

[MS-OFFMACRO2]:

Office Macro-Enabled File Format Version 2

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Revision Summary

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12/12/2017	2.4	Minor	Clarified the meaning of the technical content.

Table of Contents

1	Introduction	6
1.1	Glossary	6
1.2	References	7
1.2.1	Normative References	7
1.2.2	Informative References	8
1.3	Structure Overview	8
1.4	Relationship to Protocols and Other Structures	8
1.5	Applicability Statement	8
1.6	Versioning and Localization	9
1.7	Vendor-Extensible Fields	9
2	Structures	10
2.1	Macro-enabled WordprocessingML Structures	10
2.1.1	Part Enumeration.....	10
2.1.1.1	Main Document.....	10
2.1.1.2	VBA Project.....	10
2.1.1.3	VBA Supplemental Data.....	11
2.1.2	Extensions	11
2.1.3	Global Elements	11
2.1.3.1	vbaSuppData.....	11
2.1.4	Global Attributes.....	11
2.1.5	Complex Types.....	11
2.1.5.1	CT_DocEvents	11
2.1.5.2	CT_Mcd	12
2.1.5.3	CT_McDs	13
2.1.5.4	CT_VbaSuppData	13
2.1.6	Simple Types	14
2.2	Macro-enabled SpreadsheetML structures	14
2.2.1	Part Enumeration.....	14
2.2.1.1	International Macro Sheet.....	14
2.2.1.2	Macro Sheet.....	15
2.2.1.3	VBA Project.....	15
2.2.1.4	Workbook	16
2.2.2	Excel Extensions.....	16
2.2.2.1	Extensions by Part	16
2.2.2.1.1	extLst	16
2.2.3	Global Elements	16
2.2.3.1	macrosheet	16
2.2.3.2	definedNames	17
2.2.4	Global Attributes.....	17
2.2.5	Complex Types.....	17
2.2.5.1	CT_Worksheet	17
2.2.5.2	CT_DefinedNames.....	20
2.2.5.3	CT_DefinedName	20
2.2.5.4	CT_DefinedNameArgumentDescriptions	21
2.2.5.5	CT_DefinedNameArgumentDescription.....	21
2.2.6	Simple Types	22
2.2.7	Formulas	22
2.3	Macro-Enabled PresentationML Structures	22
2.3.1	Part Enumeration.....	22
2.3.1.1	Presentation	22
2.3.1.2	VBA Project	22
2.3.2	Extensions	23
2.3.3	Global Elements	23
2.3.4	Global Attributes.....	23

2.3.5	Complex Types.....	23
2.3.5.1	CT_SlideMasterIdListEntry	23
2.3.6	Simple Types	23
3	Structure Examples	24
3.1	VBA Supplemental Data Part	24
3.2	Macro Sheet Part	24
4	Security Considerations.....	25
4.1	Security Considerations for Implementers	25
4.2	Index of Security Fields	25
5	Appendix A: Full XML Schemas	26
5.1	http://schemas.microsoft.com/office/word/2006/wordml Schema	26
5.2	http://schemas.microsoft.com/office/excel/2006/main Schema	26
5.3	http://schemas.microsoft.com/office/excel/2008/2/main Schema	27
6	Appendix B: Product Behavior	29
7	Change Tracking.....	30
8	Index.....	31

1 Introduction

This document specifies the Office Macro-Enabled File Format Version 2. This file format specifies the structures of macro-enabled WordprocessingML, SpreadsheetML, and PresentationML file formats that are either not present in or modified from non-macro-enabled WordprocessingML, SpreadsheetML, and PresentationML file formats described in [\[ISO/IEC29500-1:2016\]](#). The macro-enabled file formats consist of the non-macro-enabled file formats described in [\[ISO/IEC29500-1:2016\]](#) and the XML structures, XML, and non-XML parts described in this document.

Sections 1.7 and 2 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

AutoFilter: A mechanism that can be used to filter tabular data based on user-defined criteria such as values, strings, and formatting.

conditional formatting: A mechanism that changes the appearance of a user interface element based on the evaluation of a rule or expression.

data consolidation: The process of combining tabular data from various worksheets into a single list.

document: An object in a content database such as a file, folder, list, or site. Each object is identified by a URI.

embedded object: An object that is created by using one application and is hosted in a document that was created by using another application. Embedding an object, rather than inserting or pasting it, ensures that the object retains its original format. Users can double-click an embedded object and edit it with the toolbars and menus from the application that was used to create it. See also Object Linking and Embedding (OLE).

Hypertext Markup Language (HTML): An application of the Standard Generalized Markup Language (SGML) that uses tags to mark elements in a document, as described in [\[HTML\]](#).

locale: A collection of rules and data that are specific to a language and a geographical area. A locale can include information about sorting rules, date and time formatting, numeric and monetary conventions, and character classification.

macro: A set of instructions that are recorded or written, and then typically saved to a file. When a macro is run, all of the instructions are performed automatically.

macro sheet: A single, logical container that is used to store and run Microsoft Excel 4.0 for Windows macro formulas.

page break: A divider that breaks a worksheet into separate pages for printing. Page breaks are inserted automatically based on the paper size, margin settings, scaling options, and the positions of any page breaks that are inserted manually.

page margin: The white space at the top, bottom, and sides of a document when a document is printed.

phonetic information: A series of characters that appear above text in a cell and provide information that helps users pronounce the text.

presentation: A collection of slides that are intended to be viewed by an audience.

protection: A mechanism that helps restrict users from making unwanted changes to the data or structure of a workbook.

range: An addressable region that is in a workbook. A range typically consists of zero or more cells and represents a single, contiguous rectangle of cells on a single sheet.

sheet: A worksheet. The term sheet frequently refers to a worksheet because worksheets are the most common type of sheet.

sheet view: A collection of display settings, such as which cells are shown, and the zoom level for a sheet window.

sort condition: A condition that determines how to sort cells in a range.

table: A list that is defined in a workbook.

Vector Markup Language (VML): A system of marking up or tagging two-dimensional vector graphics for publication on the World Wide Web. VML graphics are scalable and editable, and typically require less disk space and less time to download.

Visual Basic for Applications (VBA): A macro-based programming language that derives from Microsoft Visual Basic and can be used to customize and extend an application. Unlike Visual Basic, Microsoft Visual Basic for Applications (VBA) code and macros can be run only from within a host application that supports VBA.

workbook: A container for a collection of sheets.

worksheet: A single logical container for a set of tabular data and other objects in a workbook.

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.

[ISO/IEC29500-1:2016] ISO/IEC, "Information technology -- Document description and processing languages -- Office Open XML File Formats -- Part 1: Fundamentals and Markup Language Reference", ISO/IEC 29500-1:2016, <https://www.iso.org/standard/71691.html>

[ISO/IEC29500-3:2015] ISO/IEC, "Information technology -- Document description and processing languages -- Office Open XML File Formats -- Part 3: Markup Compatibility and Extensibility", <https://www.iso.org/standard/65533.html>

[ISO/IEC29500-4:2016] ISO/IEC, "Information technology -- Document description and processing languages -- Office Open XML File Formats -- Part 4: Transitional Migration Features", <https://www.iso.org/standard/71692.html>

[ISO/IEC29500:2012] ISO/IEC, "Information Technology -- Document description and processing languages -- Office Open XML File Formats -- Parts 1-4", ISO/IEC 29500-1:2012, http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=61750

[MS-OVBA] Microsoft Corporation, "[Office VBA File Format Structure](#)".

