

[MS-OXWOAB]:

Offline Address Book (OAB) Retrieval File Format

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Revision Summary

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6/27/2008	1.0	Major	Initial Release.
8/6/2008	1.01	Minor	Revised and edited technical content.
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1 Introduction

The Offline Address Book (OAB) Retrieval File Format enables a client to retrieve an address book from the server for local storage when the server is offline. A server can represent properties of known **recipients** and make them available in an **address book** to its clients. When the client cannot reach the server because the server is offline or there is a high network cost to access it, the client can use the OAB retrieval file format to keep a local copy of the address book. The **offline address book (OAB)** version 4 Web-based retrieval mechanism is a way of delivering an offline address book from the server to the client.

As part of **OAB Web distribution**, the server publishes an **OAB manifest** document. The format of that manifest is detailed in this document.

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

1.1 Glossary

This document uses the following terms:

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

address list: A collection of distinct Address Book objects.

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

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

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

Hypertext Transfer Protocol (HTTP): An application-level protocol for distributed, collaborative, hypermedia information systems (text, graphic images, sound, video, and other multimedia files) on the World Wide Web.

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

OAB manifest: A file that contains information about data files in a version 4 **OAB** and has a fixed, well-known name "oab.xml". By discovering the Web Distribution Point (WDP) URI and downloading the manifest, a client application can receive all the information that is necessary to download any published data file in a specific WDP, as necessary.

OAB web distribution: A distribution mechanism that is specific to **offline address book (OAB)** version 4 and is used to publish OAB data files and an OAB manifest as a collection of files that a client application can download by using the HTTP/1.1 protocol, as described in [\[RFC2616\]](#).

OAL data sequence number: An integer that is associated with **offline address list (OAL)** data that represents the generation number of this data. The value of the initial sequence number is "1". Each subsequent data generation process that produces a data set that is not identical to the previous data set is incremented by one.

offline address book (OAB): A collection of **address lists** that are stored in a format that a client can save and use locally.

offline address book (OAB) data file: A file that contains **offline address book (OAB)** version 4-specific data, as described in [\[MS-OXOAB\]](#).

offline address list (OAL): A portion of data that is in an **offline address book (OAB)** and is related to a single **address list**.

recipient: An entity that is in an **address list**, can receive email messages, and contains a set of attributes. Each attribute has a set of associated values.

Uniform Resource Identifier (URI): A string that identifies a resource. The URI is an addressing mechanism defined in Internet Engineering Task Force (IETF) Uniform Resource Identifier (URI): Generic Syntax [\[RFC3986\]](#).

Web Distribution Point (WDP): A location on a server where **offline address book (OAB)** files are published for web distribution. A client can discover the URI of a WDP by using the Autodiscover Publishing and Lookup Protocol, as described in [\[MS-OXDSCLI\]](#).

XML: The Extensible Markup Language, as described in [\[XML1.0\]](#).

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

1.2 References

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

1.2.1 Normative References

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

[FIPS180] FIPS PUBS, "Secure Hash Standard", FIPS PUB 180-1, April 1995, <http://niatec.info/GetFile.aspx?pid=63>

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

[MS-OXDSCLI] Microsoft Corporation, "[Autodiscover Publishing and Lookup Protocol](#)".

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

[MS-OXOAB] Microsoft Corporation, "[Offline Address Book \(OAB\) File Format and Schema](#)".

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

[RFC2616] Fielding, R., Gettys, J., Mogul, J., et al., "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2616, June 1999, <https://www.rfc-editor.org/info/rfc2616>

[RFC2818] Rescorla, E., "HTTP Over TLS", RFC 2818, May 2000, <http://www.rfc-editor.org/rfc/rfc2818.txt>

[RFC5234] Crocker, D., Ed., and Overell, P., "Augmented BNF for Syntax Specifications: ABNF", STD 68, RFC 5234, January 2008, <http://www.rfc-editor.org/rfc/rfc5234.txt>

[XML10] World Wide Web Consortium, "Extensible Markup Language (XML) 1.0 (Third Edition)", February 2004, <http://www.w3.org/TR/2004/REC-xml-20040204/>

1.2.2 Informative References

[MS-OXPROTO] Microsoft Corporation, "[Exchange Server Protocols System Overview](#)".

