[MS-OXOAB]:
Offline Address Book (OAB) File Format and Schema

Revision Summary

Date	Revision History	Revision Class	Comments
04/04/2008	0.1		Initial Availability.
04/25/2008	0.2		Revised and updated property names and other technical content.
06/27/2008	1.0		Initial Release.
08/06/2008	1.01		Revised and edited technical content.
09/03/2008	1.02		Revised and edited technical content.
10/01/2008	1.03		Revised and edited technical content.
12/03/2008	1.04		Updated IP notice.
02/04/2009	1.05		Revised and edited technical content.
03/04/2009	1.06		Revised and edited technical content.
04/10/2009	2.0		Updated technical content for new product releases.
07/15/2009	3.0	Major	Revised and edited for technical content.
11/04/2009	4.0.0	Major	Updated and revised the technical content.
02/10/2010	4.1.0	Minor	Updated the technical content.

Table of Contents

1 Introduction

This document specifies the **offline address book (OAB)** version 2, OAB version 3, and OAB version 4 file formats. OABs are files that **store address list** information on the client, so that the client can access the information when it does not have a network connection with the server or is working **offline**. This specification assumes the reader has familiarity with the **address book** concepts and requirements of the Address Book Object protocol, as specified in [MS-OXOABK]. Those concepts and requirements are not repeated in this specification.

1.1 Glossary

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

address book
Address Book object
address creation template
address list
alias
ambiguous name resolution (ANR)
ASCII
cyclic redundancy check (CRC) (1)
departmental group
distinguished name (DN)
distribution list
GUID
.jpg
Lempel-Ziv Extended (LZX)
Lempel-Ziv Extended Delta (LZXD)
little-endian
mailbox
mail user
mail tip
message database (MDB)
offline address book (OAB)
property
property tag
public folder
relative distinguished name (RDN)
recipient(2)
Rich Text Format (RTF)
Simple Mail Transfer Protocol (SMTP)
table
X500 DN

The following terms are specific to this document:

mail agent: An **Address Book object** other than a **remote mail user**, **mail user**, **distribution list**, or **public folder**.

narrow character set: A character set that represents text characters as a sequence of bytes, where each byte represents a unique character. The ASCII character set is a **narrow character set**.

parent distinguished name (PDN): The **distinguished name** of the next immediate object closer to the root of the tree of **relative distinguished names (RDNs)**.

remote mail user: A collection of properties such as telephone numbers, e-mail addresses, and pager numbers pertaining to a person or business external to the messaging server.

X509: An ITU-T standard for Public Key Infrastructure subsequently adapted by the IETF, as specified in [RFC3280].

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

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information. Please check the archive site, http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624, as an additional source.

[ISO/IEC 8802-3] International Organization for Standardization, "Information technology -- Telecommunications and information exchange between systems -- Local and metropolitan area networks -- Specific requirements -- Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications", ISO/IEC 8802-3:2000, http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=31002.

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

[MS-MCI] Microsoft Corporation, "MCI Compression and Decompression", June 2008.

[MS-OXCDATA] Microsoft Corporation, "Data Structures", June 2008.

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

[MS-OXOABK] Microsoft Corporation, "Address Book Object Protocol Specification", June 2008.

[MS-OXOABKT] Microsoft Corporation, "Address Book User Interface Templates Protocol Specification", June 2008.

[MS-OXPFOAB] Microsoft Corporation, "Offline Address Book (OAB) Public Folder Retrieval Protocol Specification", June 2008.

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

[MS-PATCH] Microsoft Corporation, "LZX DELTA Compression and Decompression", June 2008.

[RFC2044] Yergeau, F., "UTF-8, a transformation format of Unicode and ISO 10646", RFC 2004, October 1996, http://www.ietf.org/rfc/rfc2044.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.

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

1.2.2 Informative References

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

[MS-ADTS] Microsoft Corporation, "Active Directory Technical Specification", July 2006, http://go.microsoft.com/fwlink/?LinkId=112149.

[MS-OXWOAB] Microsoft Corporation, "Offline Address Book (OAB) Retrieval File Format", June 2008.

[RFC2315] Kaliski, B., "PKCS #7: Cryptographic Message Syntax", RFC 2315, March 1998, http://www.ietf.org/rfc/rfc2315.txt.

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

1.3 Structure Overview

A server can choose to make user **properties**, such as job titles, addresses, and telephone numbers, available to its clients in an address book. The address book can then be browsed or searched by clients looking for **recipient** information. To organize the contents of an address book, the server can divide recipients into containers and the client can choose which container to browse or search.

Each **address book container** is known as an address list. The **collection** of available containers, or address lists, is the address book. When the client is unable to reach the server, which can be caused by working offline or having high network costs to access the server, the client can use a local copy of the address book or address lists to retrieve user information. The local copy of the address book is known as an offline address book (OAB).

An OAB is composed of three or more files that provide the full functionality of the online address book when the client is working offline. This specification describes the structure of each of the files required to create an OAB version 2, OAB version 3, and OAB version 4 file.<1>

1.3.1 OAB Version 2 and OAB Version 3

The OAB version 2 and OAB version 3 file format specifies the structure of files that are **downloaded** from the server to the client to support an offline address book (OAB). OAB version 2 and OAB version 3 are very similar; OAB version 3 adds **Unicode** support and additional **recipient properties**.

The OAB version 2 and OAB version 3 file consists of the following files:

- Browse file. The Browse file contains one fixed size record per user, with members that **point** to offsets in the **RDN** Index, **ANR** Index, and Details files. The fixed size record contains data and offsets that account for all of the user's data in the OAB version 2 and OAB version 3 file. For an overview of the Browse file, see section 1.3.1.1. For information about the structure of the Browse file, see section 2.3.
- RDN Index file. The relative distinguished name (RDN) Index file is used for primary key lookups based on the **X500 DN** and **Simple Mail Transfer Protocol (SMTP)** address properties of the **Address Book object**. For an overview of the RDN Index file, see section 1.3.1.2. For information about the structure of the RDN Index file, see section 2.4.

- ANR Index file. The ANR Index file is used for ambiguous name resolution (ANR). Values for the **display name**, surname, office location, and e-mail **alias** are all sorted together into one structure so that a single search can find Address Book objects based on multiple properties. For an overview of the ANR Index file, see section 1.3.1.3. For information about the structure of the ANR Index file, see section 2.5.
- Details file. The Details file contains all other properties for address book objects in the version 2 and version 3 OAB. The Details file is not indexed. The client can choose not to download the Details file in order to save space and bandwidth since there is no information in there that is required for basic e-mail addressing. For an overview of the Details file, see section 1.3.1.4. For information about the structure of the Details file, see section 2.6.
- **Display template** files. For an overview of the display template file, see section 1.3.1.5. For information about the structure of the display template file used by OAB version 2 and later versions, see section 2.2.

Each of these files is compressed before **synchronization** to save network bandwidth.

Figure 1 shows each of these OAB files and the indexes that point from one file to another. After an OAB has been downloaded to the client, incremental updates can be downloaded using a Changes file.

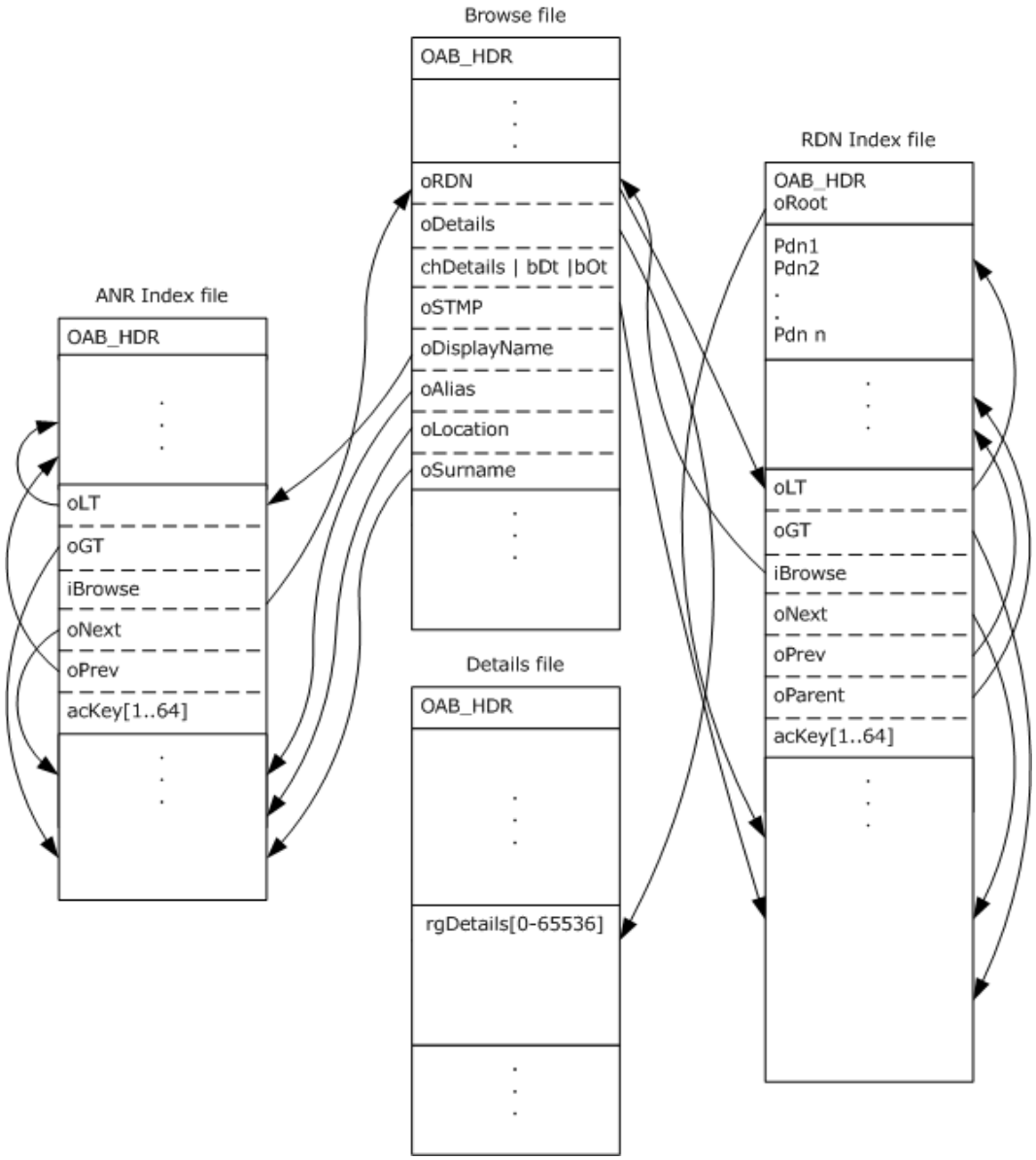


Figure 1: Relationship of the OAB version 2 and OAB version 3 files

1.3.1.1 Uncompressed Browse File

The records in the Browse file are sorted in alphabetical order according to Address Book object display names and allow for fast paging of Address Book object data. It has offsets into the other files for the display name, the surname, the office location, the X500 DN, the SMTP address, the e-mail alias, and the details record. It also maintains values for the object type and Address Book object display type. Each record is a fixed size. Fetching an entire record requires that the client follow each link from the Browse file and retrieve data from the other files. The **header** of the Browse file includes a file type, a record count, and a serial number. The serial number is a rotating hash of the RDN value of each record in the Browse file order.

1.3.1.2 Uncompressed RDN Index File

The RDN Index file is split into two sections: the **parent distinguished name (PDN) table** and the RDN index. The PDN table contains the list of all parent **distinguished name** values for X500 DNs and all **domain** names used by SMTP addresses. The last RDN of the X500 DNs and the local-part of SMTP addresses are stored in the key field of the records in the RDN index section.

For example, given the following distinguished name value, /o=Adventure-Works/ou=New York/CN=recipients/CN=JohnH, the relative distinguished name (RDN) object is /CN=JohnH and the parent distinguished name (PDN) is /o=Adventure-Works/ou=New York/CN=recipients/. The key field of the RDN index, also known as the RDN value, is simply JohnH.

Records in the RDN index part of the file are of variable size, contain the index key value, and have pointers to the record in the PDN table so that the original value of the X500 DN or SMTP address can be reconstructed. In the record is an index of the related browse record in the Browse file and four more offsets are stored to create a threaded tree structure within the RDN Index file. An offset in the header of the RDN Index file points past the end of the PDN table to the root of the RDN index tree.

1.3.1.3 Uncompressed ANR Index File

The ANR Index file is structured similarly to the RDN Index file, but does not contain a PDN table. Each record is a variable size and has four offsets that construct a threaded tree structure. Records have an index of master records in the Browse file and the value portion is either an office location string, a surname string, an alias string, or a display name string. The root of the ANR index tree is always the first node in the file; therefore no root offset is required in the header.

1.3.1.4 Uncompressed Details File

The Details file contains variable size records that store a fixed set of properties for each address book object. Each record can be up to 65536 bytes long and all the stored properties for a single address book object have to fit into that record. The data is not indexed and there are no links from this file to any of the other files, but the Browse file does have links to this file.

1.3.1.5 Uncompressed Display Template File

The **template** file describes how the address book object data can be presented to a user, as specified in [MS-OXOABKT].

1.3.1.6 Uncompressed Changes File

The Changes file describes the changes that need to happen to the other files to produce a file set that represents the next generational version of the OAB version 2 and OAB version 3 files. It consists of a sequence of variable size records that contain data to update individual records. Numerous change files might be required to make a set of OAB version 2 and OAB version 3 files current with the server.

1.3.1.7 Compressed OAB Version 2 and OAB Version 3 Files

OAB version 2 and OAB version 3 files are compressed by the server before being transferred to the client. A compressed file starts with a header and then a sequence of compressed blocks. All OAB version 2 and OAB version 3 files are compressed the same way. For more information about the compression of OAB version 2 and OAB version 3 files, see [MS-MCI].

1.3.2 OAB Version 4

The OAB version 4 file format specifies the structure of three files that are downloaded from the server to the client.

- Full Details file. The Full Details file contains the entire offline address book, including all address book objects, the list of **property types** that can be found in the address book, and information about the address book itself, including its name, a unique identity **identifier**, a version number, and a hash value. For an overview of the Full Details file, see section 1.3.2.1. For the structure of the Full Details file, see section 2.9.
- Differential Patch file. A Differential Patch file can be used to transform a previously downloaded version of the Full Details file to the next version of the Full Details file, which saves the client from downloading the entire Full Details file again. For an overview of the Differential Patch file, see section 1.3.2.3. For the structure of the Differential Patch file, see section 2.10.
- Display Template file. A Display Template file describes how the address book objects in the OAB can be rendered by the client on a display device to the user, as specified in [MS-OXOABKT]. For an overview of the Display Template file, see section 1.3.2.4. For the structure of the Display Template file used by OAB version 2 and later versions, see section 2.2.

The address book object data in the Full Details file is not sorted in a predetermined manner, thus it is up to the client to decompress and index the file to enable fast retrieval and searches.

The files stored on the server are in a compressed format, as specified in [MS-PATCH]. All the uncompressed OAB version 4 files contain the same header structure. The header structure consists of the following fields:

- A 32 bit **little-endian** file version number. The version number used to determine the type of file: Full Details or Display Template.
- A 32 bit little-endian serial number. The serial number is a calculated value in the Full Details file and is used to validate file consistency. It is the **cyclic redundancy check (CRC)** checksum of the file not including the header structure itself. For more information about CRC, see [ISO/IEC 8802-3] section 3.2.8.
- A 32 bit little-endian record count. The record count tells the client how many address book objects exist in the Full Details file.

1.3.2.1 Uncompressed Full Details File

Apart from the OAB header, the uncompressed Full Details file consists of the following three sections:

- OAB metadata record
- OAB header record
- One or more address book object records. Each address book object record starts with a little-endian 32 bit value that specifies the size of the record in bytes, including the record size field itself.

The OAB metadata record describes the schema of the OAB header record and address book object records. It starts with a record size value, then two schema tables: one for the OAB header record, and one for the address book object records. The tables are stored sequentially after each other. The schema tables contain a 32 bit little-endian record count followed by the specified number of 32

bit **property tag** and 32 bit flag value pairs. The flag value is used to tell the client which properties are supposed to be indexed to match the behavior of a client working online.

The first property in the OAB header record and address book object records is the record size value, followed by a presence bit array, and then the property values. The property values appear in the order provided in the property table in the metadata record. The presence bit array is used to indicate whether the property exists in the OAB header record or address book object records.

The OAB header record contains information about the address list itself, including the Unicode OAB name, the **ASCII** X500 distinguished name of the OAB, an integer **sequence number**, and the OAB **GUID** formatted as an ASCII string.

address book object records contain at minimum an ASCII SMTP address, an ASCII distinguished name, a Unicode display name, an integer display type, and an integer object type. The number of address book object records matches the record count contained in the file header.

1.3.2.2 Property Encodings

ASCII strings are encoded as null terminated strings.

Unicode strings are stored as null terminated UTF-8 strings [RFC2044].

Integer values are treated as unsigned and stored in one to five bytes. If the value is less than 0x80, the value is stored as a single byte. If the value is larger than or equal to 0x80, the number of bytes that can minimally hold the value is added to 0x80 and followed by the bytes of the value itself in little-endian format. Values 0x00 through 0x7f are encoded as themselves. Values 0x80 through 0xFF are encoded as 0x81 0xXX. Values 0x0100 through 0xFFFF are encoded as 0x82 0xLSB 0xMSB. Values 0x00010000 through 0x00FFFFFF are encoded as 0x83 0xLSB 0xXX 0xMSB, and values 0x01000000 through 0xFFFFFFFF are encoded as 0x84 0xLSB 0xXX 0xXX 0xMSB.

Boolean values are stored as single bytes: 0x00 for FALSE, and 0x01 for TRUE.

Octet strings are stored using an integer byte length field first (encoded by using the preceding integer encoding **rules**) followed by the octet **stream**.

Multi-valued properties are encoded with an integer value count first (encoded by using the preceding integer encoding rules) followed by the specified number of values as encoded by the preceding rules. Multi-valued properties cannot contain empty values.

Null or empty strings are not encoded as single null terminators, but are indicated as not-present using the presence bit array.

Data encoding is specified in more detail in section 2.9.6.

1.3.2.3 Uncompressed Differential Patch File

The Differential Patch file cannot be uncompressed by itself as it requires the original Full Details file. The Differential Patch file describes how to transform an outdated Full Details file into another Full Details file. During transformation, the Differential Patch file is read by the client one block at a time to determine how large a block of the original Full Details file to read, how large the output block will be, and what the compressed patch data is. The patch file starts with a patch header that contains the file format version numbers, a maximum block size value, source and target file sizes, and the source and target file CRC hash codes. The maximum block size value tells the client the maximum size it can expect to be required to read from the original Full Details file, the maximum size it can expect to have to write to the output file, and the size of the largest patch record that will be produced. Following the patch header are a **series** of patch blocks. The patch block contains the

patch size in bytes to be read from the patch file, the size in bytes of the target block that will be produced, the size in bytes of the block to be read from the original Full Details file, and the CRC hash that the resulting output block will have. The start and end of the source and output blocks do not necessarily fall on record boundaries of the source or output files.

1.3.2.4 Uncompressed Display Template File

The display template file describes how the address book object data can be presented to a user, as specified in [MS-OXOABKT].

