<element ... d:dt="ui2">2296</element>`

PtypInteger32	ui4	The Unicode value of the element is interpreted as an unsigned 4 byte, 32-bit decimal integer.	As an **unsignedInt**, as specified in [W3C-XML]
			`Example:`
			`<element ... d:dt="ui4">32768</element>`

PtypInteger64	ui8	The Unicode value of the element is interpreted as an unsigned 8 byte, 64-bit decimal integer.	As an **unsignedLong**, as specified in [W3C-XML]
			`Example:`
			`<element ... d:dt="ui8">-189</element>`

PtypFloating64	float	The Unicode value of the element is interpreted as a single precision floating point number	`float-val = (["+"] / "-") [1*DIGIT] ["." 1*DIGIT] ["d" / "D" / "e" / "E" (["+"] / "-") 1*DIGIT]`
			`Example:`
			`<element ... d:dt="float">9.9</element>`

Server Property Type Name	WebDAV Property Type Name	Description	Format

PtypFloating32	r4	The Unicode value of the element is interpreted as a 4 byte single precision floating point number	`r4-val = (["+"] / "-") [1*DIGIT] ["." 1*DIGIT] ["d" / "D" / "e" / "E" (["+"] / "-") 1*DIGIT]`
			`Example:`
			`<element ... d:dt="r4">9.9</element>`

PtypFloating64	r8	The Unicode value of the element is interpreted as a 8 byte double precision floating point number	`r8-val = (["+"] / "-") [1*DIGIT] ["." 1*DIGIT] ["d" / "D" / "e" / "E" (["+"] / "-") 1*DIGIT]`
			`Example:`
			`<element ... d:dt="r8">.333333333</element>`

PtypBoolean	boolean	The Unicode value of the element is interpreted Boolean value either "1" (TRUE) or "0" (FALSE).	As a **boolean**, as specified in [W3C-XML]
			`Example:`
			`<element ... d:dt="boolean">1</element>`

PtypString	string	The Unicode value of the element is interpreted as a sequence of Unicode characters	As a **string**, as specified in [W3C-XML]
			`Example:`
			`<element ... d:dt="string">Description</element>`

PtypString	char	The Unicode value of the element is interpreted as a single Unicode character. The character data type maps to a string and can be used for any sequence of Unicode characters.	`char-val = 1VCHAR`
			`Example:`
			`<element ... d:dt="char">D</element>`

Server Property Type Name	WebDAV Property Type Name	Description	Format

PtypCurrency	fixed.14.4	The Unicode value of the element is interpreted as an optionally signed floating point number with no more than 14 digits to the left of the decimal point, and no more than 4 digits to the right of the decimal point. This value type is normally used to represent currency values	`fixed144-val = 0*14DIGIT "." 0*4 DIGIT`
			`Example:`
			`<element ... d:dt="fixed.14.4">00000000000012.9500</element>`

PtypString	number	The Unicode value of the element is interpreted as a number, limited by the operating system limits, which can optionally contain a leading sign, fractional digits, and an exponent.	As a **string**, as specified in [W3C-XML]
			`Example:`
			`<element ... d:dt="number">-123.456E+10</element>`

PtypTime	dateTime	The Unicode value of the element is interpreted as a date and time value expressed in [ISO-8601] format with no time zone specified	As specified in [ISO-8601]
			`Example:`
			`<element ... d:dt="datetime">2008-09-19T18:53:47.060</element>`

Server Property Type Name	WebDAV Property Type Name	Description	Format
PtypTime	dateTime.tz	The Unicode value of the element is interpreted as a date and time value expressed in [ISO-8601] format with an optional time zone identifier	As specified in [ISO-8601] Example: <element ... d:dt="datetime.tz">2008-09-19T18:53:47.060Z</element> <element ... d:dt="datetime.tz">2008-09-19T18:53:47.060-0700</element>
PtypTime	dateTime.rfc1123	The Unicode Value of the element is interpreted as a date and time value expressed in [RFC1123] format	As specified in [RFC1123] Example: <element ... d:dt="datetime.rfc1123">Mon, 15 Feb 1999 13:05:29-0700</element>
PtypTime	Date	The Unicode value of the element is interpreted as a date value that is expressed in [ISO-8601] format with no time or time zone specified.	As specified in [ISO-8601] Example: <element ... d:dt="date">2008-09-18</element>
PtypTime	time	The Unicode value of the element is interpreted as a time value expressed in [ISO-8601] format with no date or time zone specified	As specified in [ISO-8601] Example: <element ... d:dt="time">19T18:53:47.060</element>

Server Property Type Name	WebDAV Property Type Name	Description	Format
PtypTime	time.tz	The Unicode value of the element is interpreted as a time value expressed in [ISO8601] format with an optional time zone identifier	<element ... d:dt="time.tz">19T18:53:47.060Z</element> <element ... d:dt="time.tz">19T18:53:47.060-0700</element>
PtypString	uri	The Unicode value of the element is interpreted as a uniform resource identifier as specified in [RFC3986]	<element ... d:dt="uri">http://www.example.com/</element>
PtypGuid	uuid	The Unicode value of the element is interpreted as a universally unique identifier as specified in [RFC4122]	<element ... d:dt="uuid">55B329F4-EF8A-4fac-A47C-C81213DB3061</element>
PtypBinary	bin.hex	The Unicode value of the element is interpreted as a binary blob encoded in hexadecimal digits.	<element ... d:dt="bin.hex">1f8b9d</element>
PtypBinary	bin.base64	The Unicode value of the element is terpreted as Binary blob encoded in Base-64 as specified in [RFC2045]	<element ... d:dt="bin.base64">jfsSUsdjsdsUSDASjsdsusaqiq</element>

2.13.1.5.1 Multi-Valued WebDAV Property Value Types

WebDAV supports multi-valued properties where the value of the specified **property** is an array of items of a specific type. Multi-valued properties are represented in the **XML** markup by using the "dt" attribute with the value "mv", followed by the data type of the contents of the array.

For example, an array of strings is represented by the following:

```
<author d:dt="mv.string"></author>
```

Within the property element, the contents of the array are specified by a number of sub-elements, each with the element name "v"from the "xml" namespace. For example:

```
<author xmlns:x="xml:" d:dt="mv.string">
    <x:v>Attila Biber</x:v>
    <x:v>Kirk DeGrasse</x:v>
</author>
```

The following table lists the multi-valued property value types supported by WebDAV.

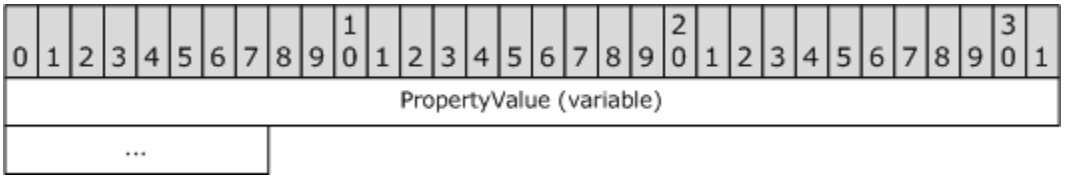
Server Property Type Name	WebDAV Type Name
PtypMultipleInteger16	mv.i2
PtypMultipleInteger32	mv.i4
PtypMultipleFloating64	mv.float
PtypMultipleCurrency	mv.fixed.14.4
PtypMultipleString8	mv.string
PtypMultipleBinary	mv.bin.hex
PtypMultipleGuid	mv.uuid

2.13.2 PropertyValue

The **PropertyValue** structure simply specifies the value of the property. It contains no information about the property type or id.

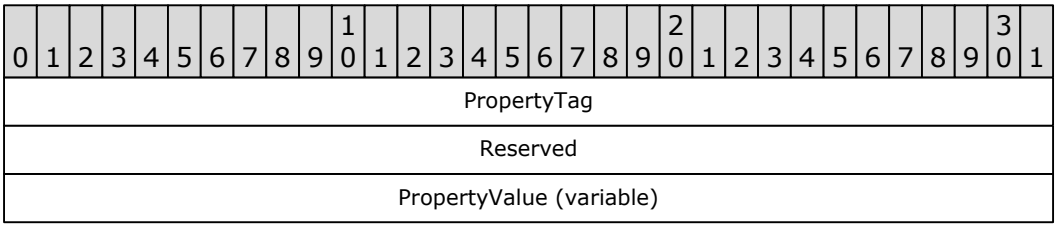
The **PropertyValue_r** structure, as specified in [MS-NSPI], is an encoding of the **PropertyValue** data structure, as specified in section 2.13.2.1. For property values with uninterpreted byte values, the permissible number of bytes in the **PropertyValue_r** structure exceeds that of the **PropertyValue** data structure, as specified in [MS-NSPI] section 2.3.1.12. 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.

2.13.2.1 PropertyValue



PropertyValue (variable size): The size varies depending on the property type which can be understood from the usage context. All numeric values are in little-endian format. For multi-valued types, the first element in the **ROP** buffer is a 16-bit integer specifying the number of entries. If the property value being passed is a string then the data includes the null terminators, as described in Table 10.

2.13.2.2 PropertyValue_r



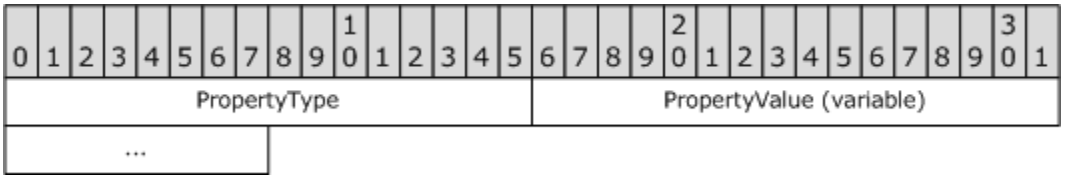
PropertyTag (4 bytes): Encodes the property tag with the value represented by the **PropertyValue_r** structure.

Reserved (4 bytes): All clients and servers MUST set this value to "0x00000000".