[MS-XLSB] Microsoft Corporation, "[Excel \(.xlsb\) Binary File Format](#)".

[MS-XLSX] Microsoft Corporation, "[Excel \(.xlsx\) Extensions to the Office Open XML SpreadsheetML File Format](#)".

[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>

[XMLSCHEMA1] Thompson, H., Beech, D., Maloney, M., and Mendelsohn, N., Eds., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>

[XMLSCHEMA2] Biron, P.V., Ed. and Malhotra, A., Ed., "XML Schema Part 2: Datatypes", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/>

1.2.2 Informative References

[ISO/IEC29500-2:2012] ISO/IEC, "Information technology -- Document description and processing languages -- Office Open XML File Formats -- Part 2: Open Packaging Conventions", ISO/IEC 29500-2:2012, http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=61796

1.3 Structure Overview

This file format specifies structures of macro-enabled WordprocessingML, SpreadsheetML, and PresentationML file formats that are either not present in or modified from non-macro-enabled WordprocessingML, SpreadsheetML, and PresentationML file formats described in [\[ISO/IEC29500-1:2016\]](#). **Document**, **Workbook**, and **Presentation** data are each contained in a compressed file (.zip) package conforming to the Open Packaging Conventions as described in [\[ISO/IEC29500-2:2012\]](#). Individual files stored in a ZIP package, called parts ([ISO/IEC29500-1:2016]), contain information about the content and structure of a document, workbook, or presentation. Some parts store information using **XML** and other parts store information by using binary data.

1.4 Relationship to Protocols and Other Structures

The structures specified in section [2](#) are dependent on the structures and concepts defined in the following references:

- [\[ISO/IEC29500-1:2016\]](#) for baseline WordprocessingML, SpreadsheetML, and PresentationML persistence formats.
- [\[ISO/IEC29500-2:2012\]](#) for open packaging conventions.
- [\[ISO/IEC29500-3:2015\]](#) for markup compatibility and extensibility.
- [\[ISO/IEC29500-4:2016\]](#) for backward compatibility considerations.

1.5 Applicability Statement

This document specifies a persistence format for structures either not present in or modified from the structures described in [\[ISO/IEC29500-1:2016\]](#) for WordprocessingML, SpreadsheetML, and PresentationML documents. The structures specified in this document are not applicable as a stand-

alone file format. Each structure specified in this document is integrated with [ISO/IEC29500-1:2016] WordprocessingML, SpreadsheetML, or PresentationML documents in a particular way, as specified in the section for that structure.

1.6 Versioning and Localization

None.

1.7 Vendor-Extensible Fields

None.

2 Structures

All global elements, global attributes, complex types, and simple types not defined in [\[ISO/IEC29500-1:2016\]](#) and not defined in the following target namespaces are extensions that use conventions specified in [\[ISO/IEC29500-3:2015\]](#):

- <http://schemas.microsoft.com/office/word/2006/wordml>
- <http://schemas.microsoft.com/office/excel/2006/main>
- <http://schemas.openxmlformats.org/presentationml/2006/main>
- <http://schemas.microsoft.com/office/excel/2008/2/main>

2.1 Macro-enabled WordprocessingML Structures

2.1.1 Part Enumeration

This section specifies the parts ([\[ISO/IEC29500-1:2016\]](#)) of the macro-enabled WordprocessingML file format that are different from the parts of the non-macro-enabled WordprocessingML file format specified in [\[ISO/IEC29500-1:2016\]](#) section 11.3. These parts and their relationships are summarized in the following table.

Part	Relationship target
Main Document (section 2.1.1.1)	WordprocessingML Package ([ISO/IEC29500-1:2016] section 11.2)
VBA Project (section 2.1.1.2)	Main Document (section 2.1.1.1)
VBA Supplemental Data (section 2.1.1.3)	VBA Project (section 2.1.1.2)

2.1.1.1 Main Document

Content Types:

- application/vnd.ms-word.document.macroEnabled.main+xml
- application/vnd.ms-word.template.macroEnabledTemplate.main+xml

Root Namespace: <http://schemas.openxmlformats.org/wordprocessingml/2006/main>

Source Relationship:

<http://schemas.openxmlformats.org/officeDocument/2006/relationships/officeDocument>

The part is modified from the Main Document specified in [\[ISO/IEC29500-1:2016\]](#), section 11.3.10.

A Main Document part is permitted to have an implicit relationship to the VBA Project part.

2.1.1.2 VBA Project

Content Type: application/vnd.ms-office.vbaProject

Root Namespace: Not applicable

Source Relationship: <http://schemas.microsoft.com/office/2006/relationships/vbaProject>

This part is specified in [\[MS-OVBA\]](#).

A package MUST contain at most one VBA Project part, which MUST be the target of an implicit relationship from the **Main Document** part (section [2.1.1.1](#)).

A VBA Project part MUST have an implicit relationship to the **VBA Supplemental Data** part (section [2.1.1.3](#)).

A VBA Project part MUST NOT have implicit or explicit relationships to any other part specified by this document or any part specified in [\[ISO/IEC29500-1:2016\]](#).

2.1.1.3 VBA Supplemental Data

Content Type: application/vnd.ms-word.vbaData+xml

Root Namespace: <http://schemas.microsoft.com/office/word/2006/wordml>

Source Relationship: <http://schemas.microsoft.com/office/2006/relationships/wordVbaData>

An instance of this part type specifies **Visual Basic for Applications (VBA)** supplemental Data.

A VBA Supplemental Data part MUST be the target of an implicit relationship from the **VBA Project** part (section [2.1.1.2](#)).

A VBA Supplemental Data part MUST NOT have implicit or explicit relationships to any other part specified by this document or any part specified in [\[ISO/IEC29500-1:2016\]](#).

The root element for a part of this content type MUST be **vbaSuppData** (section [2.1.3.1](#)).

2.1.2 Extensions

None.

2.1.3 Global Elements

2.1.3.1 vbaSuppData

Target namespace: <http://schemas.microsoft.com/office/word/2006/wordml>

A **CT_VbaSuppData** element (section [2.1.5.4](#)) that specifies supplemental **Visual Basic for Applications (VBA)** data.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this element.

```
<xsd:element name="vbaSuppData" type="CT_VbaSuppData"/>
```

2.1.4 Global Attributes

None.

2.1.5 Complex Types

2.1.5.1 CT_DocEvents

Target namespace: <http://schemas.microsoft.com/office/word/2006/wordml>

Referenced by: [CT_VbaSuppData](#)

A complex type that specifies a container of **document** events that are active for this document.

Child Elements:

eventDocNew: An element that specifies that the **New** event is active.

eventDocOpen: An element that specifies that the **Open** event is active.

eventDocClose: An element that specifies that the **Close** event is active.

eventDocSync: An element that specifies that the **Sync** event is active.

eventDocXmlAfterInsert: An element that specifies that the **XmlAfterInsert** event is active.

eventDocXmlBeforeDelete: An element that specifies that the **XmlBeforeDelete** event is active.

eventDocContentControlAfterInsert: An element that specifies that the **ContentControlAfterInsert** event is active.

eventDocContentControlBeforeDelete: An element that specifies that the **ContentControlBeforeDelete** event is active.

eventDocContentControlOnExit: An element that specifies that the **ContentControlOnExit** event is active.

eventDocContentControlOnEnter: An element that specifies that the **ContentControlOnEnter** event is active.

eventDocStoreUpdate: An element that specifies that the **StoreUpdate** event is active.

eventDocContentControlContentUpdate: An element that specifies that the **ContentControlContentUpdate** event is active.

eventDocBuildingBlockAfterInsert: An element that specifies that the **BuildingBlockAfterInsert** event is active.