1.3.2.5 Compressed OAB Details File and Compressed OAB Template file

Uncompressed Details and display template files can be very large due to the amount of information stored. In order to reduce the network traffic between the client and the server, these files are transmitted in a compressed form. A compressed file always starts with a **LZX_HDR** structure followed by one or more **LZX_BLK** structures. The **LZX_HDR** structure contains a maximum block size field that is used to tell the client the maximum size of a block it can expect to have to read from the compressed file and the maximum size of a block it can expect to have to write to an output file. It is passed so that the client can pre-allocate buffers before attempting to decompress a file. Also included in the compressed Details or display template file is a length field that indicates what the size of the resulting decompressed file will be. It is provided to help the client allocate disk **storage** and determine whether the resulting output file size is correct.

Each **LZX_BLK** structure contains a flag indicating whether the data field is compressed. If the size of a compressed block is larger than the source data, the server might choose to not compress the block and just pass it verbatim. A CRC hash of the expected decompressed output block is passed to the client to help it determine if the results of decompression are valid.

1.3.2.6 Truncated Properties

Stored on each address book object record is a PidTagOfflineAddressBookTruncatedProperties attribute. This contains the list of property tags that have been truncated or dropped due to size limits. Clients ought to check the property being retrieved from the OAB record against the list of truncated properties for the record. If the property is included in the truncated property list, the value stored in the OAB file is not the same as the address book value that is available online.

For string and Unicode attributes, the server truncates strings to a size limit. For binary properties, the server drops the entire property when it exceeds the size limit. For multi-valued properties, the server drops individual values for both string and binary properties when the combined size of all the values exceeds a size limit. For PtypObject properties, the server always drops this value and does not store it in the OAB. The property is included in the PidTagOfflineAddressBookTruncatedProperties whenever there is a value available online. For such PtypObject properties, the presenceBitArray specified in section 2.9.5 is always 0 for this property, to indicate that its value is not present in the OAB.

The following table defines the default minimum and maximum values of limit settings for String and Binary data types for files generated by the server. The minimum limit value is the smallest value that a limit can be set to, rather than the smallest size that an actual value can be. The maximum limit value is the largest value that a size limit can be set to, and does reflect the largest size a property can be.

Data Type	Type	Minimum Limit Value (in bytes)	Maximum Limit Value (in bytes)
String limit	DWORD	32	3400

Data Type	Type	Minimum Limit Value (in bytes)	Maximum Limit Value (in bytes)
Binary limit	DWORD	1024	32768
String multivalued limit	DWORD	512	65536
Binary multivalued limit	DWORD	2048	65536

Two properties are exempt from truncation: PidTagEmailAddress (X500 DN) and PidTagAddressBookHomeMessageDatabase [home-**message database (MDB)**]. These two properties are not limited because they are primary key values that uniquely identify an object.

1.4 Relationship to Protocols and Other Structures

Distributing online address books (OABs) requires a means of distributing the files to clients by using either **public folders** or a Web-based distribution method, as described in [MS-OXPFOAB] and [MS-OXWOAB] respectively.

In order to minimize communication costs, the data in the OAB is compressed, as described in [MS-PATCH] and [MS-MCI].

After the data is available to the client, a way of displaying the data is required. The client is **free** to choose its own method or the server's format can be used, as described in [MS-OXOABKT].

The method of naming properties in the OAB is based on the property tag naming convention, as described in [MS-OXPROPS] section 1.3.3.

1.5 Applicability Statement

The OAB structures are used to download information about the address book objects for use when working offline or in cached mode.

1.6 Versioning and Localization

None.

1.7 Vendor-Extensible Fields

The OAB version 2, version 3 and version 4 structures make use of property tags, but OAB version 4 has an extensible schema. New properties can be added to OAB version 4 by a vendor by assigning property tags to **Active Directory** directory service properties, as described in [MS-ADTS] section 3.1.1.2.3.

2 Structures

All integer fields in the OAB structures are unsigned and use little-endian byte order.

All CRC hash values are calculated using the IEEE 802.3 CRC polynomial of 0xEDB88320 (x32 + x26 + x23 + x22 + x16 + x12 + x11 + x10 + x8 + x7 + x5 + x4 + x2 + x + 1) and are seeded with the value 0xFFFFFFFF. For more details, see [ISO/IEC 8802-3] section 3.2.8.

All structures are packed on single byte boundaries.

All offsets are measured in bytes from the beginning of the specified file.

2.1 X500 Distinguished Name

X500 DNs are used to uniquely identify address book objects in the OAB. Each address book object MUST have a unique X500 DN value. The X500 DN is stored in the PidTagEmailAddress property, as specified in [MS-OXOABK] section 2.2.3.14. X500 DNs are structured as the following **ABNF** [RFC4234] definition illustrates.

```
x500-dn    =    org org-unit 0*13(container) object-rdn
                              ; x500-dns are limited to 16 levels
template-x500-dn = org [org-unit] 0*13(container) object-rdn
org                       =    "/o=" rdn
org-unit                  =   "/ou=" rdn
container                 =    "/cn=" rdn
object-rdn                =    "/cn=" rdn
rdn                       =    ( non-space-teletex ) /
                          ( non-space-teletex *62(teletex-char)
                            non-space-teletex )
                          ; rdn values are limited to 64 characters
                          ; the number of rdns is limited to 16 but the
                          ; total cumulative length of rdn characters in
                          ; an x500-dn is limited to 256.

teletex-char              =    SP / non-space-teletex
non-space-teletex         = "!" / DQUOTE / "%" / "&" / "\" / "(" / ")" /
                          "*" / "+" / "," / "-" / "." / "0" / "1" /
                          "2" / "3" / "4" / "5" / "6" / "7" / "8" /
                          "9" / ":" / "<" / "=" / ">" / "?" / "@" /
                          "A" / "B" / "C" / "D" / "E" / "F" / "G" /
                          "H" / "I" / "J" / "K" / "L" / "M" / "N" /
                          "O" / "P" / "Q" / "R" / "S" / "T" / "U" /
                          "V" / "W" / "X" / "Y" / "Z" / "[" / "]" /
                          "_" / "a" / "b" / "c" / "d" / "e" / "f" /
                          "g" / "h" / "i" / "j" / "k" / "l" / "m" /
                          "n" / "o" / "p" / "q" / "r" / "s" / "t" /
                          "u" / "v" / "w" / "x" / "y" / "z" / "|"
addresslist-x500-dn    =   "/guid=" 32(HEXDIG) / "/" / x500-dn
```

2.2 Uncompressed OAB Display Template File

The display template file describes how to display address book objects and e-mail addresses to the client. The display template file is a package that wraps display template and **address creation template** data structures. For more details, see [MS-OXOABKT]. The following ABNF definition shows the format of an uncompressed display template file.

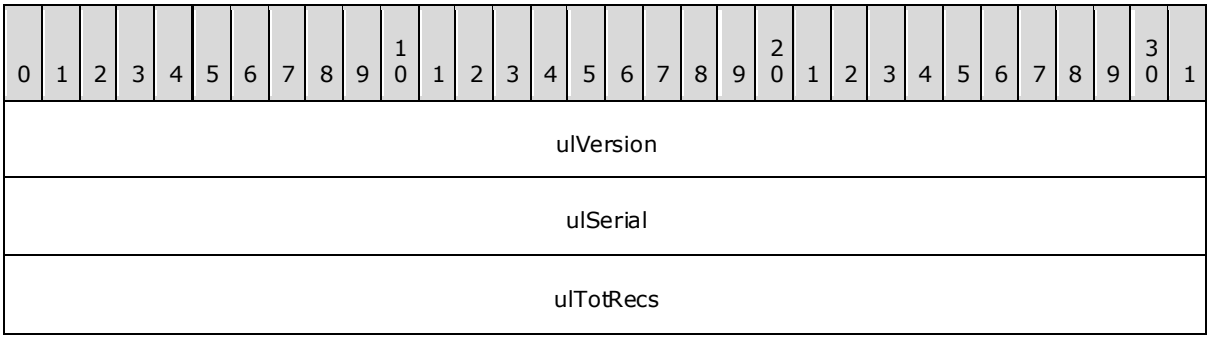
```
template-file       =    OAB_HDR mail-user-template
                         distribution-list-template
                         forum-template agent-template
                         organization-template
                         private-distributionlist-template
                         remote-mailuser-template
                         NAMES_STRUCT
                         address-templates data
mail-user-template  =    TMPLT_ENTRY
                         ; display template for mailboxes
distribution-list-template = TMPLT_ENTRY
                         ; display template for distribution lists
forum-template      =     TMPLT_ENTRY
                         ; display template for public folders
agent-template      =    TMPLT_ENTRY
                         ; display template for mail agents
organization-template =   TMPLT_ENTRY
                         ; SHOULD be set to all zeros.
private-distributionlist-template = TMPLT_ENTRY
                         ; SHOULD be set to all zeros.
remote-mailuser-template = TMPLT_ENTRY
                         ; display template for external email
                         ; addresses
address-templates    =   oot-count *(address-creation-template)
oot-count            =   %x00000000-%xFFFFFFFF
                         ; 32 bits of data
address-creation-template   =   TMPLT_ENTRY
                         ; an address creation display template
                         ; The x500 DN MUST end in the value
                         ; /CN=XXXX where XXXX is the mail-type
                         ; e.g.: SMTP, X400, or MSMAIL

data                     =   *(OCTET)
                         ; unstructured data section
```

All the following fields that start with an 'o' indicate an offset from the beginning of the file into the unstructured data section.

2.2.1 OAB_HDR

The **OAB_HDR** structure is used to determine the OAB file format version.



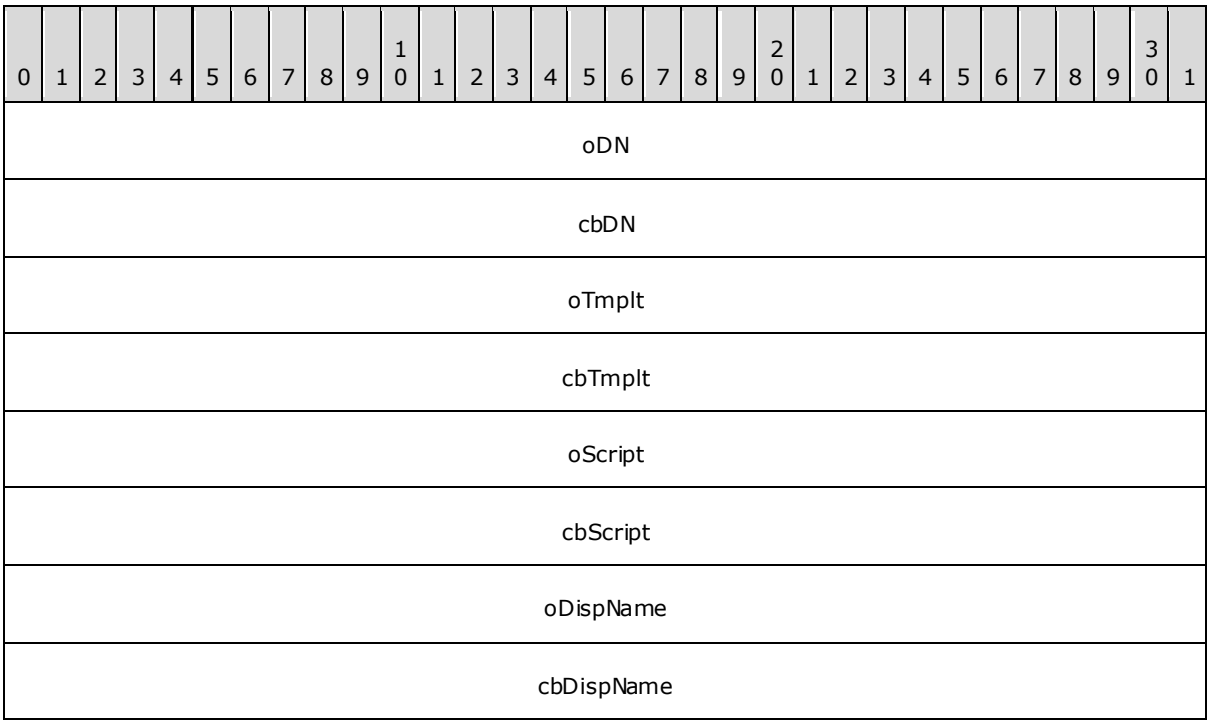
ulVersion (4 bytes): MUST be set to 0x00000007 for uncompressed display template files.

ulSerial (4 bytes): MAY be set to 0 and MUST be ignored by clients.

ulTotRecs (4 bytes): SHOULD be set to 0. Other values MUST be ignored.

2.2.2 TMPLT_ENTRY

The **TMPLT_ENTRY** structure is used to encode properties of an individual display template.



oDN (4 bytes): Absolute offset in the display template file to the template-X500-DN of the template. A value of 0x00000000 indicates that the data is not included in the file at the offset location and the value MUST be ignored.

cbDN (4 bytes): Length of the template-X500-DN value in bytes including the null terminator.

oTmplt (4 bytes): Absolute offset in the display template file to the template structure data. For more details, see [MS-OXOABKT]. A value of 0x00000000 indicates that the data is not included in the file at the offset location and the value MUST be ignored.

cbTmplt (4 bytes): Length of the template structure data, in bytes, which includes the template table, plus any stored strings.

oScript (4 bytes): Absolute offset in the display template file of the Script file for the template. For more details, see [MS-OXOABKT] section 2.2.2.2. A value of 0x00000000 indicates that the data is not included in the file at the offset location and the value MUST be ignored.

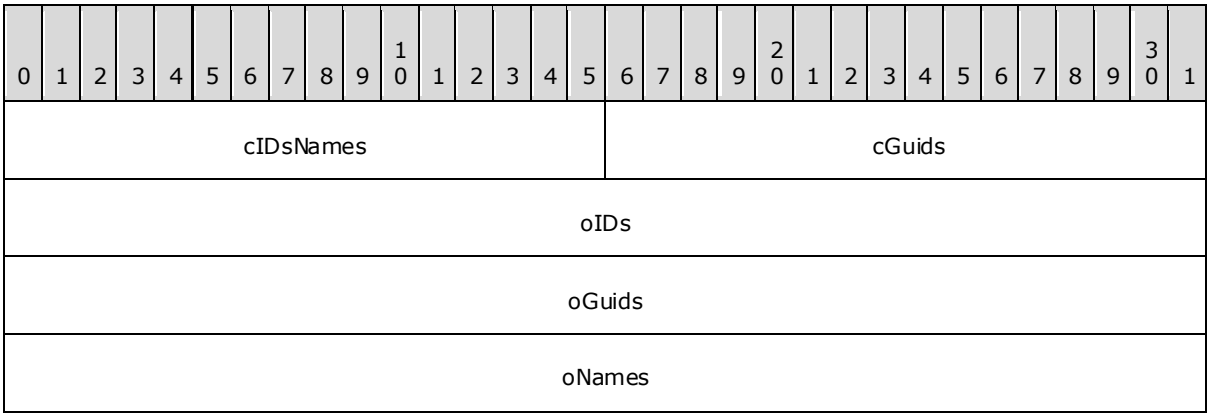
cbScript (4 bytes): Length of the Script file data in bytes.

oDispName (4 bytes): Absolute offset in the display template file to the display name for the template. A null terminated **ANSI** string. A value of 0x00000000 indicates that the data is not included in the file at the offset location and the value MUST be ignored.

cbDispName (4 bytes): Length of the display name in bytes including null terminator.

2.2.3 NAMES_STRUCT

The **NAMES_STRUCT** structure is used to map GUIDs to and from property tags.



cIDsNames (2 bytes): Count of **property IDs** and **named properties**.

cGuids (2 bytes): Count of GUIDs.

oIDs (4 bytes): Absolute offset in the display template file to the ID table. Each ID is a 4 byte integer that represents a property tag, as specified in [MS-OXCDATA] section 2.10. A value of 0x00000000 indicates that the data is not included in the file at the offset location and the value MUST be ignored.

oGuids (4 bytes): Absolute offset in the display template file to the GUID table. Each GUID is stored in binary format in 16 bytes, as specified in [MS-DTYP] section 2.3.2.1. A value of 0x00000000 indicates that the data is not included in the file at the offset location and the value MUST be ignored.

oNames (4 bytes): Absolute offset in the display template file to the PropertyName_r structure table, as specified in [MS-OXCDATA] section 2.6.2. A value of 0x00000000 indicates that the data is not included in the file at the offset location and the value MUST be ignored.

2.3 Uncompressed OAB Version 2 and OAB Version 3 Browse file

OAB version 2 and version 3 are similar. Clients can use OAB version 2 in ANSI mode or non-Unicode mode. OAB version 3 added support for Unicode characters and additional properties to recipient record data. If the client supports Unicode, the Unicode files of OAB version 3 SHOULD be used.

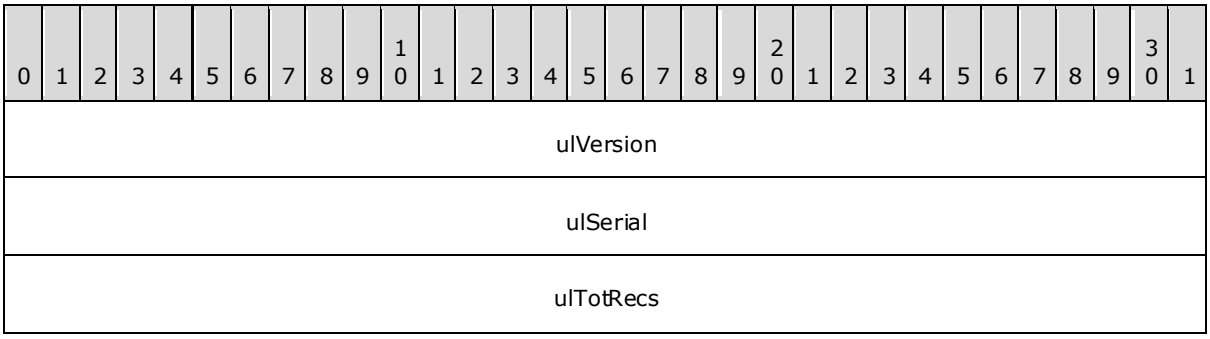
The following ABNF definition shows the format of an uncompressed OAB version 2 or OAB version 3 Browse file.

```
browse-file       =    OAB_HDR 1*16777213(B2_REC)
display-type      =    DT-MAILUSER / DT-DISTLIST /
                       DT-FORUM / DT-AGENT / DT-ORGANIZATION /
                       DT-REMOTE-MAILUSER
                       ; 8 bit value
DT-MAILUSER       =    %x00
                       ; mailbox display type
```

```
DT-DISTLIST         =    %x01
                         ; distribution list display type
DT-FORUM            =    %x02
                         ; public folder display type
DT-AGENT            =    %x03
                         ; mail agent display type
DT-ORGANIZATION     =    %x04
                         ; department or organization display type
DT-REMOTE-MAILUSER  =    %x06
                         ; external e-mail address display type
object-type         =    MAPI-FOLDER / MAPI-MAILUSER /
                         MAPI-DISTLIST
                         ; 8 bit value - high order bit is set to
                         ; 1 if the entry can receive all
                         ; message content, including Rich Text
                         ; Format (RTF) and OLE objects
MAPI-FOLDER         =    %x03
MAPI-MAILUSER       =    %x06
MAPI-DISTLIST       =    %x08
```

2.3.1 OAB_HDR

The **OAB_HDR** structure is used to determine the OAB file format version and the number of address book object records in the address list, and it contains a hash value for consistency checks.