1.3 Overview

Clients use the **OAB manifest** to identify the current version of data published by the server and build the **URIs** of data files to download. The format of the OAB manifest is **XML**, and the manifest contains one entry for each data file in the **OAB**. The entries are organized hierarchically.

1.4 Relationship to Other Protocols

- Clients discover the **URI** of the **WDP** by using the Autodiscover Publishing and Lookup Protocol [\[MS-OXDCLI\]](#).
- From the WDP URI, clients construct the manifest URI and use the **HTTP** /1.1 protocol [\[RFC2616\]](#) to retrieve the manifest file.
- Based on data in the manifest, clients use the Offline Address Book (OAB) Retrieval File Format to retrieve and consume **OAB data files** that are generated as described in [\[MS-OXOAB\]](#).
- This file format relies on the HTTP 1.1 protocol, as described in [\[RFC2616\]](#), to deliver the manifest and data **OAB** files from the server to the client. It also relies on **HTTPS**, as described in [\[RFC2818\]](#), for data protection services.

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

1.5 Prerequisites/Preconditions

None.

1.6 Applicability Statement

Before the **OAB Web distribution** mechanism specified in this document can be used, a set of **OAB** files has to be generated in the format specified in [\[MS-OXOAB\]](#), the files have to be published on an **HTTP** 1.1 server, and the **URI** of the **WDP** has to be published by means of the Autodiscover Publishing and Lookup Protocol, as specified in [\[MS-OXDCLI\]](#).

1.7 Versioning and Capability Negotiation

The Offline Address Book (OAB) Retrieval File Format has only one version.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

The client retrieves the manifest file by using the standard **HTTP**/1.1 protocol, as specified in [\[RFC2616\]](#).

2.2 Message Syntax

3 Protocol Details

3.1 Client Details

3.1.1 Abstract Data Model

3.1.2 Timers

3.1.3 Initialization

3.1.4 Higher-Layer Triggered Events

3.1.5 Message Processing Events and Sequencing Rules

The client uses the Autodiscover Publishing and Lookup Protocol, as specified in [\[MS-OXDCLI\]](#), to discover the **Web Distribution Point (WDP) URI**, and then it constructs a manifest URI by appending the well-known name "oab.xml", as specified in the following **ABNF**:

```
manifestURI = wdpUri "/oab.xml"
```

The client then retrieves the manifest file by using the standard **HTTP/1.1** protocol, as specified in [\[RFC2616\]](#). The manifest file contains information about the **OAL data sequence number** and the names of the data files that are published to a given WDP. The detailed structure of the manifest file is specified in the next section.

After the client retrieves and parses the manifest file, it ascertains what **OALs** are associated with this **OAB**. The client can retrieve each OAL in the OAB independently.

For each file that has to be retrieved, the client constructs the URI according to the following definition, and then it retrieves each of those URIs by using the HTTP/1.1 protocol [\[RFC2616\]](#), as follows:

```
dataFileURI = wdpUri "/" file
```