The following W3C XML Schema ([\[XMLSHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_DocEvents">
  <xsd:sequence>
    <xsd:element name="eventDocNew" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocOpen" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocClose" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocSync" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocXmlAfterInsert" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocXmlBeforeDelete" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlAfterInsert" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlBeforeDelete" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlOnExit" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlOnEnter" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocStoreUpdate" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlContentUpdate" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocBuildingBlockAfterInsert" minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
</xsd:complexType>
```

2.1.5.2 CT_Mcd

Target namespace: <http://schemas.microsoft.com/office/word/2006/wordml>

Referenced by: [CT_Mcnds](#)

A complex type that specifies a macro.

Attributes:

macroName: An **ST_String** attribute ([\[ISO/IEC29500-1:2016\]](#) section 22.9.2.13) that MUST equal the **name** attribute with every character set to uppercase.

name: An **ST_String** attribute ([ISO/IEC29500-1:2016] section 22.9.2.13) that specifies the name of the **macro**. This attribute MUST NOT exceed 255 characters.

menuHelp: An **ST_String** attribute ([ISO/IEC29500-1:2016] section 22.9.2.13) that MUST be ignored.

bEncrypt: An **ST_UcharHexNumber** attribute ([ISO/IEC29500-1:2016] section 17.18.98) that MUST be 0.

cmg: An **ST_UcharHexNumber** attribute ([ISO/IEC29500-1:2016] section 17.18.98) that MUST be 56.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_Mcd">
  <xsd:attribute name="macroName" type="w:ST_String" use="optional"/>
  <xsd:attribute name="name" type="w:ST_String" use="optional"/>
  <xsd:attribute name="menuHelp" type="w:ST_String" use="optional"/>
  <xsd:attribute name="bEncrypt" type="w:ST_UcharHexNumber"/>
  <xsd:attribute name="cmg" type="w:ST_UcharHexNumber"/>
</xsd:complexType>
```

2.1.5.3 CT_Mcnds

Target namespace: <http://schemas.microsoft.com/office/word/2006/wordml>

Referenced by: [CT_VbaSuppData](#)

A complex type that specifies a collection of **macros**.

Child Elements:

mcd: A **CT_Mcd** element (section [2.1.5.2](#)) that specifies a macro.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_Mcnds">
  <xsd:sequence>
    <xsd:element name="mcd" type="CT_Mcd" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

2.1.5.4 CT_VbaSuppData

Target namespace: <http://schemas.microsoft.com/office/word/2006/wordml>

Referenced by: [vbaSuppData](#)

A complex type that specifies document events and **macro** information for the VBA project.

Child Elements:

docEvents: A **CT_DocEvents** element (section [2.1.5.1](#)) that specifies a container of document events that are active for this document.

mcids: A **CT_Mcids** element (section [2.1.5.3](#)) that specifies a collection of macros stored in the VBA project.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_VbaSuppData">
  <xsd:sequence>
    <xsd:element name="docEvents" type="CT_DocEvents" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="mcids" type="CT_Mcids" minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
</xsd:complexType>
```

2.1.6 Simple Types

None.

2.2 Macro-enabled SpreadsheetML structures

2.2.1 Part Enumeration

This section specifies the parts ([\[ISO/IEC29500-1:2016\]](#)) of the macro-enabled SpreadsheetML file format that are different from the parts of the non-macro-enabled SpreadsheetML file format specified in [\[ISO/IEC29500-1:2016\]](#) section 12.3. These parts and their relationships are summarized in the following table.

Part	Relationship target
International Macro Sheet (section 2.2.1.1)	Workbook (section 2.2.1.4)
Macro Sheet (section 2.2.1.2)	Workbook (section 2.2.1.4)
VBA Project (section 2.2.1.3)	Workbook (section 2.2.1.4)
Workbook (section 2.2.1.4)	SpreadsheetML Package ([ISO/IEC29500-1:2016] section 12.2)

2.2.1.1 International Macro Sheet

Content Type: application/vnd.ms-excel.intlmacrosheet+xml

Root Namespace: <http://schemas.microsoft.com/office/excel/2006/main>

Source Relationship: <http://schemas.microsoft.com/office/2006/relationships/xlIntlMacrosheet>

An instance of this part type specifies the same information as a **Macro Sheet** part type (section [2.2.1.2](#)). When this part type is present, the associated **macro sheet** will display and operate with the US English **locale**, regardless of what the product locale, user locale, or system locale is. This will maximize compatibility when running under various locales.

2.2.1.2 Macro Sheet

Content Type: application/vnd.ms-excel.macrosheet+xml

Root Namespace: <http://schemas.microsoft.com/office/excel/2006/main>

Source Relationship: <http://schemas.microsoft.com/office/2006/relationships/xlMacrosheet>

An instance of this part type specifies a **macro sheet**. References to the macro sheet part in this document include **international macro sheets** (section [2.2.1.1](#)) as well.

A macro sheet part **MUST** be the target of an explicit relationship from the **Workbook** part (section [2.2.1.4](#)).

The root element for a part of this content type **MUST** be **macrosheet** (section [2.2.3.1](#)).

A macro sheet part is permitted to have implicit relationships to the following parts specified in [\[ISO/IEC29500-1:2016\]](#):

- Comments

A macro sheet part is permitted to have implicit relationships to the following parts specified in [\[MS-XLSB\]](#):

- Macro Sheet Binary Index
- Sort Map

A macro sheet part is permitted to have explicit relationships to the following parts specified in [\[ISO/IEC29500-1:2016\]](#):

- Custom Property
- Drawings
- OLE Object
- OLE Package
- Images
- Printer Settings
- **VML** Drawing

A macro sheet part **MUST NOT** have implicit or explicit relationships to any other part specified in [\[ISO/IEC29500-1:2016\]](#).

A formula ([\[ISO/IEC29500-1:2016\]](#) section 18.17) in a macro sheet is specified by **Formulas** (section [2.2.7](#)), which is an extension of the definition in [\[MS-XLSX\]](#) section 2.2.2.

2.2.1.3 VBA Project

Content Type: application/vnd.ms-office.vbaProject

Root Namespace: Not applicable

Source Relationship: <http://schemas.microsoft.com/office/2006/relationships/vbaProject>

This part is specified in [\[MS-OVBA\]](#).

A package MUST contain at most one VBA Project part, which MUST be the target of an implicit relationship from the **Workbook** part (section [2.2.1.4](#)).

A VBA Project part MUST NOT have implicit or explicit relationships to any other part specified by this document or any other part specified in [\[ISO/IEC29500-1:2016\]](#).

2.2.1.4 Workbook

Content Types:

- application/vnd.ms-excel.sheet.macroEnabled.main+xml
- application/vnd.ms-excel.template.macroEnabled.main+xml

Root Namespace: <http://schemas.openxmlformats.org/spreadsheetml/2006/main>

Source Relationship:

<http://schemas.openxmlformats.org/officeDocument/2006/relationships/officeDocument>

This part is modified from the part specified in [\[ISO/IEC29500-1:2016\]](#) Part1, section 12.3.23.

A Workbook part is permitted to have an implicit relationship to the **VBA Project** (section [2.2.1.3](#)), **Macro Sheet** (section [2.2.1.2](#)), and **International Macro Sheet** (section [2.2.1.1](#)) parts.

2.2.2 Excel Extensions

Extensions are specified by using conventions provided by [\[ISO/IEC29500-3:2015\]](#).

2.2.2.1 Extensions by Part

This section specifies the elements from [\[ISO/IEC29500-1:2016\]](#) that are extended by this format. Either the **Ignorable** attribute ([\[ISO/IEC29500-3:2015\]](#) section 10.1.1), **AlternateContent** element ([\[ISO/IEC29500-3:2015\]](#) section 10.2.1), or **extLst** element ([\[ISO/IEC29500-1:2016\]](#) section 18.2.10) MUST be used to maintain compatibility with ISO/IEC 29500 implementations.

2.2.2.1.1 extLst

The **extLst** ([\[ISO/IEC29500-1:2016\]](#) section 18.2.10) child element of the workbook ([\[ISO/IEC29500-1:2016\]](#) section 18.2.27) element is extended by the addition of new child **ext** ([\[ISO/IEC29500-1:2016\]](#) section 18.2.7) elements, whose structure is specified in the following table.

Ext uri	Child element
{8193D73E-4604-4355-AFF4-8A2333D13BE4}	definedNames (section 2.2.3.2)

For more information about how extension lists are used, see [\[ISO/IEC29500-1:2016\]](#) section 18.2.10.

2.2.3 Global Elements

2.2.3.1 macrosheet

Target namespace: <http://schemas.microsoft.com/office/excel/2006/main>

A **CT_Worksheet** element (section [2.2.5.1](#)) that specifies a **macro sheet**.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this element.