PropertyValue (variable size): Encodes the **PropertyValue** field of the **PropertyValue** structure. For more details, see section 2.13.2.1. This is the actual value of the property represented by the **PropertyValue_r** structure. The type value is specified by the **PropertyTag** field.

2.13.3 TypedPropertyValue

The **TypedPropertyValue** structure includes the property type with the value of the property.

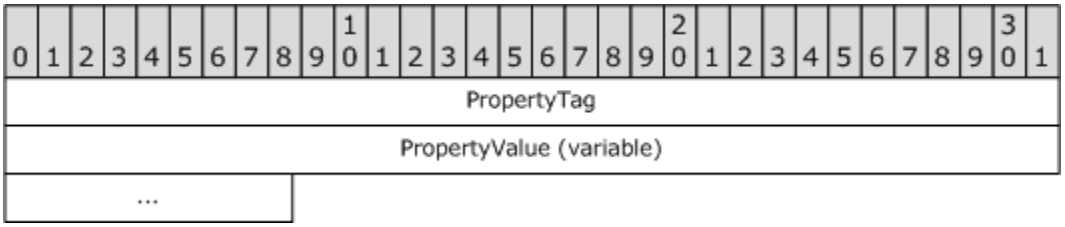


PropertyType (2 bytes): A 16-bit unsigned integer that specifies the data type of the property value, according to the table in section 2.13.1.

PropertyValue (variable size): A **PropertyValue** structure as specified in section 2.13.2. The value MUST be compatible with the value of the **PropertyType** field.

2.13.4 TaggedPropertyValue

As a rule, property tags are not specified explicitly in **ROP** buffers. To save space, property tags are specified implicitly by a previous operation and only the property values are put in the buffer. But under some circumstances a **TaggedPropertyValue** is used to explicitly include the property type and ID in the buffer.

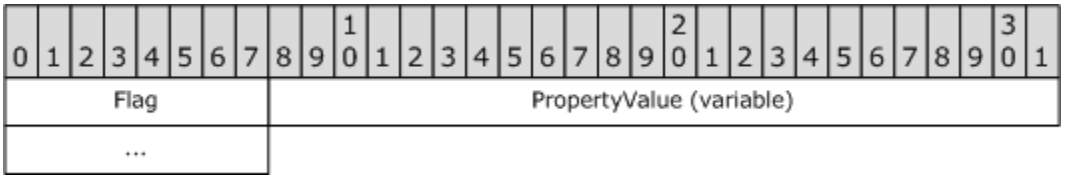


PropertyTag (32 bits): A **PropertyTag** structure giving the **PropertyId** and **PropertyType** for the property.

PropertyValue (variable size): A **PropertyValue** structure specifying the value of the property. Its syntax is specified by the **PropertyType** field of the tag, and its semantics by the **PropertyId** field of the tag.

2.13.5 FlaggedPropertyValue

The **FlaggedPropertyValue** structure includes a flag to indicate whether the value was successfully retrieved or not. Error conditions include a missing property or a failure at the server.



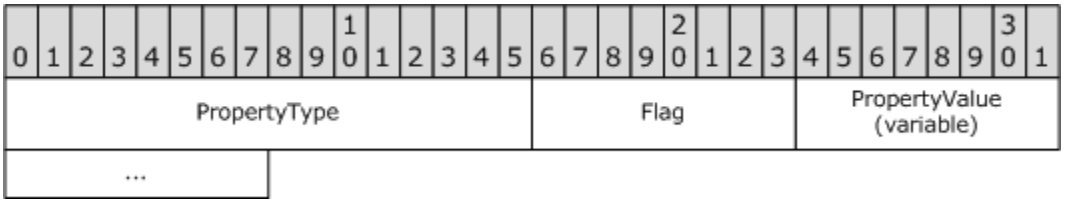
Flag (1 byte): An 8-bit unsigned integer. This flag MUST be set one of three possible values: "0x0", "0x1", or "0xA", which determines what is conveyed in the **PropertyValue** field. The following table summarizes the meanings of these three values.

Flag value	What it implies about the **PropertyValue** field
0x0	The **PropertyValue** field will be **PropertyValue** structure containing a value compatible with the property type implied the context.
0x1	The **PropertyValue** field is not present.
0xA	The **PropertyValue** field will be a **PropertyValue** structure containing an unsigned 32-bit integer. This value is a property error code (see section 2.4.2) indicating why the property value is not present.

PropertyValue (variable size): A PropertyValue structure (see section 2.13.2) unless the Flag field is "0x1".

2.13.6 FlaggedPropertyValueWithType

The **FlaggedPropertyValueWithType** structure includes both the property type and a flag giving more information about the property value.



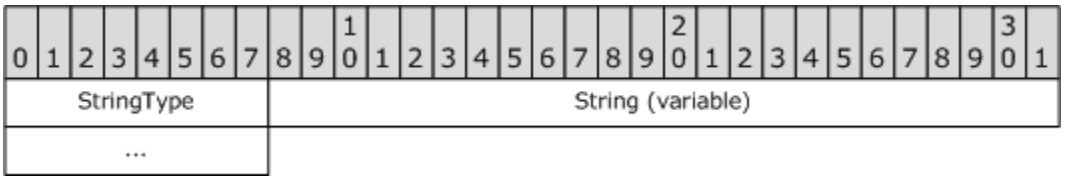
PropertyType (2 bytes): A 16-bit unsigned integer that specifies the data type of the property value, according to the table immediately below.

Flag (1 byte): An 8-bit unsigned integer. This flag MUST be set one of three possible values: "0x0", "0x1", or "0xA", which determines what is conveyed in the **PropertyValue** field. Refer to the table in section 2.13.5 for the interpretation of this flag.

PropertyValue (variable size): A **PropertyValue** structure (see section 2.13.2). The value MUST be compatible with the value of the **PropertyType** field.

2.13.7 TypedString

A **TypedString** structure is used in certain ROPs in order to compact the string representation on the wire as much as possible.



StringType (1 byte): 8-bit enumeration. The value MUST be one of the following:

- "0x00": There is no string present.
- "0x01": The string is empty.
- "0x02": Null-terminated 8-bit character string. The null terminator is one zero byte.
- "0x03": Null-terminated Reduced Unicode character string. The null terminator is one zero byte.
- "0x04": Null-terminated Unicode character string. The null terminator is 2 zero bytes.

String (variable, optional): If the **StringType** field is set to "0x02", "0x03", or "0x04", then this field MUST be present and in the format specified by the **Type** field. Otherwise, this field MUST NOT be present.

To produce a Reduced Unicode string from an original Unicode string, the server first scans the original Unicode string and determines that every character has a value less than "0x100"; in other words, that the high-order byte of every character, including the null terminator, is zero. It then produces a Reduced Unicode string that is exactly half the size of the original Unicode string by omitting all the high-order zero bytes, including that of the null terminator.

To reproduce the original Unicode string from a Reduced Unicode string, the server inserts a zero byte after each byte of the Reduced Unicode string, doubling its size.

2.14 Restrictions

Restrictions describe a filter for limiting the view of a table to particular set of rows. This filter represents a Boolean expression that is evaluated against each item of the table. The item will be included as a row of the restricted table if and only if the value of the Boolean expression evaluates to **TRUE**.

Restrictions are sent to the server with the **RopFindRow**, **RopRestrict**, **RopSetSearchCriteria**, and **RopSynchronizationConfigure** requests, and are returned from the **RopGetSetSearchCriteria** request.

There are 12 different restriction packet formats: Six of them (**AndRestriction**, **OrRestriction**, **NotRestriction**, **SubRestriction**, **CommentRestriction**, and **CountRestriction**) are used to construct more complicated restrictions from one or more simpler ones. The other six types (**ContentRestriction**, **PropertyRestriction**, **ComparePropertiesRestriction**, **BitMaskRestriction**, **SizeRestriction**, and **ExistRestriction**) specify specific tests based on the properties of an item.

While the packet formats differ, the first 8 bits always stores **RestrictType**, an unsigned byte value specifying the type of restriction. The possible values for **RestrictType** are presented in the following table.

RestrictType	Hexadecimal value	Description	Alternate name
AndRestriction **AndRestriction_r**	0x00	Logical **AND** operation applied to a list of subrestrictions.	**RES_AND**
OrRestriction **OrRestriction_r**	0x01	Logical **OR** operation applied to a list of subrestrictions.	**RES_OR**

RestrictType	Hexadecimal value	Description	Alternate name
NotRestriction **NotRestriction_r**	0x02	Logical **NOT** applied to a subrestriction	**RES_NOT**
ContentRestriction **ContentRestriction_r**	0x03	Search a property value for specific content.	**RES_CONTENT**
PropertyRestriction **PropertyRestriction_r**	0x04	Compare a property value to a particular value.	**RES_PROPERTY**
ComparePropertiesRestriction **ComparePropsRestriction_r**	0x05	Compare the values of two properties.	**RES_COMPAREPROPS**
BitMaskRestriction **BitMaskRestriction_r**	0x06	Perform bitwise **AND** of a property value with a mask and compare to zero	**RES_BITMASK**
SizeRestriction **SizeRestriction_r**	0x07	Compare the size of a property value to a particular figure.	**RES_SIZE**
ExistRestriction **ExistRestriction_r**	0x08	Test whether a property has a value.	**RES_EXIST**
SubObjectRestriction **SubRestriction_r**	0x09	Test whether any row of a message's attachment or recipient table satisfies a subrestriction.	**RES_SUBRESTRICTION**

RestrictType	Hexadecimal value	Description	Alternate name
CommentRestriction	0x0A	Associates a comment with a subrestriction.	**RES_COMMENT**
CountRestriction	0x0B	Limits the number of matches returned from a subrestriction.	**RES_COUNT**

The subsections which follow describe each packet format.