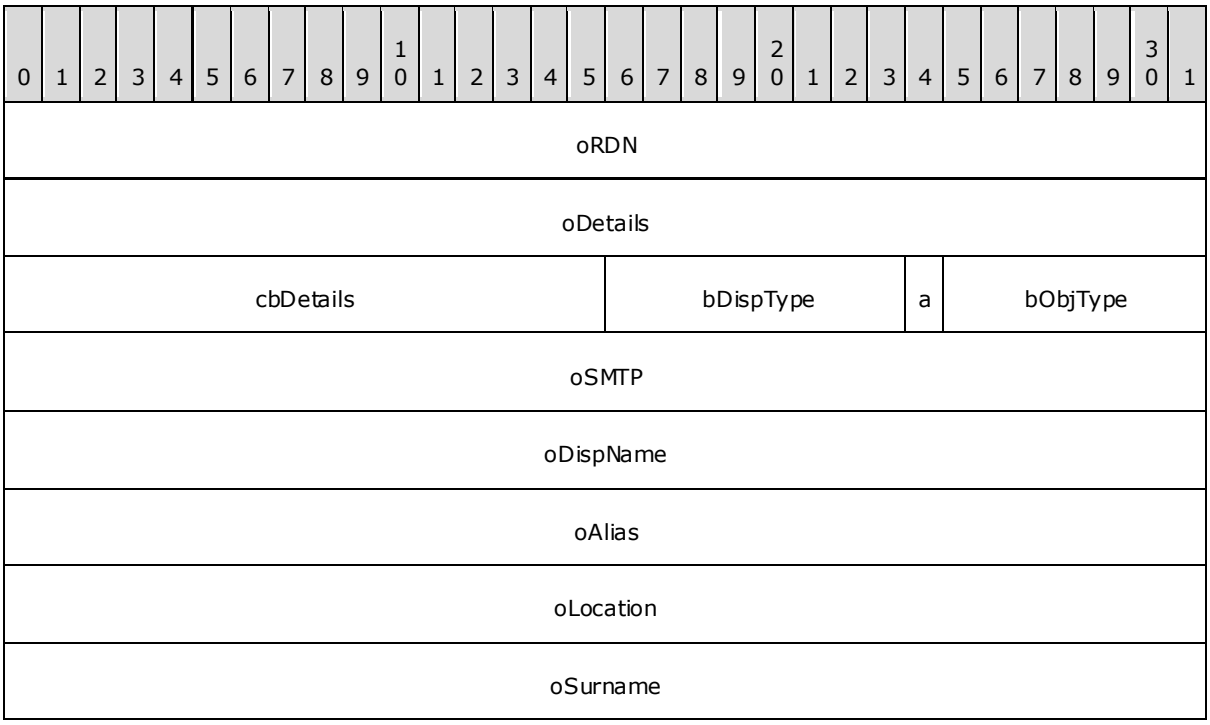
ulVersion (4 bytes): MUST be set to 0x0000000A for uncompressed version 2 OAB Browse files. MUST be set to 0x0000000E for uncompressed version 3 OAB Browse files.

ulSerial (4 bytes): A hash of the RDN records for the current set of files.

ulTotRecs (4 bytes): The number of **B2_REC** records stored in the Browse file. MUST be 1 or larger and MUST be less than 16,777,213.

2.3.2 B2_REC

The **B2_REC** structure is used to encode an address book object in the Browse file. The address book objects are sorted in the Browse file by alphabetical display name order. The **locale** that is used by the server to sort the files SHOULD be stored on the public folder **message** that contains the files. The client SHOULD use the stored locale for string comparison when searching the files. For more details, see [MS-OXPFOAB] section 2.2.1.5.



oRDN (4 bytes): Offset of the RDN record in the RDN Index file.

oDetails (4 bytes): Offset of the details record in the Details file.

cbDetails (2 bytes): Size of the details record in the Details file.

bDispType (1 byte): Display type of the address book object. MUST be set to one of the values in the following table.

Value	Meaning
0x00	DT_MAILUSER
0x01	DT_DISTLIST
0x02	DT_FORUM
0x03	DT_AGENT
0x06	DT_REMOTE_MAILUSER

a (1 bit): SHOULD be set to 1 if the address book object can receive all message content, including **Rich Text Format (RTF)** and Object Linking and Embedding (OLE) objects. SHOULD be set to 0 if the address book object cannot receive all message content. For more details, see [MS-OXOABK] section 2.2.3.18.

bObjType (7 bits): Object type of the address book object. MUST be set to one of the values in the following table.

Value	Meaning
0x03	MAPI-FOLDER
0x06	MAPI-MAILUSER
0x08	MAPI-DISTLIST

oSMTP (4 bytes): Offset of the SMTP address record in the RDN Index file.

oDispName (4 bytes): Offset of the display name record in the ANR Index file.

oAlias (4 bytes): Offset of the alias record in the ANR Index file.

oLocation (4 bytes): Offset of the office location record in the ANR Index file.

oSurname (4 bytes): Offset of the surname record in the ANR Index file.

2.3.3 RDN Hash Computation

The RDN hash value stored in the **OAB_HDR** record of the Browse file is calculated by seeding a 4 byte integer with 0x00000000 and updated by combining the current value with a hash value of the RDN property for each record in the OAB in Browse file order.

The hash value for each RDN value is computed from the RDN value by padding the end of the null terminated string with extra nulls to align it to a 4 byte boundary. Then all the 4 byte blocks are XOR together along with the input seed. Each block is treated as a little-endian integer value. Finally the value is shifted to the left by one bit with the highest order bit being rotated into the lowest order bit.

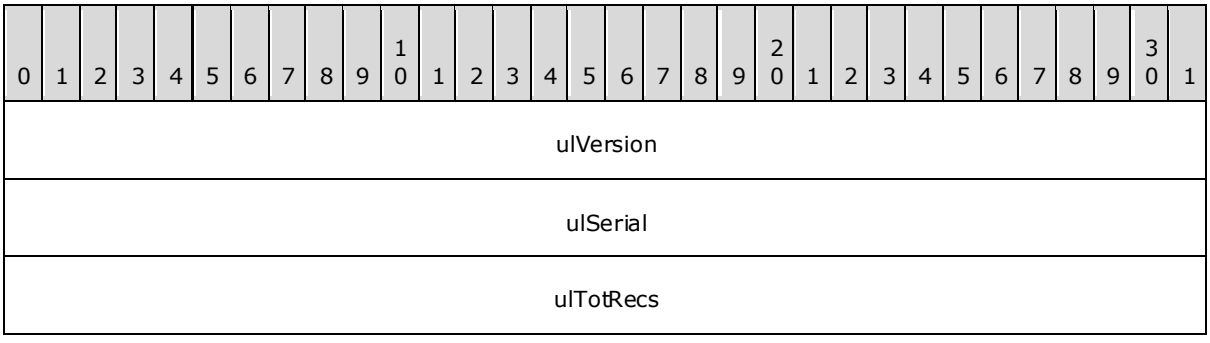
2.4 Uncompressed OAB Version 2 and OAB Version 3 RDN Index File

The following ABNF definition illustrates an uncompressed OAB version 2 or OAB version 3 RDN Index file.

```
rdn-file       =    RDN_HDR 1*pdn-record 1*RDN2_REC
pdn-record     =   1*(CHAR) %x00
```

2.4.1 RDN_HDR

The **RDN_HDR** structure is used to determine the OAB file format version and the number of RDN records in the RDN Index file, and it contains a hash value for consistency checks.



oRoot

ulVersion (4 bytes): MUST be set to 0x0000000A for uncompressed version 2 RDN Index files. MUST be set to 0x0000000E for uncompressed version 3 RDN Index files.<2>

ulSerial (4 bytes): The CRC hash of the rest of the file not including this header structure.

ulTotRecs (4 bytes): The number of **RDN2_REC** records stored in the RDN Index file.

oRoot (4 bytes): The offset of the root **RDN2_REC** node of the RDN index tree. This record MUST be after the last **pdn-record** in the file. When parsing pdn-records, use this value to stop parsing pdn-records and start parsing RDN records.

2.4.2 RDN2_REC

Each **RDN2_REC** structure corresponds to a node in the RDN index tree. The tree is constructed as a threaded tree so that searches and moving to the next and previous records are efficient.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
oLT																															
oGT																															
iBrowse																															
oPrev																															
oNext																															
oParentDN																															
acKey (variable)																															
...																															

oLT (4 bytes): Offset of the left **RDN2_REC** child of the current node in the RDN Index file. The left child MUST sort to the same value as the current node or less. MUST be set to 0x00000000 to indicate that there is no left child node.

oGT (4 bytes): Offset of the right **RDN2_REC** child of the current node in the RDN Index file. The right child MUST sort to the same value as the current node or greater. MUST be set to 0x00000000 to indicate that there is no right child node.

iBrowse (4 bytes): Index to the **B2_REC** in the browse file that references this record. The values 0x00000000 through 0x00000002 are reserved and MUST NOT be used. The index value in the Browse file is computed by using the following equation: iBrowse – 0x00000003.

oPrev (4 bytes): Offset of the previous **RDN2_REC** record in the RDN Index file when sorted as a flat list. MUST be set to 0x00000000 to indicate that this is the first node in the list.

oNext (4 bytes): Offset of the next **RDN2_REC** record in the RDN Index file when sorted as a flat list. MUST be set to 0x00000000 to indicate that this is the last node in the list.

oParentDN (4 bytes): Offset of the null-terminated ANSI **pdn-record** string in the RDN Index file. MUST NOT be set to 0x00000000.

acKey (variable): The null-terminated ANSI string value of the record, as specified by RDN in section 2.1, or the local portion of the SMTP address. It MUST be 64 characters or fewer, plus the null terminator.

For RDN records, "/CN=" MUST be removed from the final RDN before storing in the RDN Index file. The **oParentDN** points at the parent X500 DN; therefore, the actual value is computed by prepending the **acKey** value with "/CN=" then appending that result onto the end of the **parent** DN value.

For SMTP records, the SMTP address is split after '@' and the local-part of the SMTP address including the '@' is stored in the **acKey** field. The domain name part of the SMTP address is pointed to by the **oParentDN** offset.

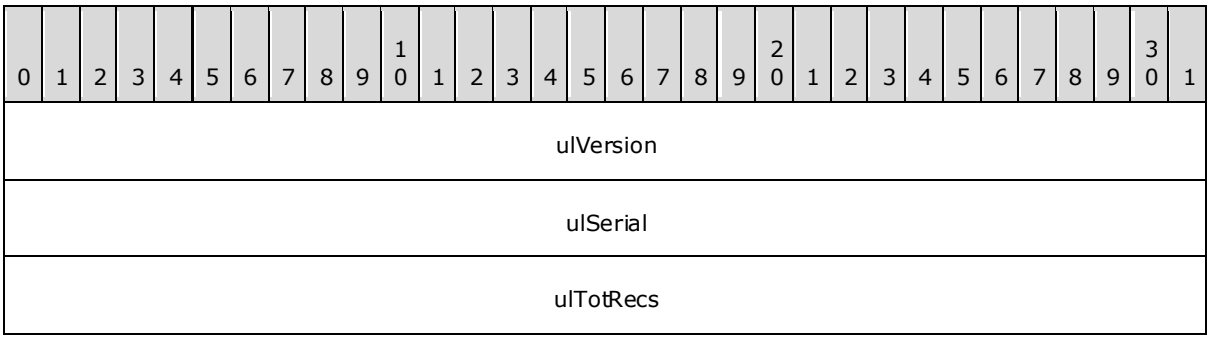
2.5 Uncompressed OAB Version 2 and OAB Version 3 ANR Index File

The following ABNF definition shows the format of an uncompressed OAB version 2 or OAB version 3 ANR Index file.

```
anr-file        =    OAB_HDR 1*ANR_REC
```

2.5.1 OAB_HDR

The **OAB_HDR** structure is used to determine the OAB file format version and the number of ANR records in the ANR Index file, and it contains a hash value for consistency checks.



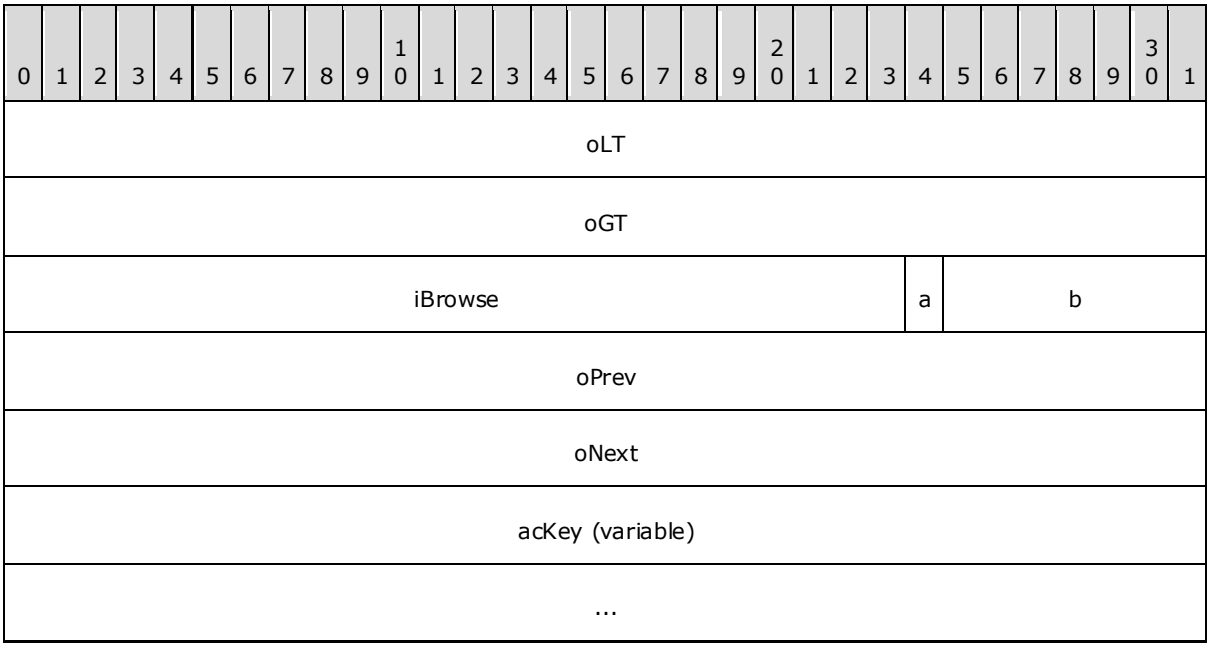
ulVersion (4 bytes): MUST be set to 0x0000000A for uncompressed OAB version 2 ANR Index files. MUST be set to 0x0000000E for uncompressed OAB version 3 ANR Index files.

ulSerial (4 bytes): The CRC hash of the rest of the file not including this header structure.

ulTotRecs (4 bytes): The number of **ANR_REC** records stored in the ANR Index file.

2.5.2 ANR_REC

Each **ANR_REC** structure corresponds to a node in the ANR index tree. The tree is constructed as a threaded tree so that searches are efficient, and traversing to the next and previous records is also efficient. The root of the tree MUST be the first **ANR_REC** in the ANR Index file.



oLT (4 bytes): Offset of the left **ANR_REC** child of the current node in the ANR Index file. The left child MUST sort to the same value as the current node or less. MUST be set to 0x00000000 to indicate that there is no left child node.

oGT (4 bytes): Offset of the right **ANR_REC** child of the current node in the ANR Index file. The right child MUST sort to the same value as the current node or greater. MUST be set to 0x00000000 to indicate that there is no right child node.

iBrowse (3 bytes): Index to the B2_REC in the Browse file that references this record. The values 0x000000 through 0x000002 are reserved and MUST NOT be used. The index value in the browse file is computed by using the following equation: iBrowse – 0x000003.

a (1 bit): MUST be set to 1 for e-mail alias records. MUST be set to 0 for display name, office location, and surname records.

b (7 bits): MUST be all zeros.

oPrev (4 bytes): Offset of the previous **ANR_REC** record in the ANR Index file when sorted as a flat list. MUST be set to 0x00000000 when this is the first node in the list.

oNext (4 bytes): Offset of the next **ANR_REC** record in the ANR Index file when sorted as a flat list. MUST be set to 0x00000000 when this is the last node in the list.

acKey (variable): The null-terminated ANSI string value of the record for OAB Version 2 ANR Index files. The null-terminated UTF8 string value of the record for OAB Version 3 ANR Index files. It MUST be 64 characters or fewer including the null terminator.

2.6 Uncompressed OAB Version 2 and OAB Version 3 Details File

The following ABNF definition shows the format of an uncompressed OAB version 2 and OAB version 3 Details file.

```
v2-details-file       =         OAB_HDR 1*details-record
details-record        =         user-certificate business-telephone
                                given-name initials street-address
                                city-locality state-province postal-code
                                country-region title company-name
                                assistant-name
                                department-name null home-telephone
                                business2-telephone home2-telephone
                                primary-fax mobile-telephone
                                assistant-telephone pager-telephone
                                comment proxy-addresses smime-certs
                                x509-certs
v3-details-file       =         OAB_HDR 1*v3-details-record
v3-details-record     =         user-certificate business-telephone
                                given-name initials street-address
                                city-locality state-province postal-code
                                country-region title company-name
                                assistant-name
                                department-name target-address
                                home-telephone
                                business2-telephone-mv home2-telephone-mv
                                primary-fax mobile-telephone
                                assistant-telephone pager-telephone
                                comment proxy-addresses smime-certs
                                x509-certs home-mdb manager
                                display-name-printable

user-certificate       =       binary-value
business-telephone     =       string-value
given-name             =       string-value
initials               =       string-value
street-address         =       string-value
city-locality          =       string-value
state-province         =       string-value
postal-code            =       string-value
country-region         =       string-value
title                  =       string-value
company-name           =       string-value
assistant-name         =       string-value
department-name        =       string-value
home-telephone         =       string-value
business2-telephone    =       string-value
home2-telephone        =       string-value
business2-telephone-mv =       multivalued-string
home2-telephone-mv     =       multivalued-string
primary-fax            =       string-value
mobile-telephone       =       string-value
assistant-telephone    =       string-value
pager-telephone        =       string-value
comment                =       string-value
proxy-addresses        =       multivalued-string
smime-certs            =       multivalued-binary
x509-certs             =       multivalued-binary
```

```
target-address          =       string-value
home-mdb                =       x500-dn
manager                 =       x500-dn
display-name-printable  =       teletex-string
string-value            =       *(ansi-char) null / null
ansi-char               =       %x01-%xFF
                                ; 8 bits of data
teletex-string          =       *(teletex-char) null / null
null                    =       %x00
                                ; 8 bits of data
multivalued-string      =       count 0*255(string-value) / null
count                   =       %x00-%xFF
                                ; 8 bits of data
binary-value            =       byte-count 0*65535(OCTET) / null
byte-count              =       %x0000-%xFFFF
                                ; 16 bits of data
multivalued-binary      =       count 0*255(binary-value) / null
```

Each Details record MUST fit into 65535 bytes. If a value is not present, a null byte MUST be encoded. All strings MUST be null terminated. Multivalued-binary or multivalued-string encodings with one or more values MUST NOT have any zero length elements.