```
<xsd:element name="macrosheet" type="CT_Worksheet"/>
```

2.2.3.2 definedNames

Target namespace: <http://schemas.microsoft.com/office/excel/2008/2/main>

A **CT_DefinedNames** element (section [2.2.5.2](#)) that specifies additional properties for **macros**.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this element.

```
<xsd:element name="definedNames" type="CT_DefinedNames"/>
```

2.2.4 Global Attributes

None.

2.2.5 Complex Types

2.2.5.1 CT_Worksheet

Target namespace: <http://schemas.microsoft.com/office/excel/2006/main>

Referenced by: [macrosheet](#)

A complex type that specifies properties for a **macro sheet**.

Child Elements:

sheetPr: A **CT_SheetPr** element ([\[ISO/IEC29500-1:2016\]](#) section A.2) that specifies sheet-level properties.

dimension: A **CT_SheetDimension** element ([\[ISO/IEC29500-1:2016\]](#) section A.2) that specifies the used **range** of the **worksheet**.

sheetViews: A **CT_SheetViews** element ([\[ISO/IEC29500-1:2016\]](#) section A.2) that specifies **sheet view** information.

sheetFormatPr: A **CT_SheetFormatPr** element ([\[ISO/IEC29500-1:2016\]](#) section A.2) that specifies **sheet** formatting properties.

cols: A **CT_Cols** element ([\[ISO/IEC29500-1:2016\]](#) section A.2) that specifies information about whole columns of the worksheet.

sheetData: A **CT_SheetData** element ([\[ISO/IEC29500-1:2016\]](#) section A.2) that specifies the Worksheet ([\[ISO/IEC29500-1:2016\]](#) section 18.3) cell table.

sheetCalcPr: This element MUST be ignored in a macro sheet.

sheetProtection: A **CT_SheetProtection** element ([\[ISO/IEC29500-1:2016\]](#) section A.2) that specifies sheet **protection** options.

protectedRanges: This element MUST be ignored in a macro sheet.

scenarios: This element MUST be ignored in a macro sheet.

autoFilter: A **CT_AutoFilter** element ([ISO/IEC29500-1:2016] section A.2) that specifies **AutoFilter** settings.

sortState: A **CT_SortState** element ([ISO/IEC29500-1:2016] section A.2) that specifies the different **sort conditions** that apply to a range.

dataConsolidate: A **CT_DataConsolidate** element ([ISO/IEC29500-1:2016] section A.2) that specifies **data consolidation** settings.

customSheetViews: A **CT_CustomSheetViews** element ([ISO/IEC29500-1:2016] section A.2) that specifies custom sheet views.

mergeCells: This element MUST be ignored in a macro sheet.

phoneticPr: A **CT_PhoneticPr** element ([ISO/IEC29500-1:2016] section A.2) that specifies default **phonetic information**.

conditionalFormatting: A **CT_ConditionalFormatting** element ([ISO/IEC29500-1:2016] section A.2) that specifies **conditional formatting** rules.

dataValidations: This element MUST be ignored in a macro sheet.

hyperlinks: This element MUST be ignored in a macro sheet.

printOptions: A **CT_PrintOptions** element ([ISO/IEC29500-1:2016] section A.2) that specifies print options for the sheet.

pageMargins: A **CT_PageMargins** element ([ISO/IEC29500-1:2016] section A.2) that specifies **page margins** for the sheet.

pageSetup: A **CT_PageSetup** element ([ISO/IEC29500-1:2016] section A.2) that specifies page setup settings for the sheet.

headerFooter: A **CT_HeaderFooter** element ([ISO/IEC29500-1:2016] section A.2) that specifies header and footer settings.

rowBreaks: A **CT_PageBreak** element ([ISO/IEC29500-1:2016] section A.2) that specifies horizontal **page break** information.

colBreaks: A **CT_PageBreak** element ([ISO/IEC29500-1:2016] section A.2) that specifies vertical page break information.

customProperties: A **CT_CustomProperties** element ([ISO/IEC29500-1:2016] section A.2) that specifies references to binary parts containing arbitrary user-defined data.

cellWatches: This element MUST be ignored in a macro sheet.

ignoredErrors: This element MUST be ignored in a macro sheet.

smartTags: This element MUST be ignored in a macro sheet.

drawing: A **CT_Drawing** element ([ISO/IEC29500-1:2016] section A.2) that specifies a reference to a drawing part ([ISO/IEC29500-1:2016] section 12.3.8) containing one or more drawing ([ISO/IEC29500-1:2016] section 20.5) elements.

picture: A **CT_SheetBackgroundPicture** element ([ISO/IEC29500-1:2016] section A.2) that specifies a background image of a sheet.

oleObjects: A **CT_OleObjects** element ([ISO/IEC29500-1:2016] section A.2) that specifies **embedded objects** in the sheet.

controls: This element MUST be ignored in a macro sheet.

webPublishItems: A **CT_WebPublishItems** element ([ISO/IEC29500-1:2016] section A.2) that specifies individual objects that have been published to **HTML**.

tableParts: A **CT_TableParts** element ([ISO/IEC29500-1:2016] section A.2) that specifies references to parts specifying every **table** on the sheet.

extLst: A **CT_ExtensionList** element ([ISO/IEC29500-1:2016] section A.2) that specifies future extensions to this format.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_Worksheet">
  <xsd:sequence>
    <xsd:element name="sheetPr" type="x:CT_SheetPr" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="dimension" type="x:CT_SheetDimension" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="sheetViews" type="x:CT_SheetViews" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="sheetFormatPr" type="x:CT_SheetFormatPr" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="cols" type="x:CT_Cols" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="sheetData" type="x:CT_SheetData" minOccurs="1" maxOccurs="1"/>
    <xsd:element name="sheetCalcPr" type="x:CT_SheetCalcPr" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="sheetProtection" type="x:CT_SheetProtection" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="protectedRanges" type="x:CT_ProtectedRanges" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="scenarios" type="x:CT_Scenarios" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="autoFilter" type="x:CT_AutoFilter" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="sortState" type="x:CT_SortState" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="dataConsolidate" type="x:CT_DataConsolidate" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="customSheetViews" type="x:CT_CustomSheetViews" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="mergeCells" type="x:CT_MergeCells" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="phoneticPr" type="x:CT_PhoneticPr" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="conditionalFormatting" type="x:CT_ConditionalFormatting" minOccurs="0"
maxOccurs="unbounded"/>
    <xsd:element name="dataValidations" type="x:CT_DataValidations" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="hyperlinks" type="x:CT_Hyperlinks" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="printOptions" type="x:CT_PrintOptions" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="pageMargins" type="x:CT_PageMargins" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="pageSetup" type="x:CT_PageSetup" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="headerFooter" type="x:CT_HeaderFooter" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="rowBreaks" type="x:CT_PageBreak" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="colBreaks" type="x:CT_PageBreak" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="customProperties" type="x:CT_CustomProperties" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="cellWatches" type="x:CT_CellWatches" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="ignoredErrors" type="x:CT_IgnoredErrors" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="smartTags" type="x:CT_SmartTags" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="drawing" type="x:CT_Drawing" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="picture" type="x:CT_SheetBackgroundPicture" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="oleObjects" type="x:CT_OleObjects" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="controls" type="x:CT_Controls" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="webPublishItems" type="x:CT_WebPublishItems" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="tableParts" type="x:CT_TableParts" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="extLst" type="x:CT_ExtensionList" minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
</xsd:complexType>
```