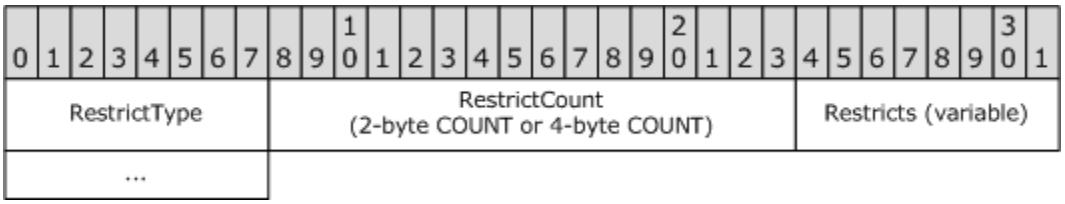
There is one variation in the way **Restriction** structures are serialized. In the context of **ROP** buffers, such as **RopRestrict** or **RopSetSearchCriteria**, all count fields (such as the number of subrestrictions of an **AndRestriction**) are 16 bits wide. But, in the context of Extended Rules, as specified in [MS-OXRULE], or Search Folder Definition Messages, as specified in [MS-OXOSRCH], these counts are 32 bits wide. Such fields are identified as **COUNT** fields throughout section 2.14.

2.14.1 AndRestriction

The **AndRestriction** structure describes an AND restriction, which is used to join a group of restrictions using a logical AND operation.

The **AndRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the **AndRestriction** data structure, as specified in section 2.14.1.1. The permissible number of **Restriction** structures in the **AndRestriction_r** data structure exceeds that of the **AndRestriction** structure. The semantic meaning is otherwise unchanged from the **AndRestriction** data structure.

2.14.1.1 AndRestriction



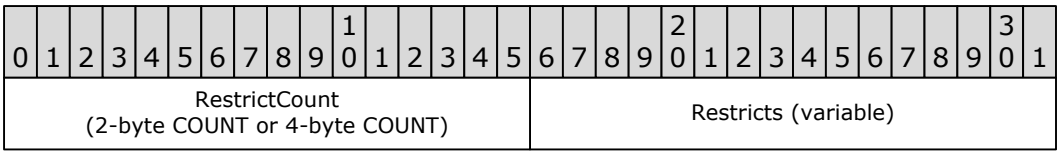
RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x00".

RestrictCount (COUNT): This value specifies how many **Restriction** structures are present in **Restricts**.

Restricts (variable): Array of **Restriction** structures. This field MUST contain **RestrictCount** structures.

The result of an **AndRestriction** is **TRUE** if all of its child restrictions evaluate to **TRUE**, and **FALSE** if any child restriction evaluates to **FALSE**.

2.14.1.2 AndRestriction_r



RestrictCount (COUNT bytes): Encodes the **RestrictCount** field of the **AndRestriction**. For more details, see section 2.14.1.1. This value MUST NOT exceed 100,000.

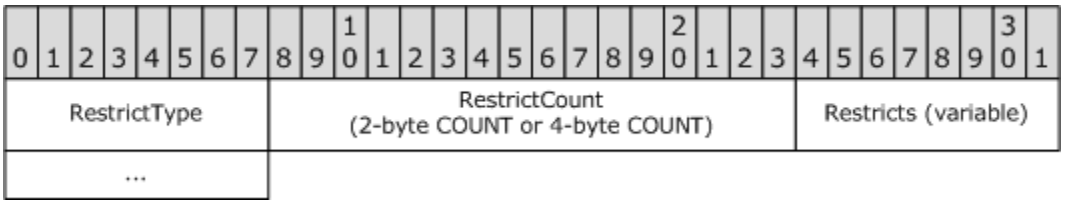
Restricts (variable size): Encodes the **Restricts** field of the **AndRestriction**. For more details, see section 2.14.1.

2.14.2 OrRestriction

The **OrRestriction** structure describes an OR restriction, which is used to join a group of restrictions using a logical OR operation.

The **OrRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the **OrRestriction** data structure, as specified in section 2.14.2.1. The permissible number of **Restriction** structures in the **OrRestriction_r** data structure exceeds that of the **OrRestriction** structure. The semantic meaning is otherwise unchanged from the **OrRestriction** data structure.

2.14.2.1 OrRestriction



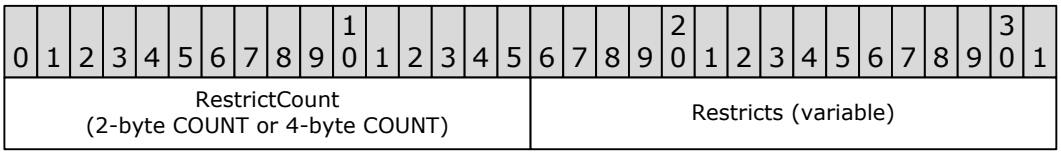
RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x01".

RestrictCount (COUNT): This value specifies how many **Restriction** structures are present in **Restricts**.

Restricts (variable): Array of **Restriction** structures. This field MUST contain **RestrictCount** structures.

The result of an **OrRestriction** is **TRUE** if at least one of its child restrictions evaluates to **TRUE**, and **FALSE** if all child restrictions evaluate to **FALSE**.

2.14.2.2 OrRestriction_r



RestrictCount (COUNT bytes): Encodes the **RestrictCount** field of the **OrRestriction**. For more details, see section 2.14.2.1. This value MUST NOT exceed 100,000.

Restricts (variable size): Encodes the **Restricts** field of the **OrRestriction**. For more details, see section 2.14.1.

2.14.3 NotRestriction

The **NotRestriction** structure describes a NOT restriction, which is used to apply a logical NOT operation to a single restriction.

The **NotRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the **NotRestriction** data structure, as specified in section 2.14.3.1. The semantic meaning is unchanged from the **NotRestriction** data structure.

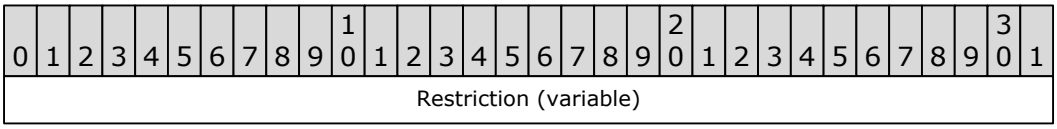
2.14.3.1 NotRestriction

RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x02".

Restriction (variable): A **restriction** structure. This value specifies the restriction the logical NOT applies to.

The result of a **NotRestriction** is **TRUE** if the child restriction evaluates to **FALSE**, and **FALSE** if the child restriction evaluates to **TRUE**.

2.14.3.2 NotRestriction_r



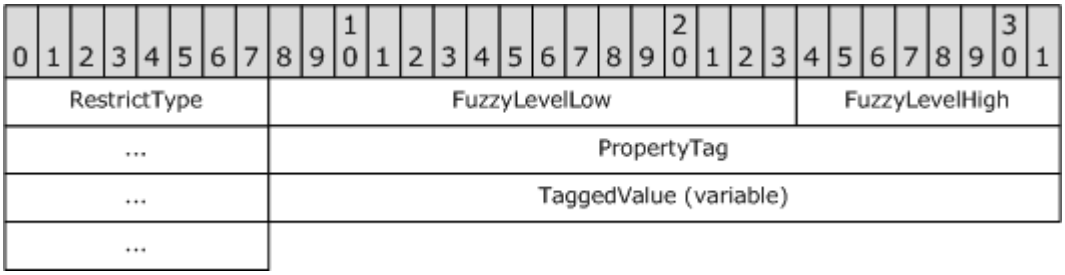
Restriction (variable size): Encodes the **Restriction** field of the **NotRestriction** structure. For more details, see section 2.14.3.1.

2.14.4 ContentRestriction

The **ContentRestriction** structure describes a content restriction, which is used to limit a table view to only those rows that include a column with contents matching a search string.

The **ContentRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the **ContentRestriction** data structure, as specified in section 2.14.4.1. The semantic meaning is unchanged from the **ContentRestriction** data structure.

2.14.4.1 ContentRestriction



RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x03".

FuzzyLevelLow (2 bytes): Unsigned 16-bit integer. This field specifies the level of precision that the server enforces when checking for a match against a **ContentRestriction**. The lower 16 bits of the **ulFuzzyLevel** member apply to both binary and string properties and MUST be set to one of the following values.

FuzzyLevelLow value	Description
0x0000 FL_FULLSTRING	The value stored in **TaggedValue** and the value of the column **PropertyTag** matches in their entirety.
0x0001 FL_SUBSTRING	The value stored in **TaggedValue** matches some portion of the value of the column **PropertyTag**.
0x0002 FL_PREFIX	The value stored in **TaggedValue** matches a starting portion of the value of the column **PropertyTag**.

FuzzyLevelHigh (2 bytes): This field applies only to string valued properties and can be set to the following bit values in any combination. **FuzzyLevelHigh** values can be OR'd together.

FuzzyLevelHigh values	Description
0x0001 FL_IGNORECASE	The comparison does not consider case.

FuzzyLevelHigh values	Description
0x0002 FL_IGNORENONSPACE	The comparison ignores Unicode-defined nonspacing characters such as diacritical marks.
0x0004 FL_LOOSE	The comparison results in a match whenever possible, ignoring case and nonspacing characters.

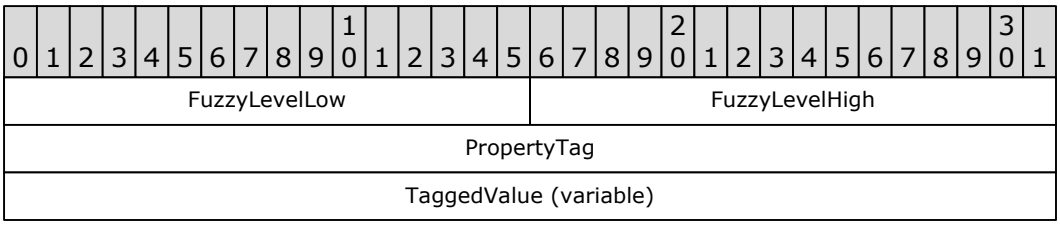
PropertyTag (4 bytes): Unsigned 32 bit integer. This value indicates the property tag of the column that whose value MUST be matched against the value specified by the **TaggedValue** field. The type of this property MUST NOT be multi-valued.