3.1.5.1 Manifest File Structure

The manifest file structure is a well-formed **XML** document, as specified in [\[XML10\]](#), and has the following **ABNF** structure, as per the specification of Augmented Backus-Naur Form (ABNF) semantics [\[RFC5234\]](#).

```
manifestDocument = prolog oabElement
prolog           = "<?xml" VersionInfo UTF8EncodingDecl "?>" *S
VersionInfo      = S "version" Eq (XMLQUOTE VersionNum XMLQUOTE)
VersionNum       = "1.0"
Eq               = "="
UTF8EncodingDecl = S "encoding" Eq XMLQUOTE "UTF-8" XMLQUOTE
oabElement       = oabSTag oabContent oabETag
oabSTag          = "<OAB>" *S
oabETag          = "</OAB>" *S
oabContent       = 1* oalElement
oalElement       = oalSTag S oalAttributes *S ">" *S oalContent oalETag
oalSTag          = "<OAL"
```

```

oalEtag          = "</OAL>" *S
oalAttributes    = idAttribute S dnAttribute S nameAttribute
idAttribute      = "id=" XMLQUOTE guidString XMLQUOTE
dnAttribute      = "dn=" XMLQUOTE addresslist-legacy-dn XMLQUOTE
nameAttribute    = "name=" XMLQUOTE nestedUnicodeRdn XMLQUOTE
guidString       = 8HEX "-" 4HEX "-" 4HEX "-" 4HEX "-" 12HEX
nestedUnicodeRdn = 1*16 ( "\" unicodeRdn )
; the total length is limited to
; 1024 characters
unicodeRdn       = 1*1023 (NON-ZERO-OCTET)
NON-ZERO-OCTET   = %x01-FF ; Any octet (8-bit data unit) except for 0
oalContent       = fullElement 1*templateElement *diffElement
fullElement      = "<Full" S seq S ver S size S uncompressedsize S SHA ">" *S      file
*S "</Full>"
templateElement = "<Template" S seq S ver S size S uncompressedsize S SHA S
langid S type ">" *S file *S "</Template>"
diffElement      = "<Diff" S seq S ver S size S uncompressedsize S SHA ">" *S
file *S "</Diff>"
seq              = "seq=" XMLQUOTE 1*DIGIT XMLQUOTE
; limited to values from 0 to 2147483648
ver              = "ver=" XMLQUOTE 1*DIGIT XMLQUOTE
; limited to values from 0 to 2147483648
size             = "size=" XMLQUOTE 1*DIGIT XMLQUOTE
uncompressedsize = "uncompressedsize=" XMLQUOTE 1*DIGIT XMLQUOTE
SHA              = "SHA=" XMLQUOTE 40HEX XMLQUOTE
langid           = "langid=" XMLQUOTE 1*HEX XMLQUOTE
type             = "type=" XMLQUOTE ("mac" / "windows") XMLQUOTE
file             = *( NONDOT / DOT) 1* NONDOT
compressedfile   = file ".lzx"
addresslist-legacy-dn = "/guid=" 32(HEX) / "/" / legacy-dn
legacy-dn        = org org-unit 1*13(container) object-rdn
; legacy-dns are limited to 16 levels
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 and
; the number of rdns is limited to 16 but the
; total cumulative length of rdn characters in
; a legacy-dn is limited to 256.

teletex-char     = " " / non-space-teletex
non-space-teletex = "!" / XMLQUOTE / "%" / "&" / "\" / "(" / ")" /
"*" / "+" / "," / "-" / "." / "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" / "|"

DIGIT            = %x30-39
HEX              = DIGIT
/ "A" / "B" / "C" / "D" / "E" / "F"
/ "a" / "b" / "c" / "d" / "e" / "f"
S                = 1*(%x20 / %x09 / %x0D / %x0A)
ALPHA            = %x41-5A / %x61-7A ; A-Z / a-z
XMLQUOTE         = DQUOTE / "'"
DOT              = "."
NONDOT           = DIGIT / ALPHA / "-"
DQUOTE           = %x22

```

; " (Double Quote)

oabElement: The **oabElement** element in the document structure represents a top-level container in the hierarchy of the XML document, and it MUST contain one or more **oalElement** entities. The **oabElement** element does not have any attributes.

oalElement: The **oalElement** element is a container in the hierarchy of the XML document that contains the XML child elements **fullElement**, **templateElement**, and **diffElement**, and it represents an **OAL** that is part of the **OAB**. For an example of the XML structure, see section 4. The **oalElement** MUST have the following attributes:

- **id** (as specified in the **idAttribute** attribute): A string representation of randomly chosen **GUIDs** that uniquely represents the current OAL. This **id** remains the same through all subsequent OAB generations.
- **dn** (as specified in the **dnAttribute** element): The **distinguished name (DN)** of the OAL.
- **name** (as specified in the **nameAttribute** element): The name of the **address list**, prepended with "\".