2.2.5.2 CT_DefinedNames

Target namespace: <http://schemas.microsoft.com/office/excel/2008/2/main>

Referenced by: [definedNames](#)

A complex type that specifies a group of additional properties for **macros**.

Child Elements:

definedName: A **CT_DefinedName** element (section [2.2.5.3](#)) that specifies additional properties for a particular macro.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_DefinedNames">
  <xsd:sequence>
    <xsd:element name="definedName" type="CT_DefinedName" minOccurs="1"
maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

2.2.5.3 CT_DefinedName

Target namespace: <http://schemas.microsoft.com/office/excel/2008/2/main>

Referenced by: [CT_DefinedNames](#)

A complex type that specifies additional properties for a **macro** named **name**.

Child Elements:

argumentDescriptions: A **CT_DefinedNameArgumentDescriptions** element (section [2.2.5.4](#)) that specifies a group of descriptions for the macro arguments if the macro has arguments.

Attributes:

name: An **ST_Xstring** attribute ([\[ISO/IEC29500-1:2016\]](#) section 22.9.2.19) that specifies the name of a macro. The **name** attribute value MUST be unique for each **CT_DefinedName** element inside the **CT_DefinedNames** element (section 2.2.5.2). At least one of the following conditions MUST be true: There exists a **CT_DefinedName** ([\[ISO/IEC29500-1:2016\]](#) section A.2) element with a **name** attribute equal to this value and either the **vbProcedure** attribute or the **xlm** attribute is equal to 1, or there exists a **Visual Basic for Applications (VBA)** macro having a name equal to this value.

The string MUST adhere to the **name** grammar as specified in [\[MS-XLSX\]](#) section 2.2.2.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_DefinedName">
  <xsd:sequence>
    <xsd:element name="argumentDescriptions" type="CT_DefinedNameArgumentDescriptions"
minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
  <xsd:attribute name="name" type="x:ST_Xstring" use="required"/>
</xsd:complexType>
```

2.2.5.4 CT_DefinedNameArgumentDescriptions

Target namespace: <http://schemas.microsoft.com/office/excel/2008/2/main>

Referenced by: [CT_DefinedName](#)

A complex type that specifies a group of argument descriptions for a particular **macro**.

Child Elements:

argumentDescription: A **CT_DefinedNameArgumentDescription** element (section [2.2.5.5](#)) that specifies an argument description for a particular macro. Each **index** attribute of these child elements **MUST** be unique for all **CT_DefinedNameArgumentDescription** elements (section 2.2.5.5) within this **CT_DefinedNameArgumentDescriptions** element.

Attributes:

count: An **unsignedInt** attribute ([\[XMLSCHEMA2\]](#) section 3.3.22) that specifies the number of **CT_DefinedNameArgumentDescription** child elements (section 2.2.5.5) of this element and specifies the number of argument descriptions of the associated macro. **MUST** be greater than or equal to 1 and **MUST** be less than or equal to 60.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_DefinedNameArgumentDescriptions">
  <xsd:sequence>
    <xsd:element name="argumentDescription" type="CT_DefinedNameArgumentDescription"
minOccurs="1" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="count" type="xsd:unsignedInt" use="optional"/>
</xsd:complexType>
```

2.2.5.5 CT_DefinedNameArgumentDescription

Target namespace: <http://schemas.microsoft.com/office/excel/2008/2/main>

Referenced by: [CT_DefinedNameArgumentDescriptions](#)

A complex type that specifies an argument description for a particular argument of a **macro**. The length of the ST_Xstring ([\[ISO/IEC29500-1:2016\]](#) section 22.9.2.19) **MUST** be less than or equal to 255.

Attributes:

index: An **unsignedInt** attribute ([\[XMLSCHEMA2\]](#) section 3.3.22) that specifies the zero-based index referring to the argument at position **index** of the associated macro. **MUST** be less than the **count** attribute value in the parent **CT_DefinedNameArgumentDescription** element (section 2.2.5.5).

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment defines the contents of this complex type.

```
<xsd:complexType name="CT_DefinedNameArgumentDescription">
  <xsd:simpleContent>
    <xsd:extension base="x:ST_Xstring">
      <xsd:attribute name="index" type="xsd:unsignedInt" use="required"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

2.2.6 Simple Types

None.

2.2.7 Formulas