TaggedValue (Variable): A **TaggedPropertyValue** structure, as specified in section 2.13.4. This structure contains the value to be matched.

The property id portion of the **PropertyTag** field in **TaggedValue** is ignored. Its property type MUST match the property type of **PropTag**.

The result of a content restriction imposed against a property is undefined when the property does not exist. When a client requires well-defined behavior for such a restriction and is not sure whether the property exists, the client can create an **AndRestriction** to join the **ContentRestriction** with an **ExistRestriction**.

2.14.4.2 ContentRestriction_r



FuzzyLevelLow (2 bytes): Encodes the **FuzzyLevelLow** field of the **ContentRestriction** structure. For more details, see section 2.14.4.1.

FuzzyLevelHigh (2 bytes): Encodes the **FuzzyLevelHigh** field of the **ContentRestriction** structure. For more details, see section 2.14.4.1.

PropertyTag (4 bytes): Encodes the **PropertyTag** field of the **ContentRestriction** structure. For more details, see section 2.14.4.1.

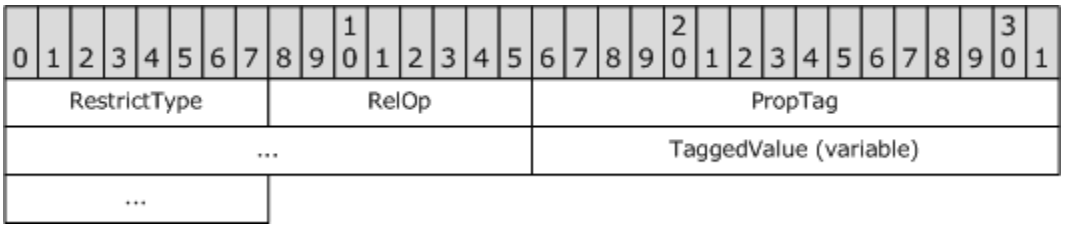
TaggedValue (variable size): Encodes **TaggedValue** field of the **ContentRestriction** structure. For more details, see section 2.14.4.1.

2.14.5 PropertyRestriction

The **PropertyRestriction** structure describes a property restriction that is used to match a constant with the value of a property.

The **PropertyRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the **PropertyRestriction** data structure, as specified in section 2.14.5.1. The semantic meaning is unchanged from the **PropertyRestriction** data structure.

2.14.5.1 PropertyRestriction



RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x4".

RelOp (1 byte): Unsigned 8-bit integer. The value indicates the relational operator that is used to compare the property on the object with **PropValue**. The value MUST be one the following.

Relational operator	Hexadecimal value	Evaluation	Alternate name
RelationalOperatorLessThan	0x00	TRUE if the value of object's property is less than the given value	**RELOP_LT**
RelationalOperatorLessThanOrEqual	0x01	TRUE if the value of the object's property is less than or equal to the given value	**RELOP_LE**
RelationalOperatorGreaterThan	0x02	TRUE if the value of the object's property value is greater than the given value	**RELOP_GT**
RelationalOperatorGreaterThanOrEqual	0x03	TRUE if the value of the object's property value is greater than or equal to the given value	**RELOP_GE**
RelationalOperatorEqual	0x04	TRUE if the object's property value equals the given value	**RELOP_EQ**

Relational operator	Hexadecimal value	Evaluation	Alternate name
RelationalOperatorNotEqual	0x05	TRUE if the object's property value does not equal the given value	**RELOP_NE**
RelationalOperatorMemberOfDL	0x64	TRUE if the value of the object's property is in the DL membership of the specified property value. The value of the object's property MUST be an **EntryID** of a mail-enabled object in the Address Book. The specified property value MUST be an **EntryID** of a distribution list object in the Address Book.	**RELOP_MEMBER_OF_DL**

PropTag (4 bytes): Unsigned 32 bit integer. This value indicates the property tag of the property that MUST be compared.

TaggedValue (Variable): TaggedValue structure (see section 2.13.4). This structure describes the property value to be compared against.

The **TaggedValue** field contains a property tag subfield which is distinct from the **PropTag** field of this structure. Only the property type portion of the **TaggedValue's** property tag subfield is used; the property id is ignored.

Multi-valued properties (when the bit **MultivalueFlag** is set) are supported for this type of restriction, but the base property types (obtained by masking off the bit **MultivalueFlag**) of both the **PropTag** field and property tag subfield of **TaggedValue** subfield MUST be the same in all cases <13>.

The **MultivalueInstance** bit MUST be set in neither the **PropTag** field nor the property tag subfield of the **TaggedValue**.

The following table describes which cases are supported for multi-valued properties.

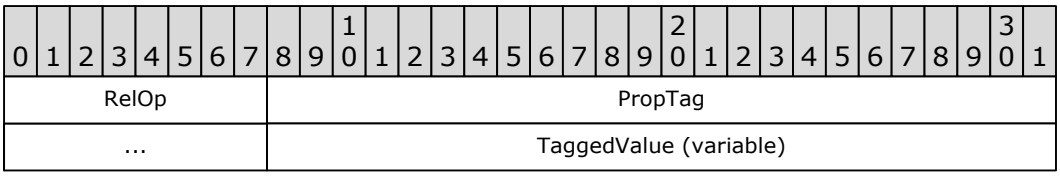
PropTag	TaggedValue	Support	Details

PropTag	TaggedValue	Support	Details
Single-valued	Single-valued	All **RelOp** values are supported	Simple comparison
Single-valued	Multi-valued	Only **RelationalOperatorEqual** and **RelationalOperatorNotEqual** are supported	The value of property **PropTag** is compared with each value of TaggedValue. If there are any matches, **RelationalOperatorEqual** is satisfied. If there are no matches, then **RelationalOperatorNotEqual** is satisfied.
Multi-valued and same as MultivalueInstance column of table	Single-valued	All **RelOp** values are supported	The single instance value of property **PropTag** on the row is compared with **TaggedValue**.
Multi-valued and same as MultivalueInstancecolumn of table	Multi-valued	Only **RelationalOperatorEqual** and **RelationalOperatorNotEqual** supported	The single instance value of property **PropTag** on the row is compared with each value of **TaggedValue**. If there are any matches, then **RelationalOperatorEqual** is satisfied. If there are no matches,then **RelationalOperatorNotEqual** is satisfied.

PropTag	TaggedValue	Support	Details
Multi-valued but not same as MultivalueInstance of table	Single-valued	All **RelOp** values supported	Each value of the property **PropTag** is compared with **TaggedValue**. For all **RelOp** values except **RelationalOperatorNotEqual**, one successful match means the restriction is satisfied. For **RelationalOperatorNotEqual**, the restriction is satisfied only when there are no matches
Multi-valued but not same as MultivalueInstance of table	Single-valued	Not supported	

In the context of a **RopFindRow** or **RopRestrict** call, the results are undefined if the property **PropTag** does not exist on the object being tested. By creating an **AndRestriction** that joins the property restriction with an **ExistRestriction**, a caller can be guaranteed accurate results.Only **RelationalOperatorEqual** and **RelationalOperatorNotEqual** are allowed for the **RelOp** field when the base type of **PropTag** is Boolean.

2.14.5.2 PropertyRestriction_r



Relop (1 byte): Encodes the **Relop** field of the **PropertyRestriction** structure. For more details, see section 2.14.5.1.

PropTag (4 bytes): Encodes the **PropTag** field of the **PropertyRestriction** structure. For more details, see section 2.14.5.1.

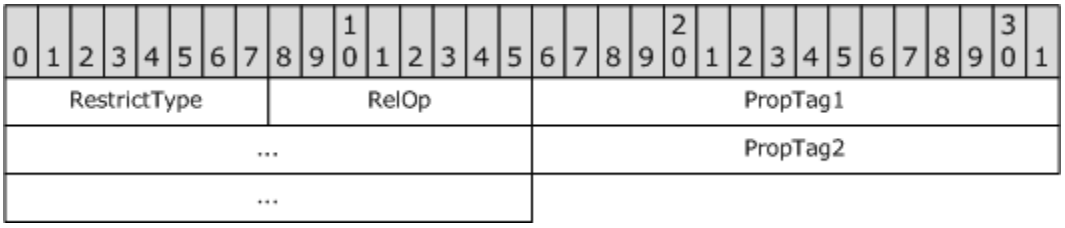
TaggedValue (variable size): Encodes the **TaggedValue** field of the **PropertyRestriction** structure. For more details, see section 2.14.5.1.

2.14.6 CompareProperties Restriction

The **CompareProperties Restriction** structure specifies a comparison between the values of two properties using a relational operator.

The **CompareProps Restriction_r** structure, as specified in [MS-NSPI], is an encoding of the **CompareProps Restriction** data structure, as specified in section 2.14.6.1. The semantic meaning is unchanged from the **CompareProps Restriction** data structure.

2.14.6.1 CompareProperties Restriction



RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x05".

RelOp (1 byte): Unsigned 8-bit integer. The value indicates the relational operator used to compare the two properties. The value MUST be one the following.

Relational operator	Hexadecimal value	Evaluation	Alternate name
RelationalOperatorLessThan	0x00	TRUE if the value of object's property is less than the given value	**RELOP_LT**
RelationalOperatorLessThanOrEqual	0x01	TRUE if the value of the object's property is less than or equal to the given value	**RELOP_LE**
RelationalOperatorGreaterThan	0x02	TRUE if the value of the object's property value is greater than the given value	**RELOP_GT**
RelationalOperatorGreaterThanOrEqual	0x03	TRUE if the value of the object's property value is greater than or equal to the given value	**RELOP_GE**

Relational operator	Hexadecimal value	Evaluation	Alternate name
RelationalOperatorEqual	0x04	TRUE if the object's property value equals the given value	**RELOP_EQ**
RelationalOperatorNotEqual	0x05	TRUE if the object's property value does not equal the given value	**RELOP_NE**
RelationalOperatorMemberOfDL	0x64	TRUE if the value of the object's property is in the DL membership of the specified property value. The value of the object's property MUST be an **EntryID** of a mail-enabled object in the Address Book. The specified property value MUST be an **EntryID** of a distribution list object in the Address Book.	**RELOP_MEMBER_OF_DL**

PropTag1 (4 bytes): Unsigned 32 bit integer. This value is the **PropertyTag** of the first property that MUST be compared.