The details elements for OAB Version 2 details files map directly to the following property tag table. For details about the following properties, see [MS-OXOABK].

Property tag name	Property tag	Property type	Description
PidTagUserCertificate	0x3A220102	PtypBinary	The **user-certificate** property contains an ASN.1 authentication certificate for a messaging user. For more details, see [ISO/IEC 8825-1]. This property is deprecated and SHOULD be set to a null entry.
PidTagBusinessTelephoneNumber	0x3A08001E	PtypString8	The **business-telephone** property contains the primary telephone number of the place of business of the address book object.
PidTagGivenName	0x3A06001E	PtypString8	The **given-name** property contains the given name of the address book object.
PidTagInitials	0x3A0A001E	PtypString8	The **initials** property contains the initials for parts of the full name of the address book object.
PidTagStreetAddress	0x3A29001E	PtypString8	The **street-address** property contains the street address of the address book object.
PidTagLocality	0x3A27001E	PtypString8	The **city-locality** property contains the name of the locality of the address book object, such

Property tag name	Property tag	Property type	Description
			as the town or city.
PidTagStateOrProvince	0x3A28001E	PtypString8	The **state-province** property contains the name of the state or province where the address book object is located.
PidTagPostalCode	0x3A2A001E	PtypString8	The **postal-code** property contains the postal code of the address book object.
PidTagCountry	0x3A26001E	PtypString8	The **country-region** property contains the name of the country or region where the address book object is located.
PidTagTitle	0x3A17001E	PtypString8	The **title** property contains the job title of the address book object.
PidTagCompanyName	0x3A16001E	PtypString8	The **company-name** property contains the name of the company that employs the address book object.
PidTagAssistant	0x3A30001E	PtypString8	The **assistant-name** property contains the name of the administrative assistant for the address book object.
PidTagDepartmentName	0x3A18001E	PtypString8	The **department-name** property contains the department name in which the address book object works.
null	0x3A08001E	PtypString8	The server duplicates the PidTagBusinessTelephoneNumber property in this field. This property is used as a placeholder and the value MUST be ignored by the client.
PidTagHomeTelephoneNumber	0x3A09001E	PtypString8	The **home-telephone** property contains the primary home telephone number for the address book object.
PidTagBusiness2TelephoneNumber	0x3A1B001E	PtypString8	The **business2-telephone** property contains a secondary business telephone number for the address book object.
PidTagHome2TelephoneNumber	0x3A2F001E	PtypString8	The **home2-telephone** property contains a secondary home telephone number for the address book object.

Property tag name	Property tag	Property type	Description
PidTagPrimaryFaxNumber	0x3A23001E	PtypString8	The **primary-fax** property contains the telephone number for the fax machine of the address book object.
PidTagMobileTelephoneNumber	0x3A1C001E	PtypString8	The **mobile-telephone** property contains the mobile telephone number of the address book object.
PidTagAssistantTelephoneNumber	0x3A2E001E	PtypString8	The **assistant-telephone** property contains the telephone number for the administrative assistant of the address book object.
PidTagPagerTelephoneNumber	0x3A21001E	PtypString8	The **pager-telephone** property contains the pager telephone number of the address book object.
PidTagComment	0x3004001E	PtypString8	The **comment** property contains a description of the purpose or content of an object.
PidTagAddressBookProxyAddresses	0x800F101E	PtypMultipleString8	The **proxy-addresses** property contains a list of e-mail addresses that this address book object is known by. Each value MUST begin with an e-mail **address type** followed by a colon character then followed by the address value.
PidTagUserX509Certificate	0x3A701102	PtypMultipleBinary	The **smime-certs** property contains SMIME certificates formatted as PKCS-7 encodings. For more details, see [RFC2315].
PidTagAddressBookX509Certificate	0x8C6A1102	PtypMultipleBinary	The **X509-certs** property contains ASN.1 [ISO/IEC 8825-1] encoded X.509 certificates. For more details, see [RFC3280].

The details elements for OAB Version 3 details files map directly to the following property tag table. For details about the following properties, see [MS-OXOABK].

property tag name	Property tag	Property type	Description
PidTagUserCertificate	0x3A220102	PtypBinary	The **user-certificate** property contains an ASN.1 authentication certificate for a messaging user. For more details, see [ISO/IEC 8825-1]. This property is deprecated and

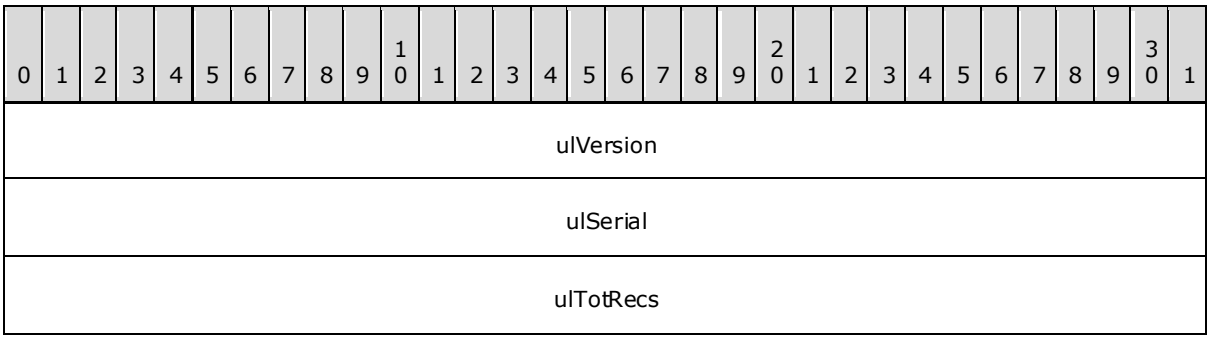
property tag name	Property tag	Property type	Description
			SHOULD be set to a null entry.
PidTagBusinessTelephoneNumber	0x3A0800 1F	PtypString	The **business-telephone** property contains the primary telephone number of the place of business of the address book object.
PidTagGivenName	0x3A0600 1F	PtypString	The **given-name** property contains the given name of the address book object.
PidTagInitials	0x3A0A00 1F	PtypString	The **initials** property contains the initials for parts of the full name of the address book object.
PidTagStreetAddress	0x3A2900 1F	PtypString	The **street-address** property contains the street address of the address book object.
PidTagLocality	0x3A2700 1F	PtypString	The **city-locality** property contains the name of the locality of the address book object, such as the town or city.
PidTagStateOrProvince	0x3A2800 1F	PtypString	The state**-province** property contains the name of the state or province where the address book object is located.
PidTagPostalCode	0x3A2A00 1F	PtypString	The **postal-code** property contains the postal code of the address book object.
PidTagCountry	0x3A2600 1F	PtypString	The **country-region** property contains the name of the country or region where the address book object is located.
PidTagTitle	0x3A1700 1F	PtypString	The **title** property contains the job title of the address book object.
PidTagCompanyName	0x3A1600 1F	PtypString	The **company-name** property contains the name of the company that employs the address book object.
PidTagAssistant	0x3A3000 1F	PtypString	The **assistant-name** property contains the name of the administrative assistant for the address book object.
PidTagDepartmentName	0x3A1800 1F	PtypString	The **department-name** property contains the department name in which the address book object works.
PidTagAddressBookTargetAddress	0x801100	PtypString	The

property tag name	Property tag	Property type	Description
	1F		PidTagAddressBookTargetAddress property contains the destination address for this object.
PidTagHomeTelephoneNumber	0x3A0900 1F	PtypString	The **home-telephone** property contains the primary home telephone number for the address book object.
PidTagBusiness2TelephoneNumbers	0x3A1B10 1F	PtypMultipleString	The **business2-telephone** property contains secondary business telephone numbers for the address book object.
PidTagHome2TelephoneNumbers	0x3A2F10 1F	PtypMultipleString	The **home2-telephone** property contains secondary home telephone numbers for the address book object.
PidTagPrimaryFaxNumber	0x3A2300 1F	PtypString	The **primary-fax** property contains the telephone number for the fax machine of the address book object.
PidTagMobileTelephoneNumber	0x3A1C00 1F	PtypString	The **mobile-telephone** property contains the mobile telephone number of the address book object.
PidTagAssistantTelephoneNumber	0x3A2E00 1F	PtypString	The **assistant-telephone** property contains the telephone number for the administrative assistant of the address book object.
PidTagPagerTelephoneNumber	0x3A2100 1F	PtypString	The **pager-telephone** property contains the pager telephone number of the address book object.
PidTagComment	0x300400 1F	PtypString	The **comment** property contains a description of the purpose or content of an object.
PidTagAddressBookProxyAddresses	0x800F10 1F	PtypMultipleString	The **proxy-addresses** property contains a list of e-mail addresses that this address book object is known by. Each value MUST begin with an e-mail address type followed by a colon character then followed by the address value.
PidTagUserX509Certificate	0x3A7011 02	PtypMultipleBinary	The **smime-certs** property contains SMIME certificates formatted as PKCS-7 encodings. For more details, see [RFC2315].
PidTagAddressBookX509Certificate	0x8C6A11 02	PtypMultipleBinary	The X509**-certs** property contains ASN.1 [ISO/IEC 8825-1] encoded X.509 certificates. For more details,

property tag name	Property tag	Property type	Description
			see [RFC3280].
PidTagAddressBookHomeMessageDatabase	0x8006001F	PtypString	The PidTagAddressBookHomeMessageDatabase property contains the DN of the MDB for this **mailbox**. This property value is not subject to truncation.
PidTagAddressBookManager	0x8005000D	PtypComObject	The PidTagAddressBookManager property contains the DN of the manager of the recipient. The user object for the manager contains a directReports property that contains references to all user objects that have their manager **property set** to this DN.
PidTagAddressBookDisplayNamePrintable	0x39FF001E	PtypString8	The PidTagAddressBookDisplayNamePrintable property contains the printable string version of the display name.

2.6.1 OAB_HDR

The **OAB_HDR** structure is used to determine the OAB file format version and it contains a hash value for consistency checks.



ulVersion (4 bytes): MUST be set to 0x00000007 for uncompressed version 2 and version 3 Details files.

ulSerial (4 bytes): The CRC hash of the rest of the file not including this header structure.

ulTotRecs (4 bytes): SHOULD be set to zero. Other values MUST be ignored.

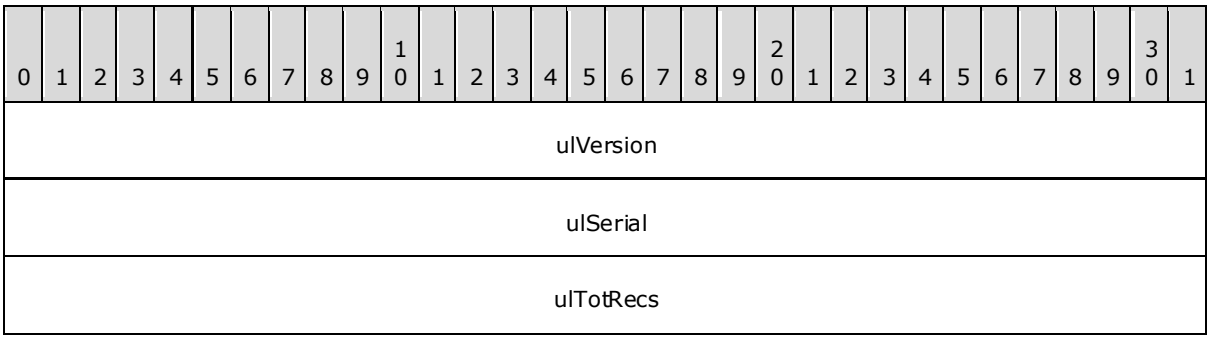
2.7 Uncompressed OAB Version 2 and OAB Version 3 Changes File

The following ABNF definition shows the format of an uncompressed OAB version 2 or OAB version 3 Changes file.

```
changes-file        =   OAB_HDR 1*change-record
change-record       =   CHG_REC [display-name parent-dn-offset rdn]
                        [domain-name-offset local-portion]
                        [alias] [location] [surname]
                        [details]
                        [display-type] [object-type]
display-name        =   string-value
parent-dn-offset    =   %x00000000-%xFFFFFFFF
                        ; little endian 32 bit value
                        ; offset of the pdn-record in the
                        ; rdn index file
domain-name-offset =    %x00000000-%xFFFFFFFF
                        ; little endian 32 bit value
                        ; offset of the domain name record in the
                        ; rdn index file
local-portion       =   1*62(ansi-char) '@' null
alias                       =   1*63(ansi-char) null
location            =   0*63(ansi-char) null
surname             =   0*63(ansi-char) null
details             =   byte-count 0*65535(OCTET)
display-type        =   DT-MAILUSER / DT-DISTLIST /
                        DT-FORUM / DT-AGENT / DT-ORGANIZATION /
                        DT-REMOTE-MAILUSER
                        ; 8 bit value
DT-MAILUSER         =   %x00
                        ; mailbox display type
DT-DISTLIST         =   %x01
                        ; distribution list display type
DT-FORUM            =   %x02
                        ; public folder display type
DT-AGENT            =   %x03
                        ; mail agent display type
DT-ORGANIZATION     =   %x04
                        ; department or organization display type
DT-REMOTE-MAILUSER  =   %x06
                        ; external e-mail address display type
object-type         =   MAPI-FOLDER / MAPI-MAILUSER /
                        MAPI-DISTLIST
                        ; 8 bit value - high order bit is set to
                        ; 1 if the entry can receive all
                        ; message content, including Rich Text
                        ; Format (RTF) and OLE objects
                        ; For details, see section 2.786
                        ; in [MS-OXPROPS]
MAPI-FOLDER         =   %x03
MAPI-MAILUSER       =   %x06
MAPI-DISTLIST       =   %x08
```

2.7.1 OAB_HDR

The **OAB_HDR** structure is used to determine the OAB file format version and the number of change records in the address list, and it contains a hash value for consistency checks.



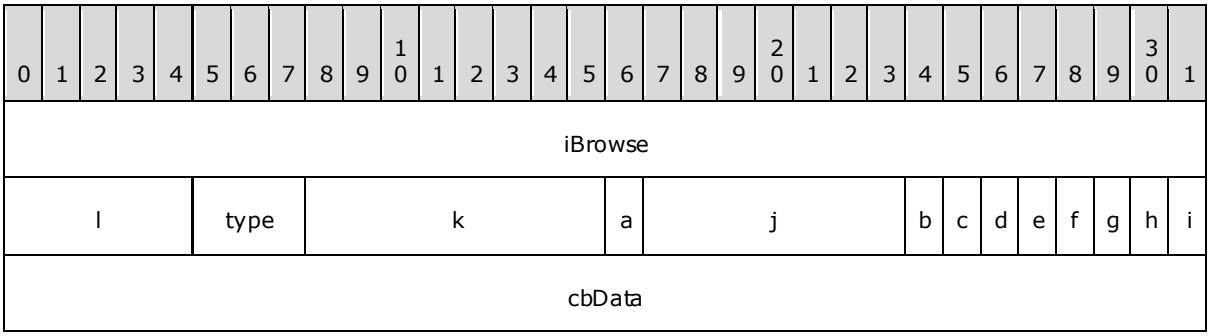
ulVersion (4 bytes): MUST be set to 0x0000000B for uncompressed version 2 Changes files. MUST be set to 0x0000000F for uncompressed version 3 Changes files.

ulSerial (4 bytes): MUST be set to the **ulSerial** value of the version 2 or version 3 OAB Browse file that these changes are to be applied against. The client MUST NOT apply a Changes file to a set of OAB files if the serial number does not match.

ulTotRecs (4 bytes): The count of the **change-record** structures in the Changes file.

2.7.2 CHG_REC

The **CHG_REC** structure is used to tell the client which record to update and what attributes are included in the change record.



iBrowse (4 bytes): The index of the record to be changed. The values 0x00000000 through 0x00000002 are reserved and MUST not be used. The index value in the browse file is computed by using the following equation: iBrowse – 0x00000003.

If the change type is an addition, the **iBrowse** points to the record in the old file that the new record MUST be inserted before. For example, if the record is to be inserted at the beginning of the file, the **iBrowse** value will be 0x00000003. If the record is to be appended at the end of the file, the **iBrowse** will be one plus the maximum **iBrowse** index in the old file. If the change type is a modification, the **iBrowse** points at the record in the old file that MUST be modified. If the change type is a deletion, the **iBrowse** points at the record in the old file that MUST be removed.

l (5 bits): MUST be set to 00000. Other values MUST be ignored.

type (3 bits): MUST be set to 000, 001, or 010. A value of 000 indicates a record modification, a value of 001 indicates a record addition, and a value of 010 indicates a record deletion.

- A value of 000 means that fields **a** through **i** are set according to the presence of the data fields in the change record, and that display-name, parent-DN-offset, and RDN MUST NOT be present in the change record.
- A value of 001 means that fields **a** through **k** MUST be to 0, even if the values are present in the change-record structure, and that display-name, parent-DN-offset, and RDN MUST be present in the change record. For addition records, even though values **a** through **k** are set to 0, they MUST be processed as if they are set to 1. If the corresponding value is not in the change-record, then a single space value is encoded when parsing the change-record.
- A value of 010 means that fields **a** through **j** MUST be 0.

k (1 byte): MUST be set to 0. Not currently used.

a (1 bit): 1 indicates that the **object-type** field MUST be present in the change-record. 0 indicates that it MUST NOT be present.

j (7 bits): MUST be set to all 0s. Not currently used.

b (1 bit): 1 indicates that the **local-portion** field MUST be present in the change-record. The value of this field MUST be the same as field **c**.

c (1 bit): 1 indicates that the **domain-name-offset** field MUST be present in the change-record. 0 indicates that it MUST NOT be present.

d (1 bit): 1 indicates that the **alias** field MUST be present in the change-record. 0 indicates that it MUST NOT be present.

e (1 bit): 1 indicates that the **location** field MUST be present in the change-record. 0 indicates that it MUST NOT be present.

f (1 bit): 1 indicates that the **surname** field MUST be present in the change-record. 0 indicates that it MUST NOT be present.

g (1 bit): 1 indicates that the **details** field MUST be present in the change-record. 0 indicates that it MUST NOT be present.

h (1 bit): 1 indicates that the **details** field MUST be present in the change-record and that it is larger than the old details record in the old Details file. 0 indicates that the size of the **details** field is equal to or smaller than the old record in the Details file. If field **g** is 0 then field **h** MUST be set to 0.

i (1 bit): 1 indicates that the **display-type** field MUST be present in the change-record. 0 indicates that it MUST NOT be present.

cbData (4 bytes): The length of the **change-record** structure in bytes. This count does not include the **CHG_REC** field.

2.7.3 Change-record

The following table describes the default fields populated in the OAB version 2 or OAB version 3 change-record.

Properties populated in the change-record for OAB version 2.