For details about address lists, see [\[MS-OXOABK\]](#).

fullElement: Each **oalElement** element MUST contain exactly one **fullElement** element. The **fullElement** element provides information about the compressed full details file, as specified in [\[MS-OXOAB\]](#) section 2.11. The following attributes MUST be specified:

- **seq** – The **OAL data sequence number**.
- **ver** – The version of the data file, as specified in [MS-OXOAB].
- **size** – The size (in bytes) of the data file on the **WDP**.
- **uncompressedsize** – The size (in bytes) of the data file after decompression.
- **SHA** – The SHA1 checksum of the compressed file, calculated as specified in [\[FIPS180\]](#).
- **file** – The name of the data file on WDP. Although this file is not actually an element, it can be found in the XML content within the <Full> and </Full> tags.

templateElement: Each **oalElement** element MUST contain at least one **templateElement** element. The **templateElement** element provides information about the uncompressed display template file, as specified in [MS-OXOAB] section 2.2. The following attributes MUST be specified:

- **seq** – The OAL data sequence number. This is kept in sync with the sequence number of the **fullElement** element.
- **ver** – The version of the data file, as specified in [MS-OXOAB].
- **size** – The size (in bytes) of the data file on WDP.
- **uncompressedsize** – The size (in bytes) of the data file after decompression.
- **SHA** – The SHA1 checksum of the compressed file, calculated as specified in [FIPS180].
- **langid** – The template language identifier, as specified in [\[MS-LCID\]](#).
- **type** – A string representing the client platform, which is currently "windows" or "mac".
- **file** – The name of the data file on WDP. Although this file is not actually an element, it can be found in the XML content within the <Template> and </Template> tags.

diffElement: Each **oalElement** element MUST contain zero or more **diffElements** element. The **diffElement** element provides information about the OAB v4 differential patch file, as specified in [MS-OXOAB] section 2.10. The following attributes MUST be specified:

- **seq** – The OAL data sequence number.
- **ver** – The version of the resulting data file that will be produced by applying this differential file.
- **size** – The size (in bytes) of data file on WDP.
- **uncompressedsize** – The size (in bytes) of data file after decompression.
- **SHA** – The SHA1 checksum of the compressed file, calculated as specified in [FIPS180].
- **file** – The name of the data file on WDP. Although this file is not actually an element, it can be found in the XML content within the <Diff> and </Diff> tags.

seq attribute: Each **fullElement**, **templateElement**, and **diffElement** element contains a **seq** attribute, which enables the optimizations for the client that are described in this section.

The client can internally maintain an integer value to store the sequence number of the last successfully downloaded OAL data. This enables the client to determine whether the server has any data that is newer than the data that is available on the client side. This internal value is referred to as **clientSequenceNumber**. If the client implementation maintains the **clientSequenceNumber** value, the client also has to store the OAL **id** to identify the OAL in future versions of the manifest. Additionally, the client has to store the last downloaded full details file so that it can build a new version of the data file by applying differential files to the older file.

As a result of parsing the manifest, the client finds the sequence number of the full OAL data file that is available on the server. This value is referred to as **serverSequenceNumber**. If **serverSequenceNumber** >= 2, there are zero or more differential details files with sequential sequence numbers from M to **serverSequenceNumber**, where $2 \leq M \leq \text{serverSequenceNumber}$. The number of differential details files depends on the server implementation.

If, for a particular OAL, the client has a copy of the full details file with the data sequence number **clientSequenceNumber**, and the manifest has differential details files from **clientSequenceNumber** to **serverSequenceNumber**, the client can download the differential detail files from **clientSequenceNumber** + 1 to **serverSequenceNumber** and apply them to the previously downloaded full details file to get to the latest version. Otherwise, the client can download a single full details file **serverSequenceNumber** value to bring itself up to date.