PropTag2 (4 bytes): Unsigned 32 bit integer. This value is the **PropertyTag** of the second property that MUST be compared.

The comparison order is *(property tag 1) (relational operator) (property tag 2)*.

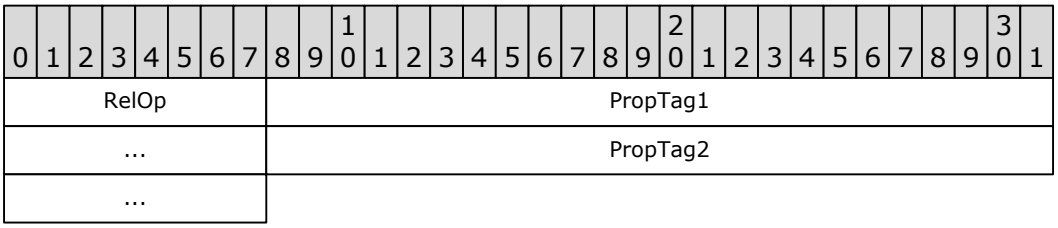
The properties to be compared MUST be of the same type.

The result of a compare property value restriction is undefined when one or both of the properties do not exist. When a client requires well-defined behavior for such a restriction and is not sure whether the property exists, for example, it is not a required column of a table, it can create an **AndRestriction** to join the compare property restriction with an Exists restriction.

The properties specified by **PropTag1** and **PropTag2** MUST be single-valued.

Only Equal and NotEqual operators are allowed field when the base types of **PropTag1** and **PropTag2** are Boolean.

2.14.6.2 CompareRestriction_r



Relop: Encodes the **Relop** field of the **ComparePropertiesRestriction** structure. For more details, see section 2.14.6.1.

PropTag1: Encodes the **PropTag1** field of the **ComparePropertiesRestriction** structure. For more details, see section 2.14.6.1.

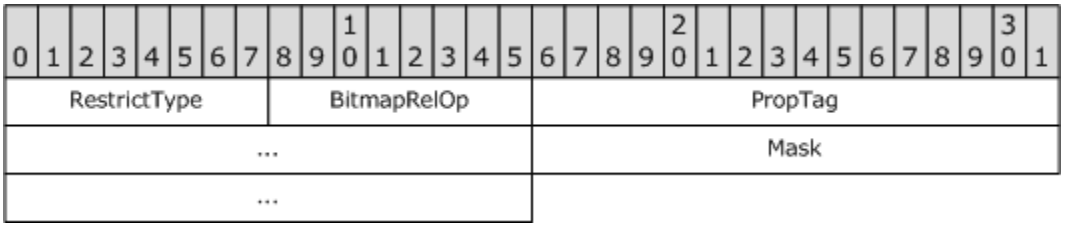
ProptTag2: Encodes the **PropTag2** field of the **ComparePropertiesRestriction** structure. For more details, see section 2.14.6.1.

2.14.7 BitMaskRestriction

The **BitMaskRestriction** structure describes a bitmask restriction, which performs a bitwise AND operation and compares the result with zero.

The **BitMaskRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the **BitMaskRestriction** data structure, as specified in section 2.14.7.1. The semantic meaning is unchanged from the **BitMaskRestriction** data structure.

2.14.7.1 BitMaskRestriction



RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x06".

BitmapRelOp (1 byte): Unsigned 8-bit integer. The value specifies how the server MUST perform the masking operation. The value MUST be one of the following:

BMR_EQZ ="0x00"

Perform a bitwise **AND** operation of the value of **Mask** with the value of the property **PropTag** and test for being equal to zero.

BMR_NEZ ="0x01"

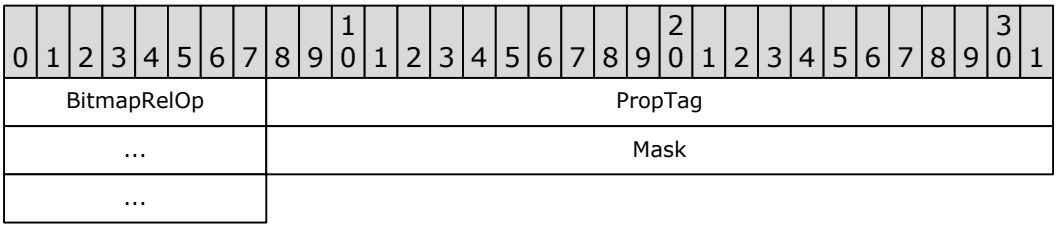
Perform a bitwise **AND** operation of the value of **Mask** with the value of the property **PropTag** and test for NOT being equal to zero.

PropTag (4 bytes): Unsigned 32 bit integer. This value is the **PropertyTag** of the property to be tested. Its property type MUST be single-valued Int32 (refer to section 2.4.2 for details about individual property types).

Mask (4 bytes): Unsigned 32 bit integer. The bitmask to use for the AND operation.

The **BitMaskRestriction** structure performs a bitwise AND operation using the bitmask **Mask** and the value of the property **PropTag**. If the result is zero, then BMR_EQZ is satisfied. If it's nonzero, that is, if the property value has at least one of the same bits set as **Mask,** then BMR_NEZ is satisfied.

2.14.7.2 BitMaskRestriction_r



BitmapRelOp (1 byte): Encodes the **BitmapRelop** field of the **BitMaskRestriction** structure. For more details, see section 2.14.7.1.

PropTag (4 bytes): Encodes the **PropTag** field of the **BitMaskRestriction** structure. For more details, see section 2.14.7.1.

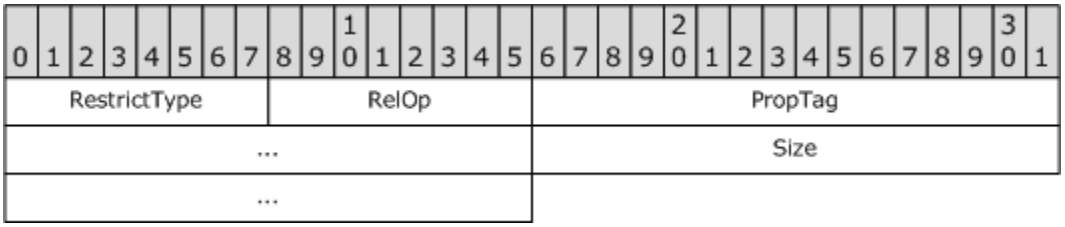
Mask (4 bytes): Encodes the **Mask** field of the **BitMaskRestriction** structure. For more details, see section 2.14.7.1.

2.14.8 SizeRestriction

The **SizeRestriction** structure describes a size restriction which compares the size (in bytes) of a property value with a given size.

The **SizeRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the SizeRestriction data structure, as specified in section 2.14.8.1. The semantic meaning is unchanged from the **SizeRestriction** data structure

2.14.8.1 SizeRestriction



RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x07".

RelOp (1 byte): Unsigned 8-bit integer. The value indicates the relational operator used in the size comparison. The value MUST be one the following.

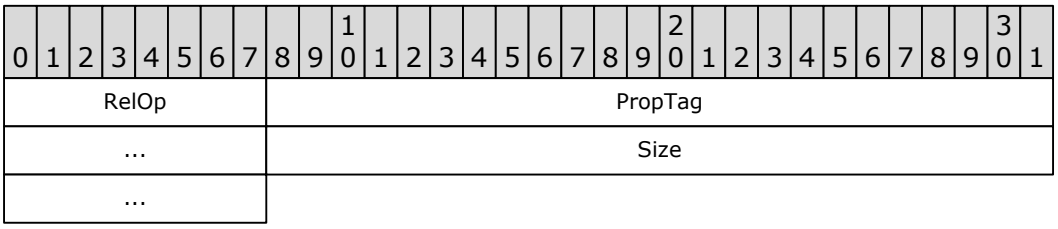
Relational operator	Hexadecimal value	Evaluation	Alternate name
RelationalOperatorLessThan	0x00	TRUE, if the value of object's property is less than the given value.	**RELOP_LT**
RelationalOperatorLessThanOrEqual	0x01	TRUE, if the value of the object's property is less than or equal to the given value.	**RELOP_LE**
RelationalOperatorGreaterThan	0x02	TRUE, if the value of the object's property value is greater than the given value.	**RELOP_GT**
RelationalOperatorGreaterThanOrEqual	0x03	TRUE, if the value of the object's property value is greater than or equal to the given value.	**RELOP_GE**
RelationalOperatorEqual	0x04	TRUE, if the object's property value equals the given value.	**RELOP_EQ**
RelationalOperatorNotEqual	0x05	TRUE, if the object's property value does not equal the given value.	**RELOP_NE**

PropTag (4 bytes): Unsigned 32 bit integer. This value indicates the property tag of the property, the size of whose value we are testing.

Size (4 bytes): Unsigned 32 bit integer. This value indicates size, as a count of bytes, that is to be used in the comparison.

In the case where PropTag is multivalued, there are two cases. If it was specified as **MultivalueInstance** column of the table, the size restriction is evaluated for each row using the size of the single instance value of the row. If was not specified as an **MultivalueInstance** column of the table, the size restriction is evaluated for each multi-value. If one of the size restrictions succeeds, the restriction is satisfied.

2.14.8.2 SizeRestriction_r



Relop (1 byte): Encodes the **Relop** field of the **SizeRestriction** structure. For more details, see section 2.14.8.1.

PropTag (4 bytes): Encodes the **PropTag** field of the **SizeRestriction** structure. For more details, see section 2.14.8.1.