Index Number	Property tag name	Property type	Property size	Description
1	PidTagDisplayName	PtypString8	Variable	Contains the display name for a given Address Book object.
2	ParentDNOffset	PtypInteger32	4 bytes	Contains the offset to the PDN in the RDN file. This field is present only if the **type** field is set to 001.
3	RDNRecordKey	PtypString8	Variable	Uniquely identifies the RDN in the RDN file. This field is present only if the **type** field is set to 001. This is a null-terminated string. The maximum size of this field is 68 bytes.
4	ParentDNOffset ForSMTP	PtypInteger32	4 bytes	Contains the offset of the Parent DN SMTP address entry in the RDN index file. This field is present only if the type field is set to 000.
5	PidTagSmtpAddress	PtypString8	Variable	Contains the SMTP mailing address of the sender.
6	PidTagAccount	PtypString8	Variable	Contains the account name for the Address Book object.
7	PidTagOfficeLocation	PtypString8	Variable	Contains the office location of the Address Book object.
8	PidTagSurname	PtypString8	Variable	Contains the family name of the Address Book object.
9	DetailsRecordSize	PtypInteger16	2 bytes	Identifies the size of the modified user record, including the **DetailsRecordSize** and the null terminator. This field is present only if the **type** field is set to 000 or 001. The maximum size of this field is limited to 64 kilobytes (KB).
10	DetailsRecords	Details record	Variable	Contains the **address-book-object-record**. This field is present only if the **type** field is set to 000 or 001.
11	PidTagDisplayType	1 byte integer	1 byte	Contains a value that is used to associate an icon with a particular **row** of a table.
12	PidTagObjectType	1 byte integer	1 byte	Contains the type of an object. The object type corresponds to the primary interface that is available for an object that is available through the

Index Number	Property tag name	Property type	Property size	Description
				OpenEntry interface. Set to 00 00 00 03 for a **folder**, 00 00 00 06 for a **mail user**, and 00 00 00 08 for a **distribution list**.

Properties populated in the change-record for OAB version 3

Index Number	Property tag name	Property type	Property size	Description
1	PidTagDisplayName	PtypString8	Variable	Contains the display name for a given Address Book object encoded as UTF8.
2	ParentDNOffset	PtypInteger32	4 bytes	Contains the offset to the PDN in the RDN file. This field is present only if the **type** field is set to 001.
3	RDNRecordKey	PtypString8	Variable	Uniquely identifies the RDN in the RDN file. This field is present only if the type field is set to 001. This is a null-terminated string. The maximum size of this field is 68 bytes.
4	ParentDNOffset ForSMTP	PtypInteger32	4 bytes	Contains the offset of the Parent DN SMTP address entry in the RDN index file. This field is present only if the type field is set to 000.
5	PidTagSmtpAddress	PtypString8	Variable	Contains the SMTP mailing address of the sender encoded as UTF8.
6	PidTagAccount	PtypString8	Variable	Contains the account name for the Address Book object encoded as UTF8.
7	PidTagOfficeLocation	PtypString8	Variable	Contains the office location of the Address Book object encoded as UTF8.
8	PidTagSurname	PtypString8	Variable	Contains the family name of the Address Book object encoded as UTF8.
9	DetailsRecordSize	PtypInteger16	2 bytes	Identifies the size of the modified user record, including the **DetailsRecordSize** and the null terminator. This field is present only if the **type** field is set to 000 or 001.

Index Number	Property tag name	Property type	Property size	Description
				The maximum size of this field is limited to 64 kilobytes (KB).
10	DetailsRecords	Details record	Variable	Contains the **address-book-object-record**. This field is present only if the type field is set to 000 or 001.
11	PidTagDisplayType	1 byte integer	1 byte	Contains a value that is used to associate an icon with a particular row of a table.
12	PidTagObjectType	1 byte integer	1 byte	Contains the type of an object. The object type corresponds to the primary interface that is available for an object that is available through the OpenEntry interface. Set to 00 00 00 03 for a folder, 00 00 00 06 for a mail user, and 00 00 00 08 for a distribution list.

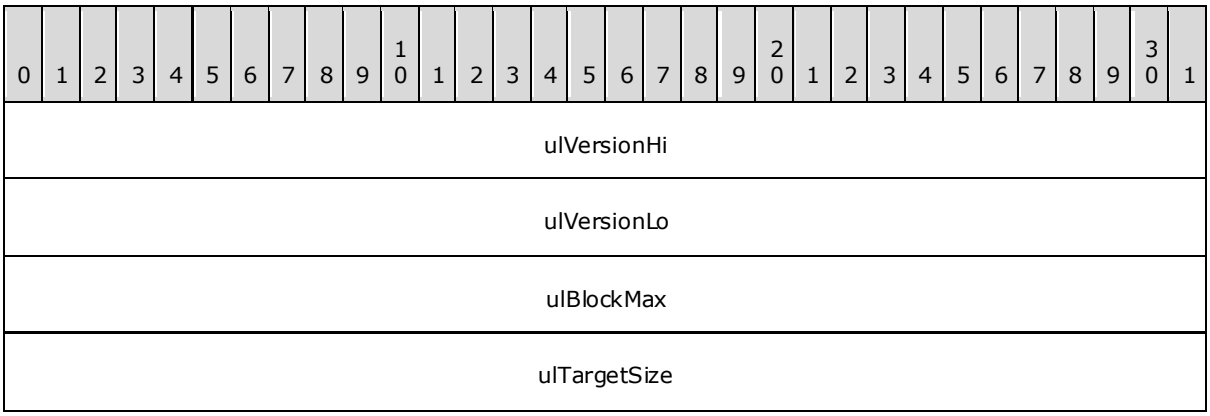
2.8 Compressed OAB Version 2 or OAB Version 3 File

A compressed OAB version 2 or OAB version 3 file is structured as the following ABNF definition illustrates.

```
v2-compressed-file       =    MDI_HDR 1*MDI_BLK
```

2.8.1 MDI_HDR

The **MDI_HDR** structure contains versioning information to indicate that it is an OAB version 2 or OAB version 3 compressed file. It contains the target file size value that SHOULD be used by the client to check that the final result is correct.



ulVersionHi (4 bytes): An integer value that MUST be set to 0x00000002.

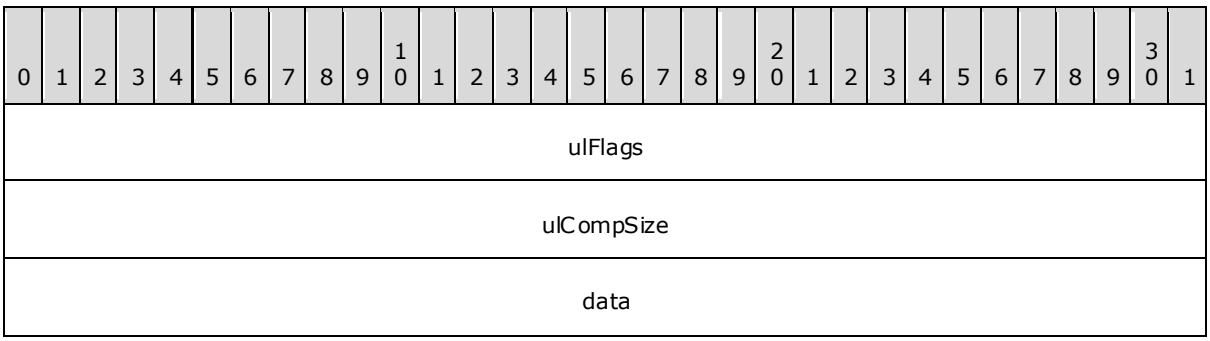
ulVersionLo (4 bytes): An integer value that MUST be set to 0x00000001.

ulBlockMax (4 bytes): An integer value that indicates, in bytes, the largest sized block read from the source compressed input file or written to the target output file. This field is present so that the client can pre-allocate required buffers. MUST be set to 0x00008000.

ulTargetSize (4 bytes): An integer value that specifies the expected length of the resulting output target file. This value SHOULD be used by the client to ensure that the target output file was generated correctly.

2.8.2 MDI_BLK

The **MDI_BLK** structure is used to split the decompression process into more easily handled smaller sized blocks.



ulFlags (4 bytes): An integer value that indicates whether the data field is compressed. MUST be either 0x00000000 to indicate the data field is not compressed and can be written out directly to the target file, or 0x00000001 to indicate the data field is compressed and ought to be decompressed using MCI decompression first.

ulCompSize (4 bytes): An integer value that specifies the size of the data field in bytes.**ulUncompSize (4 bytes):** An integer value that specifies the size in bytes of the output target block to be written to the output file.

data (4 bytes): Either a raw data stream or a compressed byte stream depending on the value of the **ulFlags** field. For more details, see [MS-MCI].

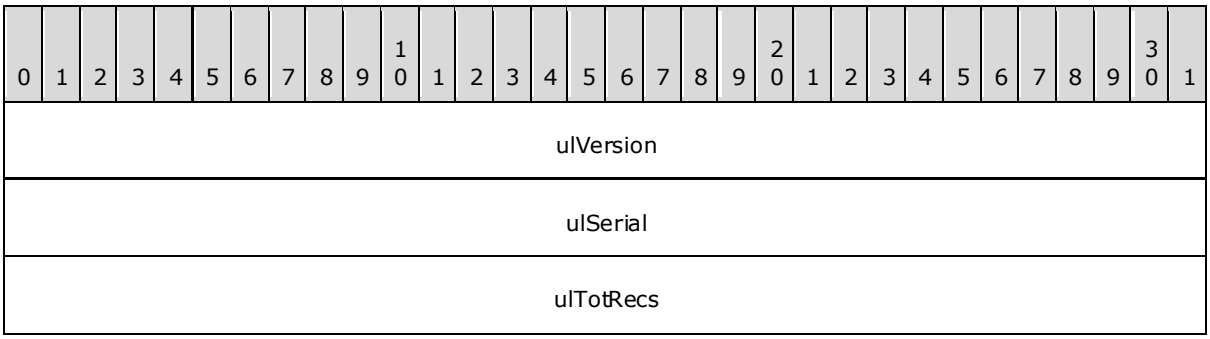
2.9 Uncompressed OAB Version 4 Full Details File

The following ABNF definition shows the format of an uncompressed OAB version 4 Details file.

```
v4-details-file             =     OAB_HDR OAB_META_DATA
                                  header-record
                                  1*address-book-object-record
header-record               =     OAB_V4_REC
address-book-object-record  =     OAB_V4_REC
```

2.9.1 OAB_HDR

The **OAB_HDR** structure is used to determine the OAB file format version and the number of address book object records in the address list, and it contains a hash value for consistency checks.



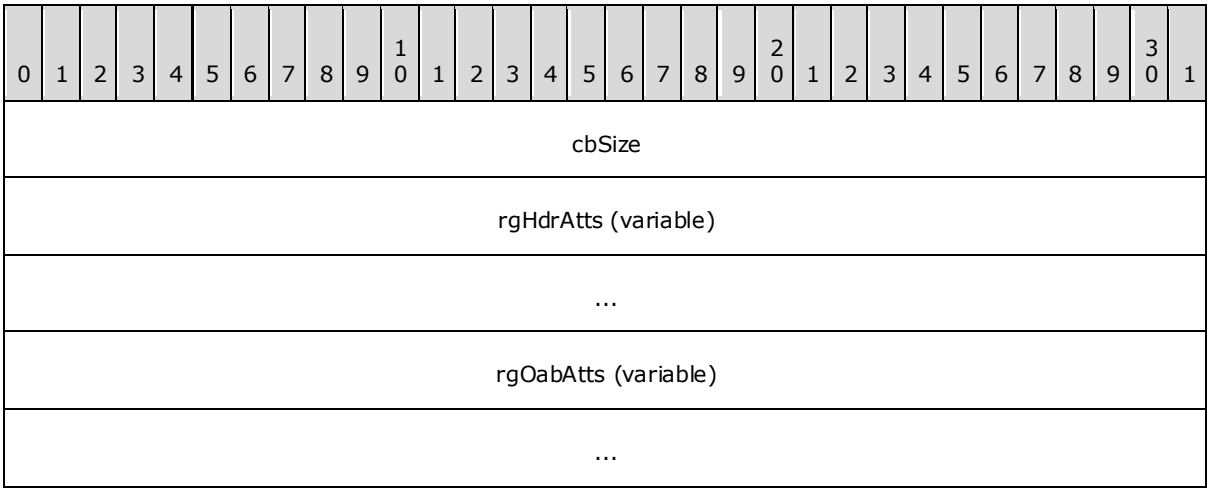
ulVersion (4 bytes): Set to 0x00000020 for uncompressed version 4 OAB Full Details files. Set to 0x00000007 for uncompressed display template files.

ulSerial (4 bytes): The CRC hash of the rest of the file not including this header structure. All CRC checksums are calculated with an initial seed of 0xFFFFFFFF and use the IEEE 802.3 [ISO/IEC 8802-3] CRC polynomial of 0xEDB88320.

ulTotRecs (4 bytes): The number of **address-book-object-records** stored in the file.

2.9.2 OAB_META_DATA

The **OAB_META_DATA** structure contains information about the schema of all properties that can be represented in an OAB header or address book object record.



cbSize (4 bytes): The length of the **OAB_META_DATA** structure in bytes. This count includes both the **cbSize** field and the combined length of the **rgHdrAtts** and **rgOabAtts** fields.

rgHdrAtts (variable): An **OAB_PROP_TABLE** structure that describes the properties that can be present in the header**-record**. MUST contain 4 or more header property records, as described in section 2.9.2.1.

rgOabAtts (variable): An **OAB_PROP_TABLE** structure that describes the properties that can be present in any **address-book-object-record**. MUST contain 5 or more address book object property records, as described in section 2.9.2.2.

2.9.2.1 rgHdrAtts

The **rgHdrAtts** table MUST have at least the four following attributes for compatibility with the client.

Index Number	Property tag name	Property tag	Property type	Description
1	PidTagOfflineAddressBookName	0x6800001F	PtypString	Display name of the address list. Can change between generation versions of the same address list.
2	PidTagOfflineAddressBookDistinguishedName	0x6804001E	PtypString8	The **AddressList**-X500-DN of the address list container object. Can change between generation versions of the same address list.
3	PidTagOfflineAddressBookSequence	0x68010003	PtypInteger32	The sequence number of the OAB. This number increases by one between generation versions of the same address list.
4	PidTagOfflineAddressBookContainerGuid	0x6802001E	PtypString8	A string formatted GUID that represents the address list container object. This value never changes between generation versions of the same address list. This value is be formatted as "xxxxxxxx-xxxx-xxxx-

Index Number	Property tag name	Property tag	Property type	Description
				xxxx-xxxxxxxxxxx".

The property in the following table is an optional property in the **rgHdrAtts** table. <3>

Property tag name	Property tag	Property type	Description
PidTagAddressBookHierarchicalRootDepartment	0x8C98001E	PtypString8	DN for the root **departmental group** in the department hierarchy for the organization. The DN can change between generation versions of the same address list.

2.9.2.2 rgOabAtts

The rgOabAtts table MUST be present on all Address Book object records, and MUST have at least the five following attributes:

- PidTagEmailAddress – this MUST be the first entry.
- PidTagSmtpAddress – this MUST be the second entry.
- PidTagDisplayName
- PidTagDisplayType
- PidTagObjectType

The following table describes the default attributes populated on Address Book object records by the server. The administrator can choose not to use the default list of attributes, and can add any additional attributes to the five required attributes. Each of the properties is further specified in [MS-OXOABK]. <4>

Index Number	Property tag name	Property tag	Property type	Description
1	PidTagEmailAddress	0x3003001E	PtypString8	Contains the X500 DN.
2	PidTagSmtpAddress	0x39fe001f	PtypString	Contains the SMTP mailing address of the sender.
3	PidTagDisplayName	0x3001001F or 0x3001001E	PtypString or PtypString8	Contains the display name for a given Address Book object.

Index Number	Property tag name	Property tag	Property type	Description
4	PidTagAddressBookPhoneticDisplayName	0x8C92001F	PtypString	Contains the phonetic display name of an object.
5	PidTagAccount	0x3A00001F	PtypString	Contains the account name for the Address Book object.
6	PidTagSurname	0x3A11001F	PtypString	Contains the family name of the Address Book object.
7	PidTagAddressBookPhoneticSurname	0x8C8F001F	PtypString	Contains the phonetic spelling of the surname.
8	PidTagGivenName	0x3A06001F	PtypString	Contains the given name of the Address Book object.
9	PidTagAddressBookPhoneticGivenName	0x8C8E001F	PtypString	Contains the phonetic given name of the Address Book object.
10	PidTagAddressBookProxyAddresses	0x800f101f	PtypMultipleString	Contains the e-mail proxy addresses of the Address Book object. For example, SMTP:Laura.Miller@example.com or X400:c=US;a=;p=example;o=example;s=Miller;g=Laura;.
11	PidTagOfficeLocation	0x3A19001F	PtypString	Contains the office location of the Address Book object.
12	PidTagDisplayType	0x39000003	PtypInteger32	Contains a value that is used to associate an icon with a particular row of a table.
13	PidTagObjectType	0x0FFE0003	PtypInteger32	Contains the type of an object. The object type corresponds to the primary interface that is available for an object that is available through the OpenEntry interface.
14	PidTagSendRichInfo	0x3A40000B	PtypBoolean	Contains TRUE if the entry can receive all message content, including RTF and OLE objects; otherwise, contains FALSE.
15	PidTagBusinessTelephoneNumber	0x3A08001F	PtypString	Contains the primary business telephone for the Address Book object.
16	PidTagInitials	0x3A0A001F	PtypString	Contains the initials for parts of the full name of the Address Book object.
17	PidTagStreetAddress	0x3A29	PtypString	Contains the street address of

Index Number	Property tag name	Property tag	Property type	Description
		001F		the Address Book object.
18	PidTagLocality	0x3A27 001F	PtypString	Contains the name of the locality of the Address Book object, such as the town or city.
19	PidTagStateOrProvince	0x3A28 001F	PtypString	Contains the name of the state or province in which the Address Book object is located.
20	PidTagPostalCode	0x3A2A 001F	PtypString	Contains the postal code for the postal address of the Address Book object.
21	PidTagCountry	0x3A26 001F	PtypString	Contains the name of the country or region where the Address Book object is located.
22	PidTagTitle	0x3A17 001F	PtypString	Contains the job title of the Address Book object.
23	PidTagCompanyName	0x3A16 001F	PtypString	Contains the name of the company associated with the Address Book object.
24	PidTagAddressBookPhoneticCompanyName	0x8C91 001F	PtypString	Contains the phonetic spelling of the company name of the Address Book object.
25	PidTagAssistant	0x3A30 001F	PtypString	Contains the name of the administrative assistant of the Address Book object.
26	PidTagDepartmentName	0x3A18 001F	PtypString	Contains the name of the department in which the Address Book object works.
27	PidTagAddressBookPhoneticDepartmentName	0x8C90 001F	PtypString	Contains the phonetic spelling of the name of the department in which the Address Book object works.
28	PidTagAddressBookTargetAddress	0x8011 001F	PtypString	Contains the destination address for the Address Book object.
29	PidTagHomeTelephoneNumber	0x3A09 001F	PtypString	Contains the primary home telephone number of the Address Book object.
30	PidTagBusiness2TelephoneNumber	0x3A1B 101F	PtypMultipleString	Contains the secondary business telephone numbers of the Address Book object.
31	PidTagHome2TelephoneNumber	0x3A2F	PtypMultipleS	Contains the secondary home

Index Number	Property tag name	Property tag	Property type	Description
		101F	tring	telephone numbers of the Address Book object.
32	PidTagPrimaryFaxNumber	0x3A23 001F	PtypString	Contains the telephone number of the primary fax machine used by the Address Book object.
33	PidTagMobileTelephoneNumber	0x3A1C 001F	PtypString	Contains the cellular telephone number of the Address Book object.
34	PidTagAssistantTelephoneNumber	0x3A2E 001F	PtypString	Contains the telephone number of the administrative assistant of the Address Book object.
35	PidTagPagerTelephoneNumber	0x3A21 001F	PtypString	Contains the pager telephone number of the Address Book object.
36	PidTagComment	0x3004 001F	PtypString	Contains a comment about the purpose or content of an Address Book object.
37	PidTagUserCertificate	0x3A22 0102	PtypBinary	Contains an ASN.1 authentication certificate for a messaging user.
38	PidTagUserX509Certificate	0x3A70 1102	PtypMultipleBinary	Contains X.509 version 3 security certificates for the Address Book object, as described in [RFC2459].
39	PidTagAddressBookX509Certificate	0x8C6A 1102	PtypMultipleBinary	Contains ASN.1 encoded X.509 certificates, as described in [RFC2459].
40	PidTagAddressBookHomeMessageDatabase	0x8006 001F	PtypString8	Contains the X500 DN of the message database (MDB) for this Mailbox. This property value is not subject to truncation.
41	PidTag7BitDisplayName	0x39FF0 01e	PtypString8	Contains the printable string version of the display name of the Address Book object.
42	PidTagDisplayTypeEx	0x3905 0003	PtypInteger32	Contains a value used to associate an icon with a particular row of a table.
43	PidTagAddressBookSeniorityIndex	0x8CA0 0003	PtypInteger32	Contains the seniority index for the user or department. The value is used to sort users or departments by order of seniority.

