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| | September 24, 2009 | |

TOC

**XML Media Types**
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**Status of this Memo**



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**Abstract**

This document standardizes three media types -- application/xml, application/xml-external-parsed-entity, and application/xml-dtd -- for use in exchanging network entities that are related to the Extensible

Markup Language (XML) while deprecating text/xml and text/xml-external-parsed-entity. This document also standardizes a convention (using the suffix '+xml') for naming media types outside of these five types when those media types represent XML MIME entities. XML MIME entities are currently exchanged via the HyperText Transfer Protocol on the World Wide Web, are an integral part of the WebDAV protocol for remote web authoring, and are expected to have utility in many domains.
Major differences from [RFC3023] (Murata, M., St.Laurent, S., and D. Kohn, “XML Media Types,” January 2001.) are deprecation of text/xml and text/xml-external-parsed-entity, the addition of XPointer and XML Base as fragment identifiers and base URIs, respectively, mention of the XPointer Registry, and updating of many references.

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**Table of Contents**

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## 1. Introduction

TOC

The World Wide Web Consortium has issued the Extensible Markup Language (XML) 1.0 specification. (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, “Extensible Markup Language (XML) 1.0 (Fifth Edition),” November 2008.) [XML]. To enable the exchange of XML network entities, this document standardizes three media types -- application/xml, application/xml-external-parsed-entity, and application/xml-dtd --, deprecates two media types -- text/xml and text/xml-external-parsed-entity --, as well as a naming convention for identifying XML-based MIME media types.

XML entities are currently exchanged on the World Wide Web, and XML is also used for property values and parameter marshalling by the WebDAV (Dusseault, L., “HTTP Extensions for Distributed Authoring -- WEBDAV,” June 2007.) [RFC4918] protocol for remote web authoring. Thus, there is a need for a media type to properly label the exchange of XML network entities.

Although XML is a subset of the Standard Generalized Markup Language (SGML) ISO 8879 (International Standard Organization, “Information Processing -- Text and Office Systems -- Standard Generalized Markup Language (SGML),” October 1986.) [SGML], which has been assigned the media types text/sgml and application/sgml, there are several reasons why use of text/sgml or application/sgml to label XML is inappropriate. First, there exist many applications that can process XML, but that cannot process SGML, due to SGML's larger feature set. Second, SGML applications cannot always process XML entities, because XML uses features of recent technical corrigenda to SGML. Third, the definition of text/sgml and application/sgml in [RFC1874] (Levinson, E., “SGML Media Types,” December 1995.) includes parameters for SGML bit combination transformation format (SGML-bctf), and SGML boot attribute (SGML-boot). Since XML does not use these parameters, it would be ambiguous if such parameters were given for an XML MIME entity. For these reasons, the best approach for labeling XML network entities has been to provide new media types for XML.

Since XML is an integral part of the WebDAV Distributed Authoring Protocol, and since World Wide Web Consortium Recommendations are assigned standards tree media types, and since similar media types (HTML, SGML) have been assigned standards tree media types, the XML media types were also placed in the standards tree [RFC3023] (Murata, M., St.Laurent, S., and D. Kohn, “XML Media Types,” January 2001.).

Similarly, XML has been used as a foundation for other media types, including types in every branch of the IETF media types tree. To facilitate the processing of such types, media types based on XML, but that are not identified using application/xml (or text/xml), SHOULD be named using a suffix of '+xml' as described in Section 8 (A Naming Convention for XML-Based Media Types). This will allow XML-based tools -- browsers, editors, search engines, and other processors -- to work with all XML-based media types.

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## 2. Notational Conventions

TOC

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119] (Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," March 1997.).

As defined in [RFC2781] (Hoffman, P. and F. Yergeau, "UTF-16, an encoding of ISO 10646," Februrary 2000.) (informative), the three charsets "utf-16", "utf-16le", and "utf-16be" are used to label UTF-16 text. In this document, "the UTF-16 family" refers to those three charsets. By contrast, the phrases "utf-16" or UTF-16 in this document refer specifically to the single charset "utf-16".

As sometimes happens between two communities, both MIME and XML have defined the term entity, with different meanings. Section 2.4 of [RFC2045] (Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies," November 1996.) says:

> "The term 'entity' refers specifically to the MIME-defined header fields and contents of either a message or one of the parts in the body of a multipart entity."

Section 4 of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.) says:

> "An XML document may consist of one or many storage units. These are called entities; they all have content and are all (except for the document entity and the external DTD subset) identified by entity name".

In this document, "XML MIME entity" is defined as the latter (an XML entity) encapsulated in the former (a MIME entity).

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TOC

## 3. XML Media Types

This document standardizes three media types related to XML MIME entities: application/xml, application/xml-external-parsed-entity, and application/xml-dtd while deprecating text/xml and text/xml-external-parsed-entity. Registration information for these media types is described in the sections below.

Within the XML specification, XML MIME entities can be classified into four types. In the XML terminology, they are called "document entities", "external DTD subsets", "external parsed entities", and "external parameter entities". The media type application/xml MAY be used for "document entities", while application/xml-external-parsed-entity SHOULD