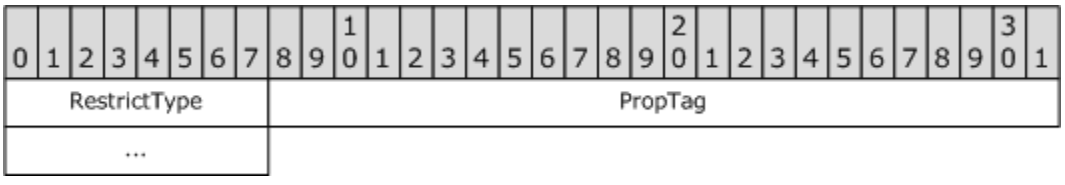
Size (4 bytes): Encodes the **Size** field of the **SizeRestriction** structure. For more details, see section 2.14.8.1.

2.14.9 ExistRestriction

The **ExistRestriction** structure tests whether a particular property value exists on a row of the table.

The **ExistRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the **ExistRestriction** data structure, as specified in section 2.14.9.1. The semantic meaning is unchanged from the **ExistRestriction** data structure.

2.14.9.1 ExistRestriction

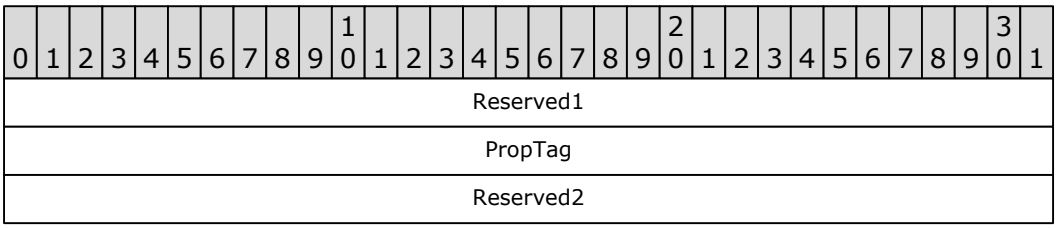


RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x08".

PropTag (4 bytes): Unsigned 32-bit integer. This value is the **PropertyTag** of the column to be tested for existence in each row.

The **ExistRestriction** is used to guarantee meaningful results for other types of restrictions that involve properties, such as property and content restrictions. The result of a restriction that involves a property which does not exist on a row is undefined. By creating an **AndRestriction** that joins the property restriction with an **ExistRestriction**, a client can be guaranteed accurate results.

2.14.9.2 ExistRestriction_r



Reserved1 (4 bytes): All clients and servers MUST set this value to "0x00000000".

PropTag (4 bytes): Encodes the PropTag field of the ExistRestriction structures. For more details, see section .2.14.9.1.

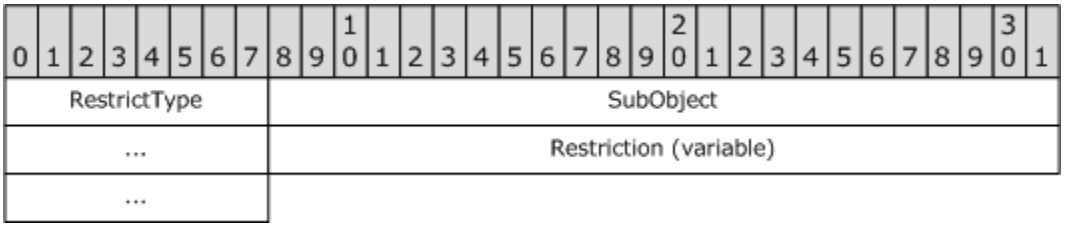
Reserved2 (4 bytes): All clients and servers MUST set this value to "0x00000000".

2.14.10 SubObjectRestriction

The **SubObjectRestriction** structure applies its subrestriction to a **Message object**'s attachment table or recipients. If ANY row of the subobject satisfies the subrestriction, then the message satisfies the **SubObjectRestriction**.

The **SubRestriction_r** structure, as specified in [MS-NSPI], is an encoding of the **SubObjectRestriction** data structure, as specified in section 2.14.10.1. The semantic meaning is unchanged from the **SubObjectRestriction** data structure.

2.14.10.1 SubObjectRestriction



RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x09".

SubObject (4 byte): Unsigned 32-bit integer. This value is a **PropertyTag** that designates the target of the subrestriction **Restriction.** Only two values are supported:

PidTagMessageRecipients

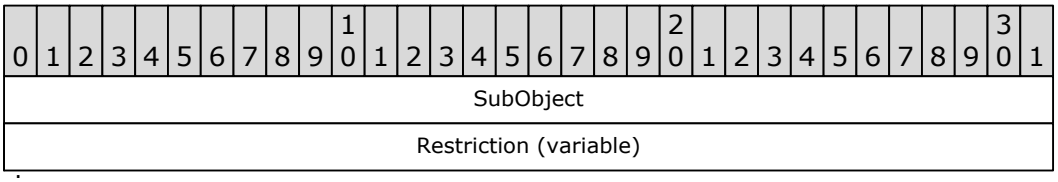
Apply the subrestriction to a message's recipiens.

PidTagMessageAttachments

Apply the subrestriction to a message's attachments.

Restriction (variable): A **restriction** structure. This subrestriction is applied to the rows of the subobject.

2.14.10.2SubRestriction_r

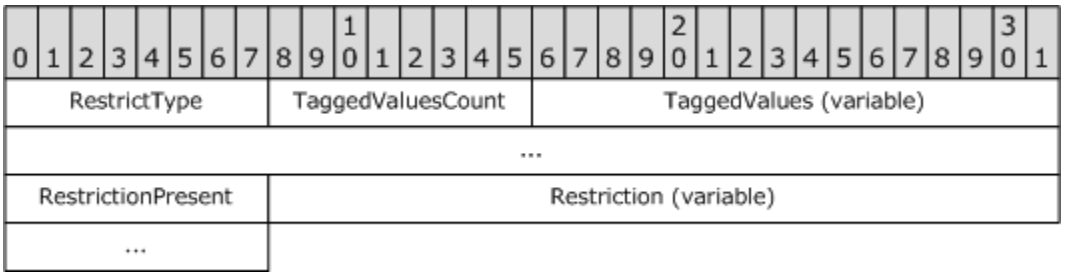


SubObject (4 bytes): Encodes the **SubObject** field of the **SubObjectRestriction** structure. For more details, see section 2.14.10.1.

Restriction (variable size): Encodes the **Restriction** field of the **SubObjectRestriction** structure. For more details, see section 2.14.10.1.

2.14.11 CommentRestriction

The **CommentRestriction** structure describes a comment restriction, which is used to annotate a restriction.



RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x0A".

TagggedValuesCount (1 byte): Unsigned 8-bit integer. This value specifies how many **TaggedValue** structures are present in **TaggedValues**.

TaggedValues (variable): Array of **TaggedPropertyValue** (see section 2.13.4) structures. This field MUST contain **TaggedValuesCount** structures. The **TaggedPropertyValue** structures MUST NOT include any multi-valued properties.

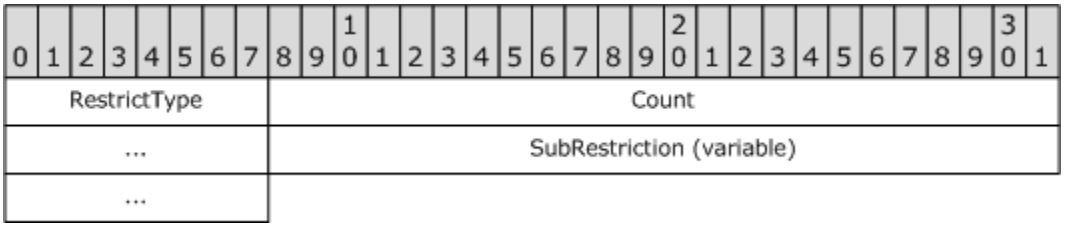
RestrictionPresent (1 byte): Unsigned 8-bit integer. This field MUST contain either **TRUE** ("0x01") or **FALSE** ("0x00"). A **TRUE** value means that the **Restriction** field is present, while a **FALSE** value indicates the **Restriction** field is not present.

Restriction (variable): A **restriction** structure. This field is only present if **RestrictionPresent** is **TRUE**.

Clients can use a **CommentRestriction** structure to save associated comments together with a restriction they pertain to. The comments are formatted as an arbitrary array of **TaggedPropValue** structures, and servers MUST store and retrieve this information for the client. If the **Restriction** field is present, servers MUST evaluate it; if it is not present, then the **CommentRestriction** node will effectively evaluate as **TRUE**. In either case, the comments themselves have no effect on the evaluation of the restriction.

2.14.12 CountRestriction

A **CountRestriction** structure limits the number of matches that are returned from its subrestriction.



RestrictType (1 byte): Unsigned 8-bit integer. This value indicates the type of restriction and MUST be set to "0x0B".

Count (4 bytes): Unsigned 32-bit integer. This value specifies the limit on the number of matches to be returned when **SubRestriction** is evaluated.

SubRestriction (variable): A **restriction** structure. This field specifies the restriction to be limited.

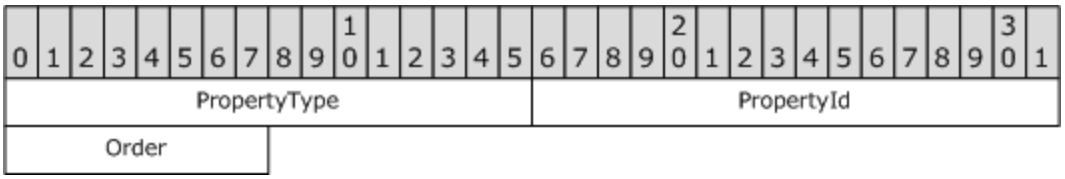
2.15 Sorting

Table sorting is performed by sending a **RopSortTable** operation to the server. The sort key is specified using a **SortOrderSet** structure. The **SortOrder** structure is part of a **SortOrderSet**. The format of these two structures is specified in the subsections which follow.