Index Number	Property tag name	Property tag	Property type	Description
44	PidTagAddressBookHierarchicalIsHierarchicalGroup	0x8CDD000B	PtypBoolean	Contains TRUE if the distribution list represents a departmental group; otherwise, contains FALSE.
45	PidTagAddressBookObjectGuid	0x8C6D0102	PtypBinary	Contains the GUID that uniquely identifies the address book object.
46	PidTagAddressBookSenderHintTranslations	0x8CAC101F	PtypMultipleString	Contains the locale ID and translations of the default **mail tip**. For example, "en-US:Hello" "es:Hola".
47	PidTagAddressBookDeliveryContentLength	0x806A0003	PtypInteger32	Specifies the maximum size of a message that a recipient can receive.
48	PidTagAddressBookModerationEnabled	0x8CB5000B	PtypBoolean	Contains TRUE if moderation is enabled for the mail user or distribution list; otherwise, contains FALSE.
49	PidTagAddressBookDistributionListMemberCount	0x8CE20003	PtypInteger32	Contains the total number of recipients in the distribution list. This value includes expanding all of the distribution lists that are members of the distribution list, and including their members in the total.
50	PidTagAddressBookDistributionListExternalMemberCount	0x8CE30003	PtypInteger32	Contains the number of external recipients in the distribution list.
51	PidTagAddressBookMember	0x8009101E	PtypEmbeddedTable, encoded as PtypMultipleString8 as specified in section 2.9.6.7.	Contains the members of the distribution list. If the distribution list is also a departmental group (as specified by the PidTagAddressBookHierarchicalIsHierarchicalGroup property), then the PidTagAddressBookMember property contains the members of the department and the child departmental groups in the hierarchy of departments.
52	PidTagAddressBookIsMemberOfDistributionList	0x8008101E	PtypEmbeddedTable, encoded as **PtypMultipleString8** as	Lists all of the distribution lists to which this object is a member.

Index Number	Property tag name	Property tag	Property type	Description
			specified in section 2.9.6.7.	
53	PidTagOfflineAddressBookTruncatedProperties	0x68051003	PtypMultipleInteger32	Contains a list of the property tags that have been truncated or limited by the server. If no properties have been removed or limited, the attribute will not be present. The only properties that cannot be truncated are PidTagOfflineAddressBookTruncatedProperties, PidTagEmailAddress, and PidTagAddressBookHomeMessageDatabase.

The following table specifies the default attributes included in the PidTagOfflineAddressBookTruncatedProperties property. Each property is further specified in [MS-OXOABK]. <5>

Index Number	Property tag name	Property tag	Property type	Description
1	PidTagThumbnailPhoto	0x8C9E0102	PtypBinary	Contains an image of the mail user's photo in **.jpg** format.
2	PidTagSpokenName	0x8CC20102	PtypBinary	Contains a recording of the mail user's name pronunciation.
3	PidTagAddressBookAuthorizedSenders	0x8CD8000D	PtypObject	A value other than null indicates that delivery **restrictions** exist for this recipient. The address book does not contain the lists of senders that are allowed for this

Index Number	Property tag name	Property tag	Property type	Description
				recipient; it only indicates whether or not such restrictions exist. <6>
4	PidTagAddressBookUnauthorizedSenders	0x8CD9000D	PtypObject	A value other than null indicates that delivery restrictions exist for this recipient. The address book does not contain the lists of senders that are prohibited for this recipient; it only indicates whether or not such restrictions exist.
5	PidTagAddressBookDistributionListMemberSubmitAccepted	0x8073000D	PtypObject	A value other than null indicates that delivery restrictions exist for this recipient. The address book does not contain the lists of the group of senders that are allowed for this recipient; it only indicates whether or not such restrictions exist.
6	PidTagAddressBookDistributionListMemberSubmitRej	0x8CDA000	PtypObje	A value other than

Index Number	Property tag name	Property tag	Property type	Description
	ected	D	ct	null indicates that delivery restrictions exist for this recipient. The address book does not contain the lists of the group of senders that are prohibited for this recipient; it only indicates whether or not such restrictions exist.

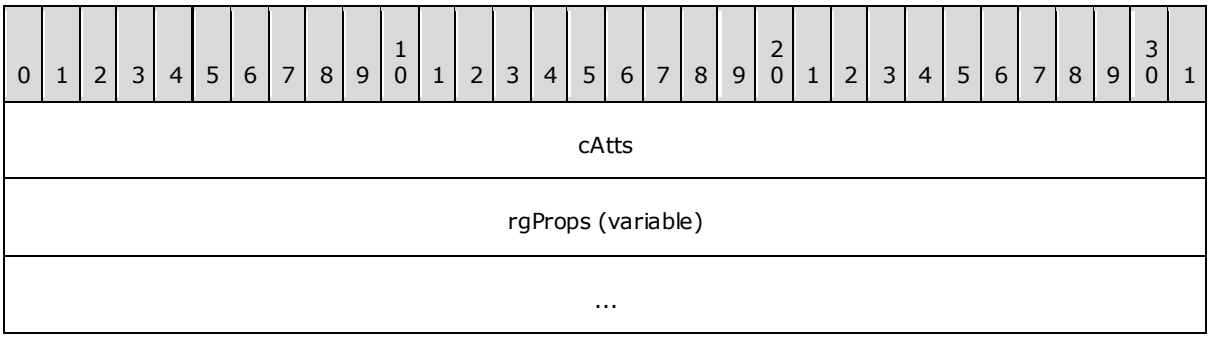
The following properties are required:

- PidTagSmtpAddress
- PidTagDisplayName
- PidTagAccount
- PidTagSurname
- PidTagGivenName
- PidTagAddressBookProxyAddresses
- PidTagOfficeLocation
- PidTagDisplayType
- PidTagObjectType
- PidTagSendRichInfo
- PidTagBusinessTelephoneNumber
- PidTagInitials
- PidTagStreetAddress
- PidTagLocality
- PidTagStateOrProvince
- PidTagPostalCode

- PidTagCountry
- PidTagTitle
- PidTagCompanyName
- PidTagAssistant
- PidTagDepartmentName
- PidTagAddressBookTargetAddress
- PidTagHomeTelephoneNumber
- PidTagBusiness2TelephoneNumber
- PidTagHome2TelephoneNumber
- PidTagPrimaryFaxNumber
- PidTagMobileTelephoneNumber
- PidTagAssistantTelephoneNumber
- PidTagPagerTelephoneNumber
- PidTagComment
- PidTagUserCertificate
- PidTagUserX509Certificate
- PidTagAddressBookX509Certificate
- PidTagAddressBookHomeMessageDatabase
- PidTag7BitDisplayName

2.9.3 OAB_PROP_TABLE

The **OAB_PROP_TABLE** structure represents the property schema of either the OAB header record or all the address book object records. It contains a list of **OAB_PROP_REC** structures.

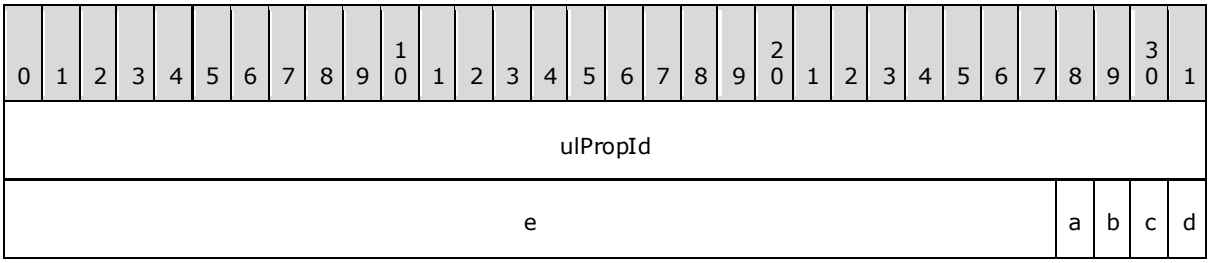


cAtts (4 bytes): An integer that specifies the number of **OAB_PROP_REC** records in **rgProps**.

rgProps (variable): A list of 0 or more **OAB_PROP_REC** structures.

2.9.4 OAB_PROP_REC

The **OAB_PROP_REC** structure defines a property that can be stored in an OAB header or address book object record and describes how the attribute is used online.



ulPropId (4 bytes): A property tag. The property type portion of the property tag MUST be one of the following values. For more details about the data types provided in the table, see [MS-OXCDATA] section 2.12.1.

Value	Meaning
0x0003	PtypInteger32
0x000B	PtypBoolean
0x001E	PtypString8
0x001F	PtypString
0x0102	PtypBinary
0x1003	PtypMultipleInteger32
0x101E	PtypMultipleString8
0x101F	PtypMultipleString
0x1102	PtypMultipleBinary

e (28 bits): All bits of e MUST be 0 and ignored on receipt. <7>

a (1 bit): 1 indicates that the property is part of the ANR property set online. 0 indicates that it is not part of the ANR property set online.

The server includes the following properties in the ANR property set by default:

PidTagDisplayName

PidTagAddressBookPhoneticDisplayName

PidTagAccount

PidTagSurname

PidTagAddressBookPhoneticSurname

PidTagGivenName

PidTagAddressBookPhoneticGivenName

PidTagAddressBookProxyAddresses

PidTagOfficeLocation<8>

b (1 bit): 1 indicates that the property is a primary key index when used online and a value MUST be present on every address-book-object-record in the OAB version 4 Full Details file.

The server includes the following properties in the primary key index property set by default:

PidTagEmailAddress

PidTagSmtpAddress

c (1 bit): 1 indicates that the property is indexed separately online. The client can choose to index the property locally.

d (1 bit): 1 indicates that the property is always truncated regardless of length.<9>

The server truncates the following properties by default:

PidTagThumbnailPhoto

PidTagSpokenName

PidTagAddressBookAuthorizedSenders

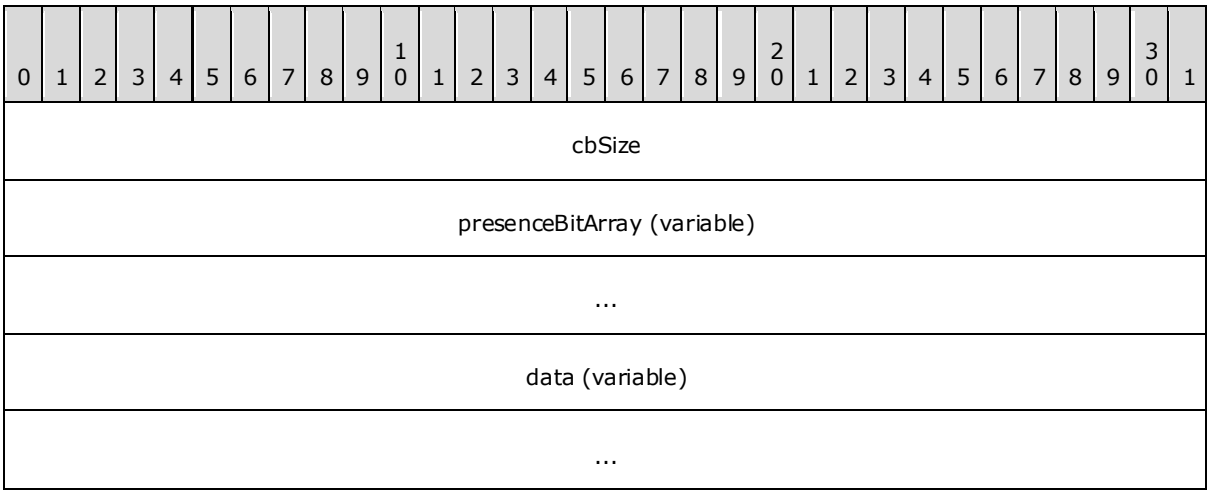
PidTagAddressBookUnauthorizedSenders

PidTagAddressBookDistributionListMemberSubmitAccepted

PidTagAddressBookDistributionListMemberSubmitRejected

2.9.5 OAB_V4_REC

The **OAB_V4_REC** structure represents either the OAB header record or an individual address book object record in an OAB file.



cbSize (4 bytes): The length of the **OAB_V4_REC** structure in bytes. This count includes both the **cbSize** field and the combined length of the **presenceBitArray** and **data** fields.

presenceBitArray (variable): A bit array that indicates whether a property specified in the **OAB_PROP_TABLE** structure is present in the data field. The first element of the bit array is the most significant bit of the first byte. The size of the **presenceBitArray** field in bytes MUST be the value of the **cAtts** field of the appropriate **OAB_PROP_TABLE** structure divided by 8 and rounded up to the nearest integer value. A 0 record in the **presenseBitArray** indicates that the property is not present in the data field. 1 indicates the property is present. The index of the property in the **OAB_PROP_TABLE** structure MUST match the index of the value in the **presenceBitArray**. Unused bits in the final byte MUST be set to 0.

data (variable): The set of property values for the **address-book-object-record** or header-**record**. The format of the **data** field is specified in section 2.9.6.

2.9.6 Data Encoding

property values are encoded in the data field based on the property type and are packed on byte boundaries. The properties are laid out in the order that the property definition exists in the **OAB_PROP_TABLE** structure. If a property does not exist, the **presenceBitArray** value MUST be 0 and no value is encoded in the data field.

2.9.6.1 PtypInteger32 (0x0003) Value Encoding

All integer values are considered unsigned and MUST fit in the range of a 32 bit integer (0 – 232-1). Integers equal to or less than 127 MUST be encoded as a single byte. Integers 128 or greater are encoded with first a byte count byte with the most significant bit set, then the little-endian value encoding. The byte count, if required, MUST be 0x81, 0x82, 0x83, or 0x84 representing 1, 2, 3, or 4 bytes. The most significant byte of the value representation MUST NOT be 0x00, a lower byte count MUST be used. For example, 0x0000007F is encoded as 0x7F, not as 0x81 0x7F, 0x82 0x7F 0x00, 0x83 0x7F 0x00 0x00, or 0x84 0x7F 0x00 0x00 0x00.

For more details about the **PtypInteger32** data type and the data types specified in the following encoding sections, see [MS-OXCDATA] section 2.12.1.

2.9.6.2 PtypBoolean (0x000B) Value Encoding

All Boolean values are encoded as a single byte. TRUE MUST be encoded as 0x01 and FALSE MUST be encoded as 0x00.

2.9.6.3 PtypString8 (0x001E) Value Encoding

All narrow or multi-byte **character set** strings are encoded as byte sequences and MUST be terminated by a single 0x00 byte. A string sequence MUST NOT contain a 0x00 byte as part of the string itself. A zero length or empty string MUST NOT be encoded, but MUST be marked as not present in the **presenceBitArray**.

Properties whose data type is **PtypEmbeddedTable**, and whose value represents a reference to at most one other Address Book object, are encoded using the **PtypString8** value encoding. The string value MUST be a distinguished name (DN) for an Address Book object, which can be present in the OAB.

2.9.6.4 PtypString (0x001F) Value Encoding

All Unicode strings are encoded as UTF-8 byte sequences and MUST be terminated by a single 0x00 byte. A string encoding MUST NOT contain a 0x00 byte as part of the string itself. A zero length or empty string MUST NOT be encoded, but MUST be marked as not present in the **presenceBitArray**.

2.9.6.5 PtypBinary (0x0102) Value Encoding

All raw byte sequences are encoded by a length value followed by the specified number of bytes. The length value is encoded as a **PtypInteger32** as shown in section 2.9.6.1. For example, the byte sequence 0x22 0xF8 0xFF 0x00 0x22 would be encoded as 0x05 0x22 0xF8 0xFF 0x00 0x22. A zero length **PtypBinary** value MUST NOT be encoded, but MUST be marked as not present in the **presenceBitArray**.

2.9.6.6 PtypMultipleInteger32 (0x1003) Value Encoding

Multi-valued integer encodings start with an integer count encoding followed by the specified number of integer value encodings. All integer encodings, including the value count, are encoded in the same way that **PtypInteger32** is encoded. All values MUST be unique. Values can appear in any order.

2.9.6.7 PtypMultipleString8 (0x101E) Value Encoding

Multi-valued string encodings start with an integer count encoding followed by the specified number of string value encodings. The count encoding is encoded in the same way that **PtypInteger32** is encoded. The individual string encodings are encoded in the same way that **PtypString8** is encoded. Strings MUST be case-insensitive. All values MUST be unique. Values can appear in any order. All strings MUST NOT be zero length or empty.

Properties whose data type is **PtypEmbeddedTable**, and whose value represents references to any number of other Address Book objects, are encoded using the **PtypMultipleString8** value encoding. Each string value MUST be a distinguished name (DN) to an address book object, which can be present in the **OAB**.

2.9.6.8 PtypMultipleString (0x101F) Value Encoding

Multi-valued Unicode string encodings start with an integer count encoding followed by the specified number of Unicode string value encodings. The count encoding is encoded in the same way that **PtypInteger32** is encoded. The individual string encodings are encoded in the same way that **PtypString** is encoded. Strings MUST be case-insensitive. All values MUST be unique. Values can appear in any order. All strings MUST NOT be zero length or empty.

2.9.6.9 PtypMultipleBinary (0x1102) Value Encoding

Multi-valued binary octet encodings start with an integer count encoding, followed by the specified number of binary value encodings. The count encoding is encoded in the same way that **PtypInteger32** is encoded. The individual binary encodings are encoded in the same way that **PtypBinary** is encoded. All values MUST be unique. Values can appear in any order. Any binary value MUST NOT be zero length.