3.1.6 Timer Events

3.1.7 Other Local Events

4 Protocol Examples

The following is an example of the manifest file and corresponding **WDP** content. The **OAB** contains two **address lists**: "Global Address List," represented by the second **OAL** element, and "All Rooms," represented by the first **OAL** element. Both address lists include two templates, both with the language **id** value set to "0409" (English). Both **OALs** have a full details data file and a differential details files. Note that the first **OAL** has the data sequence number 2 and only one differential file, whereas the second **OAL** has data sequence number 4 and three differential files.

```
<?xml version="1.0" encoding="UTF-8"?>
<OAB>
  <OAL id='f867b9e0-d01e-43e3-8708-ba86a1c77dff'
    dn='/guid=F8E7206B268E404B9519453F0F184D24' name='\All Rooms'>
    <Full seq='2' ver='32' size='554' uncompressedsize='1165'
      SHA='d626d8d782332b7e8d689eea266ee315c31f19da'>
      f867b9e0-d01e-43e3-8708-ba86a1c77dff-data-2.lzx
    </Full>
    <Template seq='2' ver='7' size='5794' uncompressedsize='25620'
      SHA='53fb16d6dcdfla559b8649e9b269eee84b85c91b' langid='0409' type='windows'>
      f867b9e0-d01e-43e3-8708-ba86a1c77dff-lng0409-2.lzx
    </Template>
    <Template seq='2' ver='7' size='5794' uncompressedsize='25620'
      SHA='53fb16d6dcdfla559b8649e9b269eee84b85c91b' langid='0409' type='mac'>
      f867b9e0-d01e-43e3-8708-ba86a1c77dff-mac0409-2.lzx
    </Template>
    <Diff seq='2' ver='32' size='132' uncompressedsize='1165'
      SHA='f53ec568b6fc3e4adce0e7d7dfd51ace604a9234'>
      f867b9e0-d01e-43e3-8708-ba86a1c77dff-binpatch-2.lzx
    </Diff>
  </OAL>
  <OAL id='2e3eaccd-85a0-4abe-84f8-603a49801bb6' dn='/' name='\Global Address List'>
    <Full seq='4' ver='32' size='574' uncompressedsize='1872'
      SHA='91c1d0fa378dc961f9e8aafb17a9569767e21c73'>
      2e3eaccd-85a0-4abe-84f8-603a49801bb6-data-4.lzx
    </Full>
    <Template seq='4' ver='7' size='5794' uncompressedsize='25620'
      SHA='53fb16d6dcdfla559b8649e9b269eee84b85c91b' langid='0409' type='windows'>
      2e3eaccd-85a0-4abe-84f8-603a49801bb6-lng0409-4.lzx
    </Template>
    <Template seq='4' ver='7' size='5794' uncompressedsize='25620'
      SHA='53fb16d6dcdfla559b8649e9b269eee84b85c91b' langid='0409' type='mac'>
      2e3eaccd-85a0-4abe-84f8-603a49801bb6-mac0409-4.lzx
    </Template>
    <Diff seq='4' ver='32' size='132' uncompressedsize='1872'
      SHA='49d0d0c8185dd93ba7df0fbc6b532049ba5a29c5'>
      2e3eaccd-85a0-4abe-84f8-603a49801bb6-binpatch-4.lzx
    </Diff>
    <Diff seq='2' ver='32' size='136' uncompressedsize='1197'
      SHA='7e391a3fd934310489f87576ad6b6e1fd6fc1590'>
      2e3eaccd-85a0-4abe-84f8-603a49801bb6-binpatch-2.lzx
    </Diff>
    <Diff seq='3' ver='32' size='138' uncompressedsize='1544'
      SHA='3eb5108d87e366681eb27be395f3ef7d9525c63f'>
      2e3eaccd-85a0-4abe-84f8-603a49801bb6-binpatch-3.lzx
    </Diff>
  </OAL>
</OAB>
```

5 Security

5.1 Security Considerations for Implementers

The manifest file contains the results of the SHA-1 hashing calculation. Note, however, that the SHA-1 hash value is used as an optional means of checksum verification of the downloaded file, and it should not be used as a security feature. In particular, it does not prevent deliberate data tampering.

5.2 Index of Security Parameters

None.

6 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Microsoft Exchange Server 2007
- Microsoft Exchange Server 2010
- Microsoft Exchange Server 2013
- Microsoft Exchange Server 2016
- Microsoft Office Outlook 2007
- Microsoft Outlook 2010
- Microsoft Outlook 2013
- Microsoft Outlook 2016
- Microsoft Exchange Server 2019
- Microsoft Outlook 2019
- Microsoft Outlook 2021

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

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

7 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

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