

# [MS-OXWOAB]: Offline Address Book (OAB) Retrieval File Format

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## Revision Summary

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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** (2) 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 1.8, 2, and 3 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in [\[RFC2119\]](#). Sections 1.5 and 1.9 are also normative but do not contain those terms. All other sections and examples in this specification are informative.

## 1.1 Glossary

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

- address book**
- address list**
- Augmented Backus-Naur Form (ABNF)**
- distinguished name (DN)**
- GUID**
- Hypertext Transfer Protocol (HTTP)**
- Hypertext Transfer Protocol over Secure Sockets Layer (HTTPS)**
- OAB manifest**
- OAB web distribution**
- OAL data sequence number**
- offline address book (OAB)**
- offline address book (OAB) data file**
- offline address list (OAL)**
- recipient**
- Uniform Resource Identifier (URI)**
- Web Distribution Point (WDP)**
- XML**

The following terms are specific to this document:

**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

References to Microsoft Open Specification documents do not include a publishing year because links are to the latest version of the documents, which are updated frequently. References to other documents include a publishing year when one is available.

## 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](mailto: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://www.itl.nist.gov/fipspubs/fip180-1.htm>

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

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

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

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

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

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

[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-OXGLOS] Microsoft Corporation, "[Exchange Server Protocols Master Glossary](#)".

[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 [\[MS-OXDSCLI\]](#).

## **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

None.

### 2.2 Message Syntax

#### 2.2.1 Message Structures

The client uses the Autodiscover Publishing and Lookup Protocol, as specified in [\[MS-OXDSCLI\]](#), 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
```

#### 2.2.1.1 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)** (1) 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 Protocol Details**

### **3.1 Server Details**

#### **3.1.1 Abstract Data Model**

None.

#### **3.1.2 Timers**

None.

#### **3.1.3 Initialization**

None.

#### **3.1.4 Higher-Layer Triggered Events**

None.

#### **3.1.5 Message Processing Events and Sequencing Rules**

None.

#### **3.1.6 Timer Events**

None.

#### **3.1.7 Other Local Events**

None.

## 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 released service packs:

- Microsoft Exchange Server 2007
- Microsoft Exchange Server 2010
- Microsoft Exchange Server 2013
- Microsoft Office Outlook 2007
- Microsoft Outlook 2010
- Microsoft Outlook 2013

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

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

## 7 Change Tracking

This section identifies changes that were made to the [MS-OXWOAB] protocol document between the July 2014 and October 2014 releases. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements or functionality.
- The removal of a document from the documentation set.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **Editorial** means that the formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the technical content of the document is identical to the last released version.

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

- New content added.
- Content updated.
- 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.

- Obsolete document removed.

Editorial changes are always classified with the change type **Editorially updated**.

Some important terms used in the change 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.

The changes made to this document are listed in the following table. For more information, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com).

| Section   | Tracking number (if applicable) and description   | Major change (Y or N) | Change type      |
|---|---|-----------------------|------------------|
| <a href="#">2.2.1.1 Manifest File Structure</a> | Removed the reference [MS-OXOABKT] from the description of the type attribute of templateElement. | N                     | Content removed. |
| <a href="#">2.2.1.1 Manifest File Structure</a> | Changed the descriptor for idAttribute from "element" to "attribute".                             | N                     | Content removed. |
| <a href="#">2.2.1.1 Manifest File Structure</a> | Added details to the "dn" and "name" attributes to indicate their source.                         | N                     | Content updated. |
| <a href="#">2.2.1.1 Manifest File Structure</a> | Added a definition number for the term "distinguished name (DN)".                                 | N                     | Content updated. |
| <a href="#">4 Protocol Examples</a>             | Removed specific product names from the introduction.   | N                     | Content removed. |

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