2.10 Compressed OAB Version 4 Differential Patch File

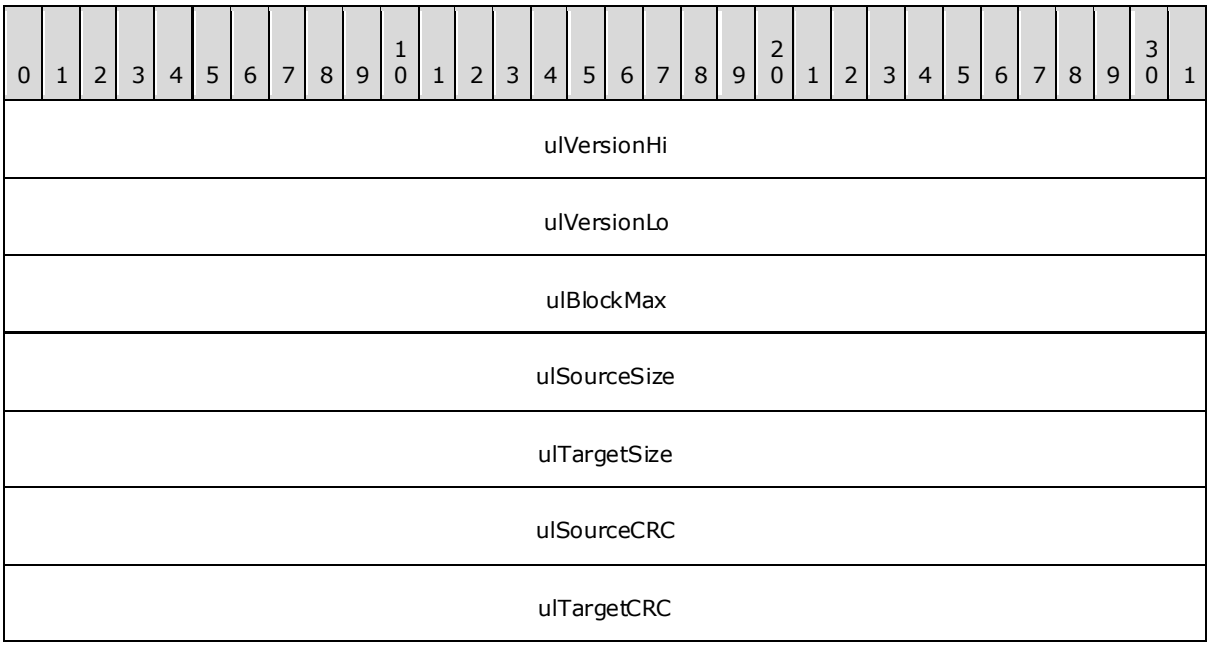
The following ABNF definition shows the format of a compressed OAB version 4 Differential Patch file.

```
patch-file    =    PATCH_HDR 1*PATCH_BLK
```

Patch files are only applied against OAB version 4 Full Details files to produce the next generation of the file.

2.10.1 PATCH_HDR

The **PATCH_HDR** structure contains versioning information to indicate that it is an OAB version 4 patch file. It contains source and target file hash and file size values that SHOULD be used by the client to check that the patch is being applied against the correct file and that the final result is correct.



ulVersionHi (4 bytes): An integer value that MUST be set to 0x00000003.

ulVersionLo (4 bytes): An integer value that MUST be set to 0x00000002.

ulBlockMax (4 bytes): An integer value that indicates in bytes the largest size of a block that will be read from the source OAB Details input file, written to the target OAB details output file, or read from the Differential Patch file. This field is here so that the client can pre-allocate required buffers.

ulSourceSize (4 bytes): An integer value that specifies the length in bytes that the source input file is expected to be. This value SHOULD be used by the client to make sure that the correct input file is being read.

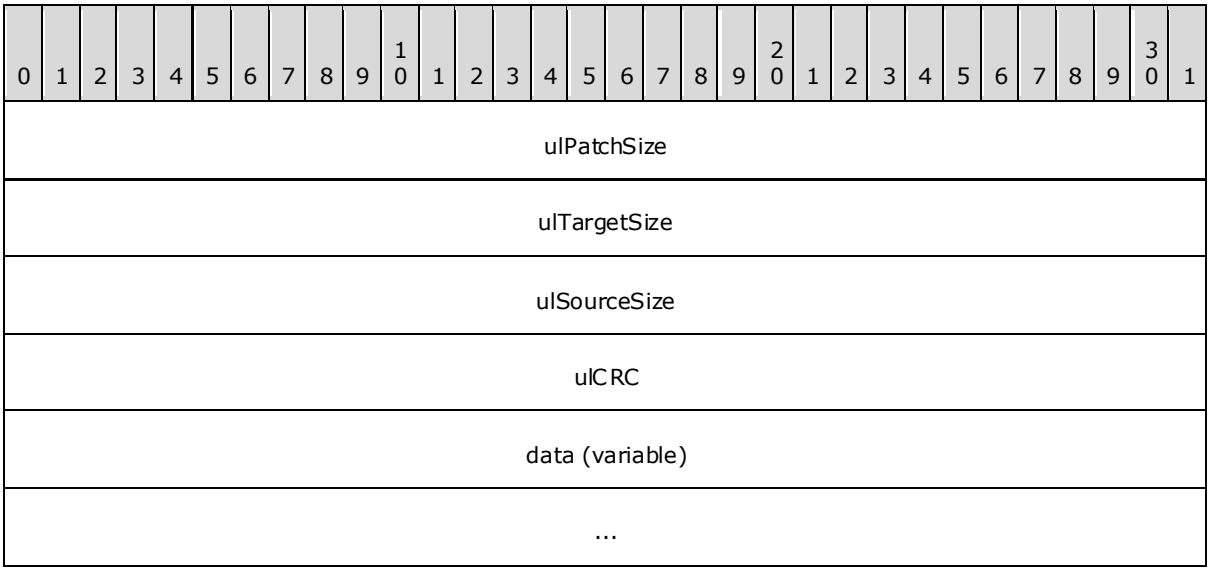
ulTargetSize (4 bytes): An integer value that specifies the length that the resulting output target file is expected to be. This value SHOULD be used by the client to ensure that the target output file was generated correctly.

ulSourceCRC (4 bytes): An integer value that represents the CRC hash of the source input file (excluding the **OAB_HDR** structure). This value SHOULD be used by the client to make sure that the correct input source file is being read.

ulTargetCRC (4 bytes): An integer value that represents the CRC hash of the target output file (excluding the **OAB_HDR** structure). This value SHOULD be used by the client to ensure that output target file was generated correctly.

2.10.2 PATCH_BLK

The **PATCH_BLK** structure is used to split the patch process into more easily handled smaller-sized blocks.



ulPatchSize (4 bytes): An integer value that specifies the size of the data field in bytes.

ulTargetSize (4 bytes): An integer value that specifies the size in bytes of the output target block to be written to the output file.

ulSourceSize (4 bytes): An integer value that specifies the size in bytes of the source input block to be read from the source input file and used to generate the output block.

ulCRC (4 bytes): An integer value that specifies the CRC hash of the resulting target block. This value SHOULD be used by the client to make sure that the correct output block has been generated.

data (variable): A byte stream of **Lempel-Ziv Extended Delta (LZXD)** compressed differences to apply to the source block that results in the target block. For more details, see [MS-PATCH].

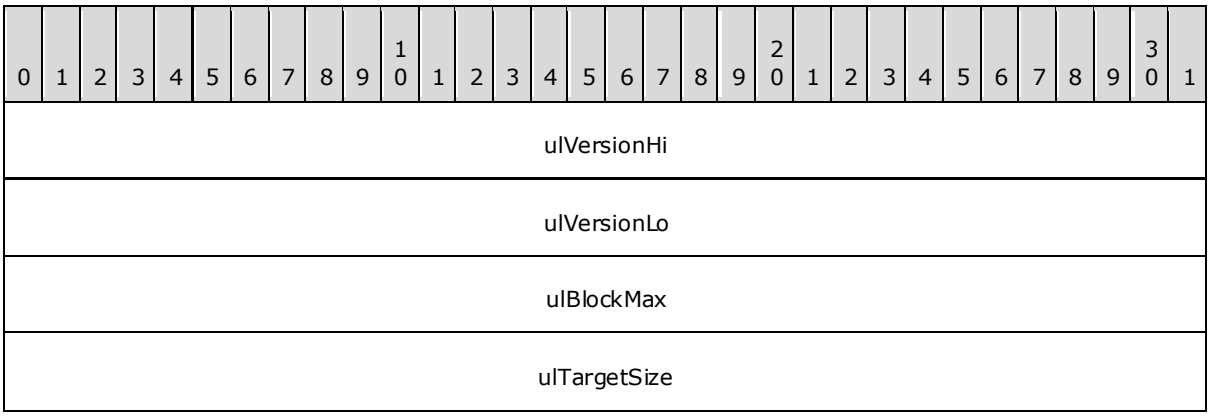
2.11 Compressed OAB Version 4 file

The following ABNF definition shows the format of a compressed OAB version 4 file.

v4-compressed-file = LZX_HDR 1*LZX_BLK

2.11.1 LZX_HDR

The **LZX_HDR** structure contains versioning information to indicate that it is an OAB version 4 compressed file. It contains the target file size value that SHOULD be used by the client to check that the final result is correct.



ulVersionHi (4 bytes): An integer value that MUST be set to 0x00000003.

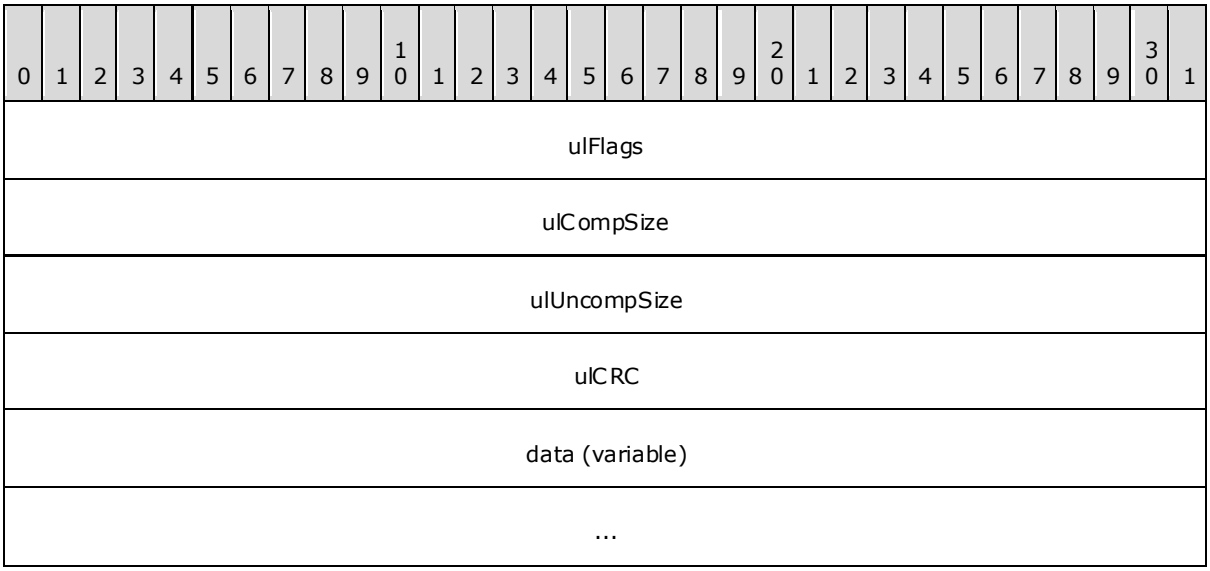
ulVersionLo (4 bytes): An integer value that MUST be set to 0x00000001.

ulBlockMax (4 bytes): An integer value that indicates in bytes the maximum block size that will be read from the source compressed input file or written to the target output file. This field is provided so that the client can pre-allocate required buffers.

ulTargetSize (4 bytes): An integer value that specifies the expected length of the resulting output target file. This value SHOULD be used by the client to ensure that the target output file was generated correctly.

2.11.2 LZX_BLK

The **LZX_BLK** structure is used to split the decompression process into more easily handled smaller-sized blocks.



ulFlags (4 bytes): An integer value that indicates whether the data field is compressed. MUST be set to either 0x00000000 to indicate that the data field is not compressed and can be

written out directly to the target file, or 0x00000001 to indicate that the data field is compressed and ought to be decompressed using LZXD decompression first.

ulCompSize (4 bytes): An integer value that specifies the size of the data field in bytes.

ulUncompSize (4 bytes): An integer value that specifies the size in bytes of the output target block to be written to the output file.

ulCRC (4 bytes): An integer value that specifies the CRC hash of the resulting target block. This value SHOULD be used by the client to ensure that the correct output block has been generated.

data (variable): Either a raw data stream or a compressed byte stream, depending on the value of the **ulFlags** field. For more details, see [MS-PATCH].

3 Structure Examples

The examples in this section illustrate the data after it is downloaded to the client and decompressed when they have an OAB installed. The client can use the data in these files to retrieve user information when working offline. The structure of the data in each file is specified in section 2.

3.1 Full OAB Version 2 Offline Address List

The following data show the contents of a sample OAB version 2 Browse file. All data in this section is shown in actual byte order.

```
OAB_HDR
    ulVersion     0a 00 00 00
    ulSerial      bd 32 79 d3
    ulTotRecs     02 00 00 00

B2_REC
    oRDN          d2 00 00 00
    oDetails      0c 00 00 00
    cbDetails     39 00
    bDispType     00
    bObjType      06
    oSmtp         8c 00 00 00
    oDispName     69 00 00 00
    oAlias        2c 00 00 00
    oLocation     00 00 00 00
    oSurname      00 00 00 00
B2_REC
    oRDN          68 00 00 00
    oDetails      45 00 00 00
    cbDetails     35 00
    bDispType     00
    bObjType      06
    oSmtp         b3 00 00 00
    oDispName     0c 00 00 00
    oAlias        8b 00 00 00
    oLocation     00 00 00 00
    oSurname      4e 00 00 00
```

The following data show the contents of a sample OAB version 2ANR Index file.

```
OAB_HDR
    ulVersion     0a 00 00 00
    ulSerial      00 00 00 00
    ulTotRecs     05 00 00 00

ANR_REC (offset 0x0000000C)
    oLT           2c 00 00 00
    oGT           4e 00 00 00
    iBrowse       04 00 00 00
    oPrev         69 00 00 00
    oNext         8b 00 00 00
    acKey         4c 69 73 61 20 4d 69 6c 6c 65 72 00
                  ; 'Lisa Miller'
```

```
ANR_REC (offset 0x0000002C)
    oLT           00 00 00 00 ; 0 = no left child
    oGT           69 00 00 00
    iBrowse       03 00 00 80 ; high order bit = alias field
    oPrev         00 00 00 00 ; 0 = left-most record
    oNext         69 00 00 00
    acKey         41 64 6d 69 6e 69 73 74 72 61 74 6f 72 00
                  ; 'Administrator'
ANR_REC (offset 0x0000004E)
    oLT           8b 00 00 00
    oGT           00 00 00 00 ; 0 = no right child
    iBrowse       04 00 00 00
    oPrev         8b 00 00 00
    oNext         00 00 00 00 ; 0 = right most record
    acKey         4d 69 6c 6c 65 72 00
                  ; 'Miller'
ANR_REC (offset 0x00000069)
    oLT           00 00 00 00 ; 0 = no left child
    oGT           00 00 00 00 ; 0 = no right child
    iBrowse       03 00 00 00
    oPrev         2c 00 00 00
    oNext         0c 00 00 00
    acKey         41 64 6d 69 6e 69 73 74 72 61 74 6f 72 00
                  ; 'Administrator'

ANR_REC (offset 0x0000008B)
    oLT           00 00 00 00 ; 0 = no left child
    oGT           00 00 00 00 ; 0 = no right child
    iBrowse       04 00 00 80 ; high order bit = alias field
    oPrev         0c 00 00 00
    oNext         4e 00 00 00
    acKey         4c 69 73 61 4d 69 6c 6c 65 72 00
                 ; 'LisaMiller'
```

The following code shows the contents of a sample OAB version 2 RDN Index file.

```
OAB_HDR
    ulVersion     0a 00 00 00
    ulSerial      00 00 00 00
    ulTotRecs     04 00 00 00
   oRoot          68 00 00 00
pdn-record (offset 0x00000010) '/o=example/ou=Exchange Administrative Group
(FYDIBOHF23SPDLT)/cn=Recipients'
                  2f 6f 3d 65 78 61 6d 70 6c 65 2f 6f 75 3d 45 78
                  63 68 61 6e 67 65 20 41 64 6d 69 6e 69 73 74 72
                  61 74 69 76 65 20 47 72 6f 75 70 20 28 46 59 44
                  49 42 4f 48 46 32 33 53 50 44 4c 54 29 2f 63 6e
                  3d 52 65 63 69 70 69 65 6e 74 73 00
pdn-record (offset 0x0000005C) 'example.com'
                  65 78 61 6d 70 6c 65 2e 63 6f 6d 00
RDN2_REC (offset 0x00000068)
    oLT           8c 00 00 00
    oGT           b3 00 00 00
    iBrowse       04 00 00 00
    oPrev         8c 00 00 00
    oNext         b3 00 00 00
    oParentDN     10 00 00 00
```

```
    acKey         4c 69 73 61 20 4d 69 6c 6c 65 72 00
                  ; 'Lisa Miller'
RDN2_REC (offset 0x0000008C)
    oLT           d2 00 00 00
    oGT           00 00 00 00
    iBrowse       03 00 00 00
    oPrev         d2 00 00 00
    oNext         68 00 00 00
    oParentDN     5c 00 00 00
    acKey         41 64 6d 69 6e 69 73 74 72 61 74 6f 72 40 00
                  ; 'Administrator@'
RDN2_REC (offset 0x000000B3)
    oLT           00 00 00 00
    oGT           00 00 00 00
    iBrowse       04 00 00 00
    oPrev         68 00 00 00
    oNext         00 00 00 00
    oParentDN     5c 00 00 00
    acKey         4c 69 73 61 4d 40 00
                  ; 'LisaM@'
RDN2_REC (offset 0x000000d2)
    oLT           00 00 00 00
    oGT           00 00 00 00
    iBrowse       03 00 00 00
    oPrev         00 00 00 00
    oNext         8c 00 00 00
    oParentDN     10 00 00 00
    acKey         41 64 6d 69 6e 69 73 74 72 61 74 6f 72 00
                  ; 'Administrator'
```

The following data show the contents of a sample OAB version 2 Details file.

```
OAB_HDR
    ulVersion     07 00 00 00
    ulSerial      00 00 00 00
    ulTotRecs     00 00 00 00
Details-Record (offset 0x0000000C)
    ; empty values for first 22 properties
    00 00 ; empty binary property
    00 00 00 00 00 00 00 00 00 00 00 00 00 00
    00 00 00 00 00 00 00 ; empty ANSI properties
    01 ; 1 value for multivalued PidTagAddressBookProxyAddresses
    53 4d 54 50 3a 41 64 6d 69 6e 69 73 74 72 61 74
    6f 72 40 65 78 61 6d 70 6c 65 2e 63
    6f 6d 00
    ; 'SMTP:Administrator@example.com'
    00 ; empty multivalued binary property
    00 ; empty multivalued binary property

Details-Record (offset 0x00000045)
    00 00; empty binary property
    00; empty ANSI property
    4c 69 73 61 00 ; 'Lisa' PidTagGivenName
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
    00 00 00 ; empty ANSI properties
    01 ; 1 value for multivalued PidTagAddressBookProxyAddresses
    53 4d 54 50 3a 4c 69 73 61 4d 40 65 78 61 6d
```

```
    70 6c 65 2e 63 6f 6d 00
    ; 'SMTP:LisaM@example.com'
    00 ; empty multivalued binary property
    00 ; empty multivalued binary property
```