```
function-call =/ (macro-function-call / command-function-call)
```

2.3 Macro-Enabled PresentationML Structures

2.3.1 Part Enumeration

This section specifies the parts ([\[ISO/IEC29500-1:2016\]](#)) of the macro-enabled PresentationML file format that are different from the parts of the non-macro-enabled PresentationML file format specified in [\[ISO/IEC29500-1:2016\]](#) section 13.3. These parts and their relationships are summarized in the following table.

Part	Relationship target
Presentation (section 2.3.1.1)	PresentationML Package ([ISO/IEC29500-1:2016] section 13.2)
VBA Project (section 2.3.1.2)	Presentation (section 2.3.1.1)

2.3.1.1 Presentation

Content Types:

- application/vnd.ms-powerpoint.presentation.macroEnabled.main+xml
- application/vnd.ms-powerpoint.slideshow.macroEnabled.main+xml
- application/vnd.ms-powerpoint.template.macroEnabled.main+xml

Root Namespace: <http://schemas.openxmlformats.org/presentationml/2006/main>

Source Relationship:

<http://schemas.openxmlformats.org/officeDocument/2006/relationships/officeDocument>

This part is modified from the **presentation** part specified in [\[ISO/IEC29500-1:2016\]](#) Part 1, section 13.3.6. presentation part is permitted to have an implicit relationship to the VBA Project part.

2.3.1.2 VBA Project

Content Type: application/vnd.ms-office.vbaProject

Root Namespace: Not applicable

Source Relationship: <http://schemas.microsoft.com/office/2006/relationships/vbaProject>

This part is specified in [\[MS-OVBA\]](#).

A package MUST contain at most one VBA Project part, which MUST be the target of an implicit relationship from the **presentation** part (section [2.3.1.1](#)).

A VBA Project part MUST NOT have implicit or explicit relationships to any other part specified by this document or any part specified in [\[ISO/IEC29500-1:2016\]](#).

2.3.2 Extensions

None.

2.3.3 Global Elements

None.

2.3.4 Global Attributes

None.

2.3.5 Complex Types

2.3.5.1 CT_SlideMasterIdListEntry

Target namespace: <http://schemas.openxmlformats.org/presentationml/2006/main>

This element specifies a slide master that is available within the corresponding presentation. A slide master is a slide that is specifically designed to be a template for all related child layout slides.

This complex type is modified from the sldMasterId specified in [\[ISO/IEC29500-1:2016\]](#), section 19.2.1.36.

The id attribute of this part MUST be present in the macro-enabled PresentationML format.

2.3.6 Simple Types

None.

3 Structure Examples

3.1 VBA Supplemental Data Part

This example shows a usage of a Word **VBA Supplemental Data** part (section [2.1.1.3](#)). Consider the following XML, showing the complete contents of the **VBA Supplemental Data** part (section 2.1.1.3) of a word-processing **document**.

```
<wne:vbaSuppData
  xmlns:ve="http://schemas.openxmlformats.org/markup-compatibility/2006"
  xmlns:o="urn:schemas-microsoft-com:office:office"
  xmlns:r="http://schemas.openxmlformats.org/officeDocument/2006/relationships"
  xmlns:m="http://schemas.openxmlformats.org/officeDocument/2006/math"
  xmlns:v="urn:schemas-microsoft-com:vml"
  xmlns:wp="http://schemas.openxmlformats.org/drawingml/2006/wordprocessingDrawing"
  xmlns:w10="urn:schemas-microsoft-com:office:word"
  xmlns:w="http://schemas.openxmlformats.org/wordprocessingml/2006/main"
  xmlns:wne="http://schemas.microsoft.com/office/word/2006/wordml">
  <wne:docEvents>
    <wne:eventDocOpen/>
    <wne:eventDocXmlAfterInsert/>
  </wne:docEvents>
  <wne:mcds>
    <wne:mcd wne:macroName="PROJECT.NEWMACROS.MACRO1" wne:name="Project.NewMacros.Macro1"
wne:bEncrypt="00" wne:cmg="56"/>
  </wne:mcds>
</wne:vbaSuppData>
```

The **docEvents** child of the **vbaSuppData** element (section [2.1.3.1](#)) specifies that both the Open event and the XMLAfterInsert event are active for this document. The **mcds** element of the **vbaSuppData** element (section 2.1.3.1) contains an **mcd** element that specifies **macro** information for the "Project.NewMacros.Macro1" macro.

3.2 Macro Sheet Part

This example shows a usage of an Excel **macro sheet** part (section [2.2.1.2](#)). Consider the following **XML**, showing the complete contents of a **macro sheet** part (section 2.2.1.2) of a workbook.

```
<xm:macrosheet
  xmlns="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
  xmlns:xm="http://schemas.microsoft.com/office/excel/2006/main"
  xmlns:r="http://schemas.openxmlformats.org/officeDocument/2006/relationships">
  <dimension ref="A1"/>
  <sheetViews>
    <sheetView showFormulas="1" tabSelected="1" workbookViewId="0">
      <selection activeCell="A2" sqref="A2"/>
    </sheetView>
  </sheetViews>
  <sheetFormatPr defaultRowHeight="15"/>
  <sheetData>
    <row r="1" spans="1:1">
      <c r="A1" t="b">
        <f>ACTIVATE ()</f>
        <v>0</v>
      </c>
    </row>
  </sheetData>
  <pageMargins left="0.7" right="0.7" top="0.75" bottom="0.75" header="0.3" footer="0.3"/>
</xm:macrosheet>
```

The **macrosheet** element (section [2.2.3.1](#)) specifies the **macro sheet**. A formula following the grammar specified in section [2.2.7](#) is specified by the **f** element ([\[ISO/IEC29500-1:2016\]](#) section 18.17).

4 Security Considerations

4.1 Security Considerations for Implementers

None.

4.2 Index of Security Fields

None.

5 Appendix A: Full XML Schemas

For ease of implementation, this section provides the full W3C XML Schemas for the new elements, attributes, complex types, and simple types specified in the preceding sections. Any schema references to namespaces included in [\[ISO/IEC29500:2012\]](#) refer specifically to the transitional schemas as specified in [\[ISO/IEC29500-4:2016\]](#).

5.1 <http://schemas.microsoft.com/office/word/2006/wordml> Schema

```
<xsd:schema elementFormDefault="qualified"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:r="http://schemas.openxmlformats.org/officeDocument/2006/relationships"
xmlns:w="http://schemas.openxmlformats.org/wordprocessingml/2006/main"
xmlns="http://schemas.microsoft.com/office/word/2006/wordml"
targetNamespace="http://schemas.microsoft.com/office/word/2006/wordml">
  <xsd:import namespace="http://schemas.openxmlformats.org/wordprocessingml/2006/main"
schemaLocation="word12.xsd" />
  <xsd:import id="rel"
namespace="http://schemas.openxmlformats.org/officeDocument/2006/relationships"
schemaLocation="orel.xsd" />
  <xsd:element name="vbaSuppData" type="CT_VbaSuppData"/>
  <xsd:complexType name="CT_DocEvents">
    <xsd:sequence>
      <xsd:element name="eventDocNew" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocOpen" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocClose" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocSync" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocXmlAfterInsert" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocXmlBeforeDelete" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlAfterInsert" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlBeforeDelete" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlOnExit" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlOnEnter" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocStoreUpdate" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlContentUpdate" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocBuildingBlockAfterInsert" minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_Mcd">
    <xsd:attribute name="macroName" type="w:ST_String" use="optional"/>
    <xsd:attribute name="name" type="w:ST_String" use="optional"/>
    <xsd:attribute name="menuHelp" type="w:ST_String" use="optional"/>
    <xsd:attribute name="bEncrypt" type="w:ST_UcharHexNumber"/>
    <xsd:attribute name="cmg" type="w:ST_UcharHexNumber"/>
  </xsd:complexType>
  <xsd:complexType name="CT_McDs">
    <xsd:sequence>
      <xsd:element name="mcd" type="CT_Mcd" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_VbaSuppData">
    <xsd:sequence>
      <xsd:element name="docEvents" type="CT_DocEvents" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="mcds" type="CT_McDs" minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:schema>
```

5.2 <http://schemas.microsoft.com/office/excel/2006/main> Schema

```
<xsd:schema elementFormDefault="qualified" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns="http://schemas.microsoft.com/office/excel/2006/main"
xmlns:x="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
xmlns:r="http://schemas.openxmlformats.org/officeDocument/2006/relationships">
```