2.15.1 SortOrder

The **SortOrder** structure describes one column that is part of a sort key for sorting rows of a table. It gives both the column and the direction of the sort.

SortOrder structures are typically combined into a **SortOrderSet** structure to describe multiple sort keys and directions in a **RopSortTable** request.



PropertyType (bits 0-15): Identifies the data type of the column to sort on. If the property is multi-valued, for example, the **MultivalueFlag** bit ("0x1000") is set in the **PropertyType**, then clients MUST also set the **MultivalueInstance** bit to "0x2000". In this case the server MUST generate one row for each individual value of a multivalued column, and sort the table by individual values of that column.

PropertyId (bits 16-31): Identifies the column to sort on.

Order (1 byte): MUST be one of the following values.

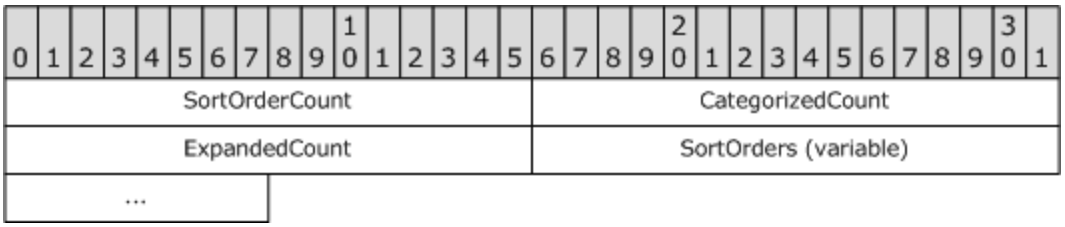
Order name	Order value	Description
Ascending	0x00	Sort by this column in ascending order.
Descending	0x01	Sort by this column in descending order.
MaximumCategory	0x04	Indicates this is an aggregated column in a categorized sort, whose **maximum** value (within the group of items with the same value of the previous category) is to be used as the sort key for the entire group.

If the MultivalueFlag bit is set, then the MultivalueInstance bit MUST also be set, and if the **MultivalueInstance** bit is set, then the **MultivalueFlag** bit MUST also be set. In other words, it is not possible to sort on all values of a multivalued column; one row per value MUST be generated and individual values used in the sort.

The **MaximumCategory** bit causes groups of messages in a categorized sort to be ordered by the maximum value of a column across an entire group. For example, a conversation view is grouped by **PidTagConversationTopic**; groups are sorted by the group's most recent (maximum) **PidTagMessageDeliveryTime** value, and within each group messages are sorted by **PidTagConversationIndex**.

2.15.2 SortOrderSet

The **SortOrderSet** structure describes a sort key consisting of one or more columns.



SortOrderCount (2 bytes): Unsigned 16-bit integer. This value specifies how many **SortOrder** structures are present in **SortOrders**.

CategorizedCount (2 bytes): Unsigned 16-bit integer. This value specifies that the first **CategorizedCount** columns are categorized. This value MUST be in the range "0" to **SortOrderCount**.

ExpandedCount (2 bytes): Unsigned 16-bit integer. This value specifies that the first **ExpandedCount** of the categorized columns start in an expanded state, where all of the rows that apply to the category are visible in the table view. This value MUST be in the range "0" to **CategorizedCount**.

SortOrders (variable): Array of **SortOrder** structures. This field MUST contain **SortOrderCount** structures. At most one of the structures can specify a multi-valued property.

3 Structure Examples

This section provides two examples of how some of these structures would appear as a stream of bytes.

3.1 Restriction Example

The following restriction, described in high level terms, could be used to search for items with reminders set on them.

A restriction of the type **AndRestriction** with the following two sub-clauses:

1. A restriction of type **AndRestriction**, with the following eight sub-clauses:
    - A restriction of type **PropertyRestriction** with a **relop** value of **RelationalOperatorNotEqual**, comparing the value of **PidTagParentEntryId** property with the **PidTagEntryId** of the Deleted Items special folder (see [MS-OXOSFLD])
    1. A restriction of type **PropertyRestriction** with a **relop** value of **RelationalOperatorNotEqual**, comparing the value of **PidTagParentEntryId** property with the **PidTagEntryId** of the Junk Mail special folder (see [MS-OXOSFLD])
    2. A restriction of type **PropertyRestriction** with a **relop** value of **RelationalOperatorNotEqual**, comparing the value of

PidTagParentEntryId property with the **PidTagEntryId** of the Drafts special folder (see [MS-OXOSFLD])

3. A restriction of type **PropertyRestriction** with a **relop** value of **RelationalOperatorNotEqual**, comparing the value of **PidTagParentEntryId** property with the **PidTagEntryId** of the Outbox special folder (see [MS-OXOSFLD])
4. A restriction of type **PropertyRestriction** with a **relop** value of **RelationalOperatorNotEqual**, comparing the value of **PidTagParentEntryId** property with the **PidTagEntryId** of the Conflicts special folder (see [MS-OXOSFLD])
5. A restriction of type **PropertyRestriction** with a **relop** value of **RelationalOperatorNotEqual**, comparing the value of **PidTagParentEntryId** property with the **PidTagEntryId** of the Local Failures special folder (see [MS-OXOSFLD])
6. A restriction of type **PropertyRestriction** with a **relop** value of **RelationalOperatorNotEqual**, comparing the value of **PidTagParentEntryId** property with the **PidTagEntryId** of the Server Failures special folder (see [MS-OXOSFLD])
7. A restriction of type **PropertyRestriction** with a **relop** value of **RelationalOperatorNotEqual**, comparing the value of **PidTagParentEntryId** property with the **PidTagEntryId** of the Sync Issues special folder (see [MS-OXOSFLD])

2. A restriction of type **AndRestriction**, with the following three sub-clauses:
    1. A restriction of type **NotRestriction**, with the following sub-clause:
        1. A Restriction of type **AndRestriction**, with the following two sub-clauses:
            1. A Restriction of type **ExistRestriction** that specifies the **PidTagMessageClass** property.
            2. A Restriction of type **ContentRestriction** with a FuzzyLevel of FL_PREFIX, comparing the value of **PidTagMessageClass** property to the string value "IPM.Schedule"
    2. A restriction of type **BitMaskRestriction** with a **BitmapRelOp** value of BMR_EQZ that compares the value of the **PidTagMessageFlags** property to the ULONG value MSGFLAG_SUBMIT
    3. A restriction of type **OrRestriction**, with the following two sub-clauses:

1. A restriction of type **PropertyRestriction** with **relop RelationalOperatorEqual**, comparing the value of **PidLidReminderSet** property to the Boolean value "1"
2. A restriction of type **AndRestriction**, with the following two sub-clauses:
    1. A Restriction of type **ExistRestriction** that specifies the **PidLidRecurring** property.
    2. A Restriction of type **PropertyRestriction** with **relop RelationalOperatorEqual**, comparing the value of **PidLidRecurring** property to the Boolean value "1".

The following describes how this corresponds to a byte stream that is passed between the client and server.

Before formatting this data structure to send to the server, the client would need to send a **RopGetPropertyIdsFromNames** request to the server to map the two named properties **PidLidReminderSet** and **PidLidRecurring** to actual property ids.

Bytes	**Field**	**Meaning**
00	**RestrictType**	**AndRestriction**
02 00	**RestrictCount**	2
00	**RestrictType**	**AndRestriction**
08 00	**RestrictCount**	8
04	**RestrictType**	**PropertyRestriction**
05	**RelOp**	**RelationalOperatorNotEqual**
20 10 09 0E	**PropTag**	**PidTagParentEntryId**
0E 02	**ByteCount**	46
00 00 00 00	**EntryID** Flags	MUST be zero
EE C1 BD 78 61 11 D0 11 91 7B 00 00 00 00 00 01	**EntryID Provider UID**	UID for Mailbox store

Bytes	Field	Meaning
01 00	**EntryID Folder Type**	eitLTPrivateFolder
(16 byte guid specific to database)	**EntryID Message Database GUID**	UID identifies database where folder was originally created
(6 bytes identifying Deleted Items folder)	**EntryID Global Counter**	UID identifies specific folder within database
00 00	**EntryID Pad**	MUST be zero
04	**RestrictType**	**PropertyRestriction**
05	**RelOp**	**RelationalOperatorNotEqual**
20 10 09 0E	**PropTag**	**PidTagParentEntryId**
0E 02	**ByteCount**	46
00 00 00 00	**EntryID Flags**	MUST be zero
EE C1 BD 78 61 11 D0 11 91 7B 00 00 00 00 00 01	**EntryID Provider UID**	UID for Mailbox store
01 00	**EntryID Folder Type**	eitLTPrivateFolder
(16 byte guid specific to database)	**EntryID Message Database GUID**	UID identifies database where folder was originally created
(6 bytes identifying Junk Mail folder)	**EntryID Global Counter**	UID identifies specific folder within database
00 00	**EntryID Pad**	MUST be zero
04	**RestrictType**	**PropertyRestriction**
05	**RelOp**	**RelationalOperatorNo**

Bytes	Field	Meaning
		tEqual
20 10 09 0E	**PropTag**	**PidTagParentEntryId**
0E 02	**ByteCount**	46
00 00 00 00	**EntryID Flags**	MUST be zero
EE C1 BD 78 61 11 D0 11 91 7B 00 00 00 00 00 01	**EntryID Provider UID**	UID for Mailbox store
01 00	**EntryID Folder Type**	eitLTPrivateFolder
(16 byte guid specific to database)	**EntryID Message Database GUID**	UID identifies database where folder was originally created
(6 bytes identifying Drafts folder)	**EntryID Global Counter**	UID identifies specific folder within database
00 00	**EntryID Pad**	MUST be zero
04	**RestrictType**	**PropertyRestriction**
05	**RelOp**	**RelationalOperatorNotEqual**
20 10 09 0E	**PropTag**	**PidTagParentEntryId**
0E 02	**ByteCount**	46
00 00 00 00	**EntryID Flags**	MUST be zero
EE C1 BD 78 61 11 D0 11 91 7B 00 00 00 00 00 01	**EntryID Provider UID**	UID for Mailbox store
01 00	**EntryID Folder Type**	eitLTPrivateFolder
(16 byte guid specific to database)	**EntryID Message**	UID identifies database where folder was