3.2 Full OAB Version 3 Offline Address List

The following data show the contents of a sample OAB version 3 Browse file. All data in this section is shown in actual byte order.

```
OAB_HDR
    ulVersion   0e 00 00 00
    ulSerial    bf 62 4f 0b
    ulTotRecs   02 00 00 00

B2_REC
    oRDN        c2 00 00 00
    oDetails    0c 00 00 00
    cbDetails   e6 00
    bDispType   00
    bObjType    06
    oSmtp       7c 00 00 00
    oDispName   69 00 00 00
    oAlias      2c 00 00 00
    oLocation   00 00 00 00
    oSurname    00 00 00 00
B2_REC
   oRDN         5e 00 00 00
    oDetails    f2 00 00 00
    cbDetails   e2 00
    bDispType   00
    bObjType    06
    oSmtp       a3 00 00 00
    oDispName   0c 00 00 00
    oAlias      8b 00 00 00
    oLocation   00 00 00 00
    oSurname    4e 00 00 00
```

The following data show the contents of a sample OAB version 3 ANR Index file.

```
OAB_HDR
    ulVersion   0e 00 00 00
    ulSerial    00 00 00 00
    ulTotRecs   05 00 00 00

ANR_REC (offset 0x0000000C)
    oLT         2c 00 00 00
    oGT         4e 00 00 00
    iBrowse     04 00 00 00
    oPrev       69 00 00 00
    oNext       8b 00 00 00
    acKey       4c 69 73 61 20 4d 69 6c 6c 65 72 00
                ; 'Lisa Miller'
ANR_REC (offset 0x0000002C)
    oLT         00 00 00 00 ; 0 = no left child
```

```
    oGT         69 00 00 00
    iBrowse     03 00 00 80 ; high order bit = alias field
    oPrev       00 00 00 00 ; 0 = left-most record
    oNext       69 00 00 00
    acKey       41 64 6d 69 6e 69 73 74 72 61 74 6f 72 00
                ; 'Administrator'
ANR_REC (offset 0x0000004E)
    oLT         8b 00 00 00
    oGT         00 00 00 00 ; 0 = no right child
    iBrowse     04 00 00 00
    oPrev       8b 00 00 00
    oNext       00 00 00 00 ; 0 = right most record
    acKey       4d 69 6c 6c 65 72 00
                ; 'Miller'
ANR_REC (offset 0x00000069)
    oLT         00 00 00 00 ; 0 = no left child
    oGT         00 00 00 00 ; 0 = no right child
    iBrowse     03 00 00 00
    oPrev       2c 00 00 00
    oNext       0c 00 00 00
    acKey       41 64 6d 69 6e 69 73 74 72 61 74 6f 72 00
                ; 'Administrator'

ANR_REC (offset 0x0000008B)
    oLT        00 00 00 00 ; 0 = no left child
    oGT        00 00 00 00 ; 0 = no right child
    iBrowse    04 00 00 80 ; high order bit = alias field
    oPrev      0c 00 00 00
    oNext      4e 00 00 00
    acKey      4c 69 73 61 4d 00 ; 'LisaM'
```

The following code shows the contents of a sample OAB version 3 RDN Index file.

```
OAB_HDR
    ulVersion   0e 00 00 00
    ulSerial    00 00 00 00
    ulTotRecs   04 00 00 00
    oRoot       5e 00 00 00
pdn-record (offset 0x00000010) '/o=First Organization/ou=First Administrative
Group/cn=Recipients'
                2f 6f 3d 46 69 72 73 74 20 4f 72 67 61 6e 69 7a
                61 74 69 6f 6e 2f 6f 75 3d 46 69 72 73 74 20 41
                64 6d 69 6e 69 73 74 72 61 74 69 76 65 20 47 72
                6f 75 70 2f 63 6e 3d 52 65 63 69 70 69 65 6e 74
                73 00
pdn-record (offset 0x00000052) 'example.com'
                65 78 61 6d 70 6c 65 2e 63 6f 6d 00
RDN2_REC (offset 0x0000005e)
    oLT         7c 00 00 00
    oGT         a3 00 00 00
    iBrowse     04 00 00 00
    oPrev       7c 00 00 00
    oNext       a3 00 00 00
    oParentDN   10 00 00 00
    acKey       4c 69 73 61 4d 00
                ; 'LisaM'
RDN2_REC (offset 0x0000007C)
```

```
    oLT         c2 00 00 00
    oGT         00 00 00 00
    iBrowse     03 00 00 00
    oPrev       c2 00 00 00
    oNext       5e 00 00 00
    oParentDN   52 00 00 00
    acKey       41 64 6d 69 6e 69 73 74 72 61 74 6f 72 40 00
                ; 'Administrator@'
RDN2_REC (offset 0x000000A3)
    oLT         00 00 00 00
    oGT         00 00 00 00
    iBrowse     04 00 00 00
    oPrev       5e 00 00 00
    oNext       00 00 00 00
    oParentDN   52 00 00 00
    acKey       4c 69 73 61 4d 40 00
                ; 'LisaM@'
RDN2_REC (offset 0x000000C2)
    oLT         00 00 00 00
    oGT         00 00 00 00
    iBrowse     03 00 00 00
    oPrev       00 00 00 00
    oNext       7c 00 00 00
    oParentDN   10 00 00 00
    acKey       41 64 6d 69 6e 69 73 74 72 61 74 6f 72 00
                ; 'Administrator'
```

The following data show the contents of a sample OAB version 3 Details file.

```
00 00 00 00 00 4c 69 73 61 00 00 00 00 00 00 00
OAB_HDR
    ulVersion   07 00 00 00
    ulSerial    00 00 00 00
    ulTotRecs   00 00 00 00
Details-Record (offset 0x0000000C)
    00 00 ; empty binary property
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 ; empty UTF8 properties
    00 00 ; empty multivalued UTF8 properties
    00 00 00 00 00 ; empty UTF8 properties
    02 ; 2 values for multivalued PidTagAddressBookProxyAddresses
    53 4d 54 50 3a 41 64 6d 69 6e 69 73 74 72 61 74
    6f 72 40 65 78 61 6d 70 6c 65 2e 63
    6f 6d 00
    ; 'SMTP:Administrator@example.com'
   58 34 30 30 3a 63 3d 55 53 3b 61 3d 20 3b 70 3d 45 78 61 6d 70 6c 65 3b 6f 3d 45 78 63 68
61 6e 67 65 3b 73 3d 41 64 6d 69 6e 69 73 74 72 61 74 6f 72 3b 00
    ; 'X400:c=US;a=;p=Example;o=Exchange;s=Administrator;'
    00 ; empty multivalued binary property
    00 ; empty multivalued binary property
    2f 6f 3d 46 69 72 73 74 20 4f 72 67 61 6e 69 7a 61 74 69 6f 6e 2f 6f 75 3d 46 69 72 73 74
20 41 64 6d 69 6e 69 73 74 72 61 74 69 76 65 20 47 72 6f 75 70 2f 63 6e 3d 43 6f 6e 66 69 67
75 72 61 74 69 6f 6e 2f 63 6e 3d 53 65 72 76 65 72 73 2f 63 6e 3d 45 58 43 48 2d 48 2d 39 37
37 2f 63 6e 3d 4d 69 63 72 6f 73 6f 66 74 20 50 72 69 76 61 74 65 20 4d 44 42 00
    ; '/o=First Organization/ou=First Administrative
Group/cn=Configuration/cn=Servers/cn=EXCH-H-977/cn=Microsoft Private MDB'
PidTagAddressBookHomeMessageDatabase
    00 00; empty properties
```

```
Details-Record (offset 0x000000f2)
    00 00; empty binary property
    00 ; empty ANSI property
    4c 69 73 61 00 ; 'Lisa' PidTagGivenName
    00 00 00 00 00 00 00 00 00 00 00 00
    00 00 ; empty multivalued UTF8 properties
    00 00 00 00 00 ; empty UTF8 properties
    02 ; 2 values for multivalued PidTagAddressBookProxyAddresses
    53 4d 54 50 3a 4c 69 73 61 4d 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 00
     ; 'SMTP:LisaM@example.com'
   58 34 30 30 3a 63 3d 55 53 3b 61 3d 20 3b 70 3d 45 78 61 6d 70 6c 65 3b 6f 3d 45 78 63 68
61 6e 67 65 3b 73 3d 4d 69 6c 6c 65 72 3b 67 3d 4c 69 73 61 3b 00
    ; 'X400:c=US;a= ;p=Example;o=Exchange;s=Miller;g=Lisa;
    00 ; empty multivalued binary property
    00 ; empty multivalued binary property
    2f 6f 3d 46 69 72 73 74 20 4f 72 67 61 6e 69 7a 61 74 69 6f 6e 2f 6f 75 3d 46 69 72 73 74
20 41 64 6d 69 6e 69 73 74 72 61 74 69 76 65 20 47 72 6f 75 70 2f 63 6e 3d 43 6f 6e 66 69 67
75 72 61 74 69 6f 6e 2f 63 6e 3d 53 65 72 76 65 72 73 2f 63 6e 3d 45 58 43 48 2d 48 2d 39 37
37 2f 63 6e 3d 4d 69 63 72 6f 73 6f 66 74 20 50 72 69 76 61 74 65 20 4d 44 42 00
    ; '/o=First Organization/ou=First Administrative
Group/cn=Configuration/cn=Servers/cn=EXCH-H-977/cn=Microsoft Private MDB'
PidTagAddressBookHomeMessageDatabase
    00 00
```

3.3 Full OAB Version 4 Details File

The following code shows the contents of a sample OAB version 4 Details file. All data in this section are shown in actual byte order.

```
OAB_HDR
    ulVersion      20 00 00 00
    ulSerial       f7 da c0 7f
    ulTotRecs      02 00 00 00
OAB_META_DATA
    cbSize         5c 00 00 00
    pHdrAtts
      cAtts        04 00 00 00
      rgProps [0]
       ulPropID    1f 00 00 68
       ulFlags     00 00 00 00 ; combination of fields a,b,c,d
      rgProps [1]
       ulPropID    1e 00 04 68
       ulFlags     00 00 00 00
      rgProps [2]
       ulPropID   03 00 01 68
       ulFlags    00 00 00 00
      rgProps [3]
       ulPropID   1e 00 02 68
       ulFlags    00 00 00 00
    pOabAtts
      cAtts       06 00 00 00
      rgProps [0]
       ulPropID   1e 00 03 30
       ulFlags    02 00 00 00 ; combination of fields a,b,c,d
      rgProps [1]
       ulPropID     1f 00 fe 39
         ulFlags    02 00 00 00
```

```
      rgProps [2]
       ulPropID     1f 00 01 30
       ulFlags      01 00 00 00
      rgProps [3]
       ulPropID    03 00 fe 0f
       ulFlags     00 00 00 00
      rgProps [4]
       ulPropID    03 00 00 39
       ulFlags     00 00 00 00
      rgProps [5]
       ulPropID    03 10 05 68
       ulFlags     00 00 00 00

OAB_V4_REC (Header Properties)
    cbSize       42 00 00 00
    PresenceArray    f0
    Att [0] (Utf8)   5c 47 6c 6f 62 61 6c 20
             41 64 64 72 65 73 73 20
             4c 69 73 74 00
    Att [1] (String)   2f 00
    Att [2] (Integer)   06
    Att [3] (String)   64 34 66 32 34 34 61 38
             2d 61 38 65 63 2d 34 34
             32 61 2d 38 37 61 33 2d
             35 32 33 36 66 38 32 63
             61 62 64 63 00

OAB_V4_REC (Address book object 0)
    cbSize      80 00 00 00
    PresenceArray    f8
    Att [0] (string)    2f 6f 3d 65 78 61 6d 70
             6c 65 2f 6f 75 3d 45 78
             63 68 61 6e 67 65 20 41
             64 6d 69 6e 69 73 74 72
             61 74 69 76 65 20 47 72
             6f 75 70 20 28 46 59 44
             49 42 4f 48 46 32 33 53
             50 44 4c 54 29 2f 63 6e
             3d 52 65 63 69 70 69 65
             6e 74 73 2f 63 6e 3d 4c
             69 73 61 20 4d 69 6c 6c
             65 72 00
    Att [1] (Utf8)   4c 69 73 61 4d 40 65 78
             61 6d 70 6c 65 2e 63 6f
             6d 00
    Att [2] (Utf8)    4c 69 73 61 20 4d 69 6c
             6c 65 72 00
    Att [3] (Integer)   06
    Att [4] (Integer)   00

OAB_V4_REC (Address book object 1)
    cbSize      8c 00 00 00
    PresenceArray    f8
    Att [0] (string)    2f 6f 3d 65 78 61 6d 70
             6c 65 2f 6f 75 3d 45 78
             63 68 61 6e 67 65 20 41
             64 6d 69 6e 69 73 74 72
             61 74 69 76 65 20 47 72
             6f 75 70 20 28 46 59 44
```

```
              49 42 4f 48 46 32 33 53
              50 44 4c 54 29 2f 63 6e
              3d 52 65 63 69 70 69 65
              6e 74 73 2f 63 6e 3d 41
              64 6d 69 6e 69 73 74 72
              61 74 6f 72 00
    Att [1] (Utf8)   41 64 6d 69 6e 69 73 74
              72 61 74 6f 72 40 65 78
              61 6d 70 6c 65 2e 63 6f
              6d 00
    Att [2] (Utf8)   41 64 6d 69 6e 69 73 74
              72 61 74 6f 72 00
    Att [3] (Integer)    06
    Att [4] (Integer)    00

Flat OAB header version 32, serial 7FC0DAF7, records 2
-----------------------
Header Attributes
Property   Flags
cAtts = 4
0x6800001F: 0   PidTagOfflineAddressBookName
0x6804001E: 0   PidTagOfflineAddressBookDistinguishedName
0x68010003: 0    PidTagOfflineAddressBookSequence
0x6802001E: 0   PidTagOfflineAddressBookContainerGuid
-----------------------
OAB Attributes
Property   Flags
cAtts = 6
0x3003001E: 2   PidTagEmailAddress
0x39FE001F: 2    PidTagSmtpAddress
0x3001001F: 1   PidTagDisplayName
0x0FFE0003: 0   PidTagObjectType
0x39000003: 0    PidTagDisplayType
0x68051003: 0   PidTagOfflineAddressBookTruncatedProperties
-----------------------
OAB Meta Data
0x6800001F: \Global Address List
0x6804001E: /
0x68010003: 6
0x6802001E: d4f244a8-a8ec-442a-87a3-5236f82cabdc
-----------------------

-----------------------
Record 0
-----------------------
0x3003001E: /o=example/ou=Exchange Administrative Group
(FYDIBOHF23SPDLT)/cn=Recipients/cn=Lisa Miller
0x39FE001F: LisaM@example.com
0x3001001F: Lisa Miller
0x0FFE0003: 6
0x39000003: 0
-----------------------
Record 1
-----------------------
0x3003001E: /o=example/ou=Exchange Administrative Group
(FYDIBOHF23SPDLT)/cn=Recipients/cn=Administrator
0x39FE001F: Administrator@example.com
0x3001001F: Administrator
0x0FFE0003: 6
```

```
  0x39000003: 0

------------------------
```

4 Security Considerations

Data stored in OAB files contain personally identifiable information. Implementers have to ensure that only authorized individuals have access to the data.

5 Appendix A: Product Behavior

The information in this specification is applicable to the following product versions. References to product versions include released service packs.

- 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. If a service pack number appears with the product version, behavior changed in that service pack. The new behavior also applies to subsequent service packs of the product unless otherwise specified.

Unless otherwise specified, any statement of optional behavior in this specification prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that product does not follow the prescription.

<1> Section 1.3: OAB versions 2 and later are supported by Exchange 2003, Exchange 2007, Exchange 2010, Outlook 2003, Outlook 2007, and Outlook 2010. There are some differences in the default behavior of Exchange 2003, Exchange 2007, and Exchange 2010, as described in this section.

<2> Section 2.4.1: An Outlook 2003 client connecting with an Exchange 2003 server will generate 0x0000000E as the **ulVersion** instead of 0x0000000A in the uncompressed RDN Index file.

<3> Section 2.9.2.1: The PidTagAddressBookHierarchicalRootDepartment property is not supported by Exchange 2003, Exchange 2007, Outlook 2003, or Outlook 2007.

<4> Section 2.9.2.2: The following properties are not populated by Exchange 2003 by default: PidTagAddressBookPhoneticDisplayName, PidTagAddressBookPhoneticSurname, PidTagAddressBookPhoneticGivenName, PidTagAddressBookPhoneticCompanyName, PidTagAddressBookPhoneticDepartmentName, and PidTagDisplayTypeEx.

<5> Section 2.9.2.2: The PidTagOfflineAddressBookTruncatedProperties property contains no properties by default in Exchange 2003 and Exchange 2007.

<6> Section 2.9.2.2: PidTagAddressBookAuthorizedSenders, PidTagAddressBookUnauthorizedSenders, PidTagAddressBookDistributionListMemberSubmitAccepted, and PidTagAddressBookDistributionListMemberSubmitRejected are used to compose a HasRestrictions boolean value in Outlook that generates a mail tip if TRUE.

<7> Section 2.9.4: This field is 29 bits in Exchange 2003 and Exchange 2007.

<8> Section 2.9.4: PidTagOfficeLocation is not in the ANR property set in Exchange 2007.

<9> Section 2.9.4: This field is not supported in Exchange 2003 and Exchange 2007.

6 Change Tracking

This section identifies changes made to [MS-OXOAB] protocol documentation between November 2009 and February 2010 releases. Changes are classed as major, minor, or editorial.

Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements or functionality.
- An extensive rewrite, addition, or deletion of major portions of content.
- A protocol is deprecated.
- The removal of a document from the documentation set.
- Changes made for template compliance.

Minor changes do not affect protocol interoperability or implementation. Examples are updates to fix technical accuracy or ambiguity at the sentence, paragraph, or table level.

Editorial changes apply to grammatical, formatting, and style issues.

No changes means that the document is identical to its last release.

Major and minor changes can be described further using the following revision types:

- New content added.
- Content update.
- Content removed.
- New product behavior note added.
- Product behavior note updated.
- Product behavior note removed.
- New protocol syntax added.
- Protocol syntax updated.
- Protocol syntax removed.
- New content added due to protocol revision.
- Content updated due to protocol revision.
- Content removed due to protocol revision.
- New protocol syntax added due to protocol revision.
- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.
- New content added for template compliance.
- Content updated for template compliance.

- Content removed for template compliance.
- Obsolete document removed.

Editorial changes always have the revision type "Editorially updated."

Some important terms used in revision type descriptions are defined as follows:

Protocol syntax refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.

Protocol revision refers to changes made to a protocol that affect the bits that are sent over the wire.

Changes are listed in the following table. If you need further information, please contact protocol@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Revision Type
2.7.2 CHG_REC	46798 Updated the description of the value 010 for the type field.	N	Content update.

7 Index

V