```

targetNamespace="http://schemas.microsoft.com/office/excel/2006/main"
<xsd:import namespace="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
schemaLocation="xlsheet.xsd" />
<xsd:import
namespace="http://schemas.microsoft.com/office/excel/2006/main"
schemaLocation="xlmacrosheet.xsd" />
<xsd:element name="macrosheet" type="CT_Worksheet"/>
<xsd:complexType name="CT_Worksheet">
<xsd:sequence>
<xsd:element name="sheetPr" type="x:CT_SheetPr" minOccurs="0" maxOccurs="1"/>
<xsd:element name="dimension" type="x:CT_SheetDimension" minOccurs="0" maxOccurs="1"/>
<xsd:element name="sheetViews" type="x:CT_SheetViews" minOccurs="0" maxOccurs="1"/>
<xsd:element name="sheetFormatPr" type="x:CT_SheetFormatPr" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="cols" type="x:CT_Cols" minOccurs="0" maxOccurs="unbounded"/>
<xsd:element name="sheetData" type="x:CT_SheetData" minOccurs="1" maxOccurs="1"/>
<xsd:element name="sheetCalcPr" type="x:CT_SheetCalcPr" minOccurs="0" maxOccurs="1"/>
<xsd:element name="sheetProtection" type="x:CT_SheetProtection" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="protectedRanges" type="x:CT_ProtectedRanges" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="scenarios" type="x:CT_Scenarios" minOccurs="0" maxOccurs="1"/>
<xsd:element name="autoFilter" type="x:CT_AutoFilter" minOccurs="0" maxOccurs="1"/>
<xsd:element name="sortState" type="x:CT_SortState" minOccurs="0" maxOccurs="1"/>
<xsd:element name="dataConsolidate" type="x:CT_DataConsolidate" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="customSheetViews" type="x:CT_CustomSheetViews" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="mergeCells" type="x:CT_MergeCells" minOccurs="0" maxOccurs="1"/>
<xsd:element name="phoneticPr" type="x:CT_PhoneticPr" minOccurs="0" maxOccurs="1"/>
<xsd:element name="conditionalFormatting" type="x:CT_ConditionalFormatting"
minOccurs="0" maxOccurs="unbounded"/>
<xsd:element name="dataValidations" type="x:CT_DataValidations" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="hyperlinks" type="x:CT_Hyperlinks" minOccurs="0" maxOccurs="1"/>
<xsd:element name="printOptions" type="x:CT_PrintOptions" minOccurs="0" maxOccurs="1"/>
<xsd:element name="pageMargins" type="x:CT_PageMargins" minOccurs="0" maxOccurs="1"/>
<xsd:element name="pageSetup" type="x:CT_PageSetup" minOccurs="0" maxOccurs="1"/>
<xsd:element name="headerFooter" type="x:CT_HeaderFooter" minOccurs="0" maxOccurs="1"/>
<xsd:element name="rowBreaks" type="x:CT_PageBreak" minOccurs="0" maxOccurs="1"/>
<xsd:element name="colBreaks" type="x:CT_PageBreak" minOccurs="0" maxOccurs="1"/>
<xsd:element name="customProperties" type="x:CT_CustomProperties" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="cellWatches" type="x:CT_CellWatches" minOccurs="0" maxOccurs="1"/>
<xsd:element name="ignoredErrors" type="x:CT_IgnoredErrors" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="smartTags" type="x:CT_SmartTags" minOccurs="0" maxOccurs="1"/>
<xsd:element name="drawing" type="x:CT_Drawing" minOccurs="0" maxOccurs="1"/>
<xsd:element name="picture" type="x:CT_SheetBackgroundPicture" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="oleObjects" type="x:CT_OleObjects" minOccurs="0" maxOccurs="1"/>
<xsd:element name="controls" type="x:CT_Controls" minOccurs="0" maxOccurs="1"/>
<xsd:element name="webPublishItems" type="x:CT_WebPublishItems" minOccurs="0"
maxOccurs="1"/>
<xsd:element name="tableParts" type="x:CT_TableParts" minOccurs="0" maxOccurs="1"/>
<xsd:element name="extLst" type="x:CT_ExtensionList" minOccurs="0" maxOccurs="1"/>
</xsd:sequence>
</xsd:complexType>
</xsd:schema>

```

5.3 http://schemas.microsoft.com/office/excel/2008/2/main Schema

```

<xsd:schema elementFormDefault="qualified"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:r="http://schemas.openxmlformats.org/officeDocument/2006/relationships"
xmlns="http://schemas.microsoft.com/office/excel/2008/2/main"
xmlns:x="http://schemas.openxmlformats.org/spreadsheetml/2006/main"

```