Bytes	Field	Meaning
	Database GUID	originally created
(6 bytes identifying Outbox folder)	**EntryID Global Counter**	UID identifies specific folder within database
00 00	**EntryID Pad**	MUST be zero
04	**RestrictType**	**PropertyRestriction**
05	**RelOp**	**RelationalOperatorNotEqual**
20 10 09 0E	**PropTag**	**PidTagParentEntryId**
0E 02	**ByteCount**	46
00 00 00 00	**EntryID Flags**	MUST be zero
EE C1 BD 78 61 11 D0 11 91 7B 00 00 00 00 00 01	**EntryID Provider UID**	UID for Mailbox store
01 00	**EntryID Folder Type**	eitLTPrivateFolder
(16 byte guid specific to database)	**EntryID Message Database GUID**	UID identifies database where folder was originally created
(6 bytes identifying Conflicts folder)	**EntryID Global Counter**	UID identifies specific folder within database
00 00	**EntryID Pad**	MUST be zero
04	**RestrictType**	**PropertyRestriction**
05	**RelOp**	**RelationalOperatorNotEqual**
20 10 09 0E	**PropTag**	**PidTagParentEntryId**
0E 02	**Byte Count**	46

Bytes	Field	Meaning
00 00 00 00	**EntryID Flags**	MUST be zero
EE C1 BD 78 61 11 D0 11 91 7B 00 00 00 00 00 01	**EntryID Provider UID**	UID for Mailbox store
01 00	**EntryID Folder Type**	eitLTPrivateFolder
(16 byte guid specific to database)	**EntryID Message Database GUID**	UID identifies database where folder was originally created
(6 bytes identifying Local Failures folder)	**EntryID Global Counter**	UID identifies specific folder within database
00 00	**EntryID Pad**	MUST be zero
04	**RestrictType**	**PropertyRestriction**
05	**RelOp**	**RelationalOperatorNotEqual**
20 10 09 0E	**PropTag**	**PidTagParentEntryId**
0E 02	**Byte Count**	46
00 00 00 00	**EntryID Flags**	MUST be zero
EE C1 BD 78 61 11 D0 11 91 7B 00 00 00 00 00 01	**EntryID Provider UID**	UID for Mailbox store
01 00	**EntryID Folder Type**	eitLTPrivateFolder
(16 byte guid specific to database)	**EntryID Message Database GUID**	UID identifies database where folder was originally created
(6 bytes identifying Server Failures folder)	**EntryID Global Counter**	UID identifies specific folder within database

Bytes	Field	Meaning
00 00	**EntryID Pad**	MUST be zero
04	**RestrictType**	**PropertyRestriction**
05	**RelOp**	**RelationalOperatorNotEqual**
20 10 09 0E	**PropTag**	**PidTagParentEntryId**
0E 02	**Byte Count**	46
00 00 00 00	**EntryID Flags**	MUST be zero
EE C1 BD 78 61 11 D0 11 91 7B 00 00 00 00 00 01	**EntryID Provider UID**	UID for Mailbox store
01 00	**EntryID Folder Type**	eitLTPrivateFolder
(16 byte guid specific to database)	**EntryID Message Database GUID**	UID identifies database where folder was originally created
(6 bytes identifying Sync Issues folder)	**EntryID Global Counter**	UID identifies specific folder within database
00 00	**EntryID Pad**	MUST be zero
00	**RestrictType**	**AndRestriction**
03 00	**RestrictCount**	3
02	**RestrictType**	**NotRestriction**
00	**RestrictType**	**AndRestriction**
02 00	**RestrictCount**	2
08	**RestrictType**	**ExistRestriction**
1F 00 1A 00	**PropTag**	**PidTagMessageClass**

Bytes	Field	Meaning
03	**RestrictType**	**ContentRestriction**
02 00	**FuzzyLevelLow**	FL_PREFIX
00 00	**FuzzyLevelHigh**	
1F 00 1A 00	**PropertyTag**	**PidTagMessageClass**
49 00 50 00 4D 00 2E 00 53 00 63 00 68 00 65 00 64 00 75 00 6C 00 65 00 00 00	**PropValue**	"IPM.Schedule"
06	**RestrictType**	**BitMaskRestriction**
00	**BitmapRelOp**	BMR_EQZ
03 00 07 0E	**PropTag**	**PidTagMessageFlags**
04 00 00 00	**Mask**	MSGFLAG_SUBMIT
01	**RestrictType**	**OrRestriction**
02 00	**RestrictCount**	2
04	**RestrictType**	**PropertyRestriction**
04	**RelOp**	**RelationalOperatorEqual**
0B 00 + (2 byte mapped prop id)	**PropTag**	**PidLidReminderSet**
01	**PropValue**	TRUE
00	**RestrictType**	**AndRestriction**
02 00	**RestrictCount**	2
08	**RestrictType**	**ExistRestriction**
0B 00 + (2 byte mapped prop id)	**PropTag**	**PidLidRecurring**

Bytes	Field	Meaning
04	**RestrictType**	**PropertyRestriction**
04	**RelOp**	**RelationalOperatorEqual**
0B 00 + (2 byte mapped prop id)	**PropTag**	**PidLidRecurring**
01	**PropValue**	TRUE

3.2 PropertyRow Example

In this example, the client sends **RopGetPropertiesSpecific** to the server requesting the properties from an open **Message object**:

Hexadecimal value	Property ID	Property type
0E070003	**PidTagMessageFlags**	**PtypInteger32**
00370001	**PidTagSubject**	**PtypUnspecified**
1000001F	**PidTagBody**	**PtypString**

Additional assumptions used in this example:

- This message had been sent to this mailbox from a different user.
- The message contained an attachment.
- The message had been already read by the user but had not been modified.
- The subject of this message is "Hello".
- The body of the message is so large that the server requires the client to stream the body to the client.

Under these conditions, the PropertyRow data returned from the server would use the FlaggedPropertyRow structure variant (see section 2.13.5) to return the data from **RopGetPropertiesSpecific** with the following data:

Bytes	Field	Meaning
01	Flag for PropertyRow	There were either errors retrieving values or some

Bytes	Field	Meaning
		values were not returned
00	Flag for **FlaggedPropertyValue** (see section 2.13.5)	The value for this property is returned
13 00 00 00	**PtypInteger32 PropertyValue**	MSGFLAG_READ |MSGFLAG_UMODIFIED |MSGFLAG_HASATTACH
1F 00	PropertyType for **FlaggedPropertyValue WithType** (see section 2.13.6)	**PtypString**
00	Flag for **FlaggedPropertyValue WithType**	**PropertyRestriction**
48 00 65 00 6C 00 6C 00 6F 00 00 00	String PropertyValue	"Hello"
0A	Flag for **FlaggedPropertyValue**	The value for this property was not returned. RopOpenStream can be used to obtain the property value.
0E 00 07 80	32-bit SCODE	NotEnoughMemory error (see section 2.4)

4 Security Considerations

There are no special security considerations for this protocol over and above those specified in [MS-OXCRPC].

5 Appendix A: Office/Exchange Behavior

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

- Microsoft Office Outlook 2003
- Microsoft Exchange Server 2003
- Microsoft Office Outlook 2007
- Microsoft Exchange Server 2007
- Microsoft Outlook 2010
- Microsoft Exchange Server 2010

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

<1> Section 1.5: Exchange 2010 Beta supports public folder referrals, but does not support public folders when client connection services are deployed on an Exchange server that does not also have a mailbox store installed

<2> Section 2.2.1.1: Exchange 2010 Beta can output unexpected results when using **RopOpenFolder** when client connection services are deployed on an Exchange server that does not also have a mailbox store installed.

<3> Section 2.2.1.2: Exchange 2010 Beta can output unexpected results when using **RopOpenMessage** when client connection services are deployed on an Exchange server that does not also have a mailbox store installed.

<4> Section 2.2.2: Exchange 2007 does not support the obsolete NNTP newsgroup folder EntryID.

<5> Section 2.2.4.3: Outlook 2003 and Outlook 2007 sometime leave 3 extra bytes not filled at the end of the Contact Address EntryID structure; in other words, the sum of all fields specified in this protocol can be 3 bytes less than the count of bytes of the entire EntryID. The value extra 3 bytes has no meaning to either the server or the client.

<6> Section 2.2.4.4: Outlook 2003 and Outlook 2007 sometimes leaves 3 extra bytes not filled at the end of the Personal Distribution List EntryID structure; in other words, the sum of all fields specified in this protocol can be 3 bytes less than the count of bytes of the entire EntryID. The value extra 3 bytes has no meaning to either the server or the client.

<7> Section 2.4: Exchange 2010 Beta can output unexpected results for **RopAbort** when client connection services are deployed on an Exchange server that does not also have a mailbox store installed.

<8> Section 2.4: Exchange 2010 Beta does not support this ROP when client connection services are deployed on an Exchange server that does not also have a mailbox store installed.

<9> Section 2.4.2: Exchange 2010 Beta can output unexpected results when using **RopOpenStream** when client connection services are deployed on an Exchange server that does not also have a mailbox store installed.

<10> Section 2.8: Exchange 2010 Beta does not support this ROP when client connection services are deployed on an Exchange server that does not also have a mailbox store installed.

<11> Section 2.8: Exchange 2010 Beta does not support this ROP when client connection services are deployed on an Exchange server that does not also have a mailbox store installed.

<12> Section 2.10.2: Exchange 2003, Exchange 2007, and Exchange 2010 will sometimes return values larger than 255 bytes or characters.

<13> Section 2.14.5.1: Exchange 2010 Beta does not support multivalued data types in restrictions when client connection services are deployed on an Exchange server that does not also have a mailbox store installed.

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