```

xmlns:xm="http://schemas.microsoft.com/office/excel/2006/main"
targetNamespace="http://schemas.microsoft.com/office/excel/2008/2/main">
  <xsd:import namespace="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
  schemaLocation="xlbasictypes.xsd" />
  <xsd:import namespace="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
  schemaLocation="xlsheet.xsd" />
  <xsd:import namespace="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
  schemaLocation="xlpivot.xsd" />
  <xsd:import namespace="http://schemas.openxmlformats.org/officeDocument/2006/relationships"
  schemaLocation="orel.xsd" />
  <xsd:import namespace="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
  schemaLocation="xlworkbook.xsd" />
  <xsd:import namespace="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
  schemaLocation="xlsupbook.xsd" />
  <xsd:element name="macrosheet" type="CT_Worksheet"/>
  <xsd:element name="definedNames" type="CT_DefinedNames"/>
  <xsd:complexType name="CT_DefinedName">
    <xsd:sequence>
      <xsd:element name="argumentDescriptions" type="CT_DefinedNameArgumentDescriptions"
minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
    <xsd:attribute name="name" type="x:ST_Xstring" use="required"/>
  </xsd:complexType>
  <xsd:complexType name="CT_DefinedNameArgumentDescription">
    <xsd:simpleContent>
      <xsd:extension base="x:ST_Xstring">
        <xsd:attribute name="index" type="xsd:unsignedInt" use="required"/>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
  <xsd:complexType name="CT_DefinedNameArgumentDescriptions">
    <xsd:sequence>
      <xsd:element name="argumentDescription" type="CT_DefinedNameArgumentDescription"
minOccurs="1" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="count" type="xsd:unsignedInt" use="optional"/>
  </xsd:complexType>
  <xsd:complexType name="CT_DefinedNames">
    <xsd:sequence>
      <xsd:element name="definedName" type="CT_DefinedName" minOccurs="1"
maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:schema>

```

6 Appendix B: 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 Office 2010 suites
- Microsoft Office 2013
- Microsoft Visual Basic for Applications 6.0 (VBA 6.0)
- Microsoft Visual Basic for Applications 7.0 (VBA 7.0)
- Microsoft Office 2016

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

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

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.
- A document revision that captures changes to protocol functionality.

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 **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

Section	Description	Revision class
1.4 Relationship to Protocols and Other Structures	Updated references [ISO/IEC29500-1:2012], [ISO/IEC29500-3:2012] and [ISO/IEC29500-4:2012] to [ISO/IEC29500-1:2016] [ISO/IEC29500-3:2015] and [ISO/IEC29500-4:2016].	Minor

8 Index

A

[Applicability](#) 8

C

[Change tracking](#) 30

[Common data types and fields](#) 10

Complex types

[CT_DefinedName](#) 20

[CT_DefinedNameArgumentDescription](#) 21

[CT_DefinedNameArgumentDescriptions](#) 21

[CT_DefinedNames](#) 20

[CT_DocEvents](#) 11

[CT_Mcd](#) 12

[CT_McDs](#) 13

[CT_SlideMasterIdListEntry](#) 23

[CT_VbaSuppData](#) 13

[CT_Worksheet](#) 17

[CT_DefinedName – complex type](#) 20

[CT_DefinedNameArgumentDescription – complex type](#) 21

[CT_DefinedNameArgumentDescriptions – complex type](#) 21

[CT_DefinedNames – complex type](#) 20

[CT_DocEvents – complex type](#) 11

[CT_Mcd – complex type](#) 12

[CT_McDs – complex type](#) 13

[CT_SlideMasterIdListEntry – complex type](#) 23

[CT_VbaSuppData – complex type](#) 13

[CT_Worksheet – complex type](#) 17

D

[Data types and fields - common](#) 10

[definedNames – global element](#) 17

Details

[common data types and fields](#) 10

[CT_DefinedName – complex type](#) 20

[CT_DefinedNameArgumentDescription – complex type](#) 21

[CT_DefinedNameArgumentDescriptions – complex type](#) 21

[CT_DefinedNames – complex type](#) 20

[CT_DocEvents – complex type](#) 11

[CT_Mcd – complex type](#) 12

[CT_McDs – complex type](#) 13

[CT_SlideMasterIdListEntry – complex type](#) 23

[CT_VbaSuppData – complex type](#) 13

[CT_Worksheet – complex type](#) 17

[definedNames – global element](#) 17

[Excel extensions - macro-enabled SpreadsheetML structures](#) 16

[extensions - macro-enabled PresentationML structures](#) 23

[extensions - macro-enabled WordprocessingML structures](#) 11

[extensions by part – Excel extensions](#) 16

[global attributes – macro-enabled PresentationML structures](#) 23

[global attributes – macro-enabled SpreadsheetML structures](#) 17

[global attributes – macro-enabled WordprocessingML structures](#) 11

[global elements – macro-enabled PresentationML structures](#) 23

[International Macro Sheet - part enumeration](#) 14

[Macro Sheet - part enumeration](#) 15

[macrosheet – global element](#) 16

[main document - part enumeration](#) 10

[part enumeration - macro-enabled PresentationML structures](#) 22

[part enumeration - macro-enabled SpreadsheetML structures](#) 14

[part enumeration - macro-enabled WordprocessingML structures](#) 10

[Presentation - part enumeration](#) 22

[simple types - macro-enabled PresentationML structures](#) 23

[simple types - macro-enabled SpreadsheetML structures](#) 22

[simple types - macro-enabled WordprocessingML structures](#) 14

[VBA Project - part enumeration \(section 2.1.1.2 10, section 2.2.1.3 15, section 2.3.1.2 22\)](#)

[VBA Supplemental Data - part enumeration](#) 11

[vbaSuppData – global element](#) 11

[Workbook - part enumeration](#) 16

E

Examples

[Macro Sheet Part](#) 24

[VBA Supplemental Data Part](#) 24

Excel extensions

[extensions by part](#) 16

[Excel extensions – macro-enabled SpreadsheetML structures](#) 16

[Extensions – macro-enabled PresentationML structures](#) 23

[Extensions – macro-enabled WordprocessingML structures](#) 11

[Extensions by part - Excel extensions](#) 16

F

[Fields - vendor-extensible](#) 9

[Full XML schema](#) 26

G

[Global attributes – macro-enabled PresentationML structures](#) 23

[Global attributes – macro-enabled SpreadsheetML structures](#) 17

[Global attributes – macro-enabled WordprocessingML structures](#) 11

Global elements

[definedNames](#) 17

[macrosheet](#) 16

[vbaSuppData](#) 11

[Global elements – macro-enabled PresentationML structures](#) 23
[Glossary](#) 6

I

[Implementer - security considerations](#) 25
[Informative references](#) 8
[International Macro Sheet - part enumeration](#) 14
[Introduction](#) 6

L

[Localization](#) 9

M

[Macro Sheet - part enumeration](#) 15
[Macro Sheet Part example](#) 24
[macrosheet – global element](#) 16
[Main document - part enumeration](#) 10

N

[Normative references](#) 7

O

[Overview \(synopsis\)](#) 8

P

Part enumeration
[International Macro Sheet](#) 14
[Macro Sheet](#) 15
[main document](#) 10
[Presentation](#) 22
VBA Project ([section 2.1.1.2](#) 10, [section 2.2.1.3](#) 15, [section 2.3.1.2](#) 22)
[VBA Supplemental Data](#) 11
[Workbook](#) 16
[Part enumeration – macro-enabled PresentationML structures](#) 22
[Part enumeration – macro-enabled SpreadsheetML structures](#) 14
[Part enumeration – macro-enabled WordprocessingML structures](#) 10
[Presentation - part enumeration](#) 22
[Product behavior](#) 29

R

[References](#) 7
[informative](#) 8
[normative](#) 7
[Relationship to protocols and other structures](#) 8

S

Security
[implementer considerations](#) 25
[index of security fields](#) 25
[Simple types – macro-enabled PresentationML structures](#) 23

[Simple types – macro-enabled SpreadsheetML structures](#) 22
[Simple types – macro-enabled WordprocessingML structures](#) 14

Structures

[overview](#) 10
Structures – macro-enabled PresentationML
[CT_SlideMasterIdListEntry – complex type](#) 23
[extensions](#) 23
[global attributes](#) 23
[global elements](#) 23
[part enumeration](#) 22
[Presentation - part enumeration](#) 22
[simple types](#) 23
[VBA Project - part enumeration](#) 22
Structures – macro-enabled SpreadsheetML
[CT_DefinedName – complex type](#) 20
[CT_DefinedNameArqumentDescription – complex type](#) 21
[CT_DefinedNameArqumentDescriptions – complex type](#) 21
[CT_DefinedNames – complex type](#) 20
[CT_Worksheet – complex type](#) 17
[definedNames – global element](#) 17
[Excel extensions](#) 16
[extensions by part - Excel extensions](#) 16
[global attributes](#) 17
[International Macro Sheet - part enumeration](#) 14
[Macro Sheet - part enumeration](#) 15
[macrosheet – global element](#) 16
[part enumeration](#) 14
[simple types](#) 22
[VBA Project - part enumeration](#) 15
[Workbook - part enumeration](#) 16
Structures – macro-enabled WordprocessingML
[CT_DocEvents – complex type](#) 11
[CT_Mcd – complex type](#) 12
[CT_McDs – complex type](#) 13
[CT_VbaSuppData – complex type](#) 13
[extensions](#) 11
[global attributes](#) 11
[main document - part enumeration](#) 10
[part enumeration](#) 10
[simple types](#) 14
[VBA Project - part enumeration](#) 10
[VBA Supplemental Data - part enumeration](#) 11
[vbaSuppData – global element](#) 11

T

[Tracking changes](#) 30

V

VBA Project - part enumeration ([section 2.1.1.2](#) 10, [section 2.2.1.3](#) 15, [section 2.3.1.2](#) 22)
[VBA Supplemental Data - part enumeration](#) 11
[VBA Supplemental Data Part example](#) 24
[vbaSuppData – global element](#) 11
[Vendor-extensible fields](#) 9
[Versioning](#) 9

W

[Workbook - part enumeration](#) 16

X

[XML schema](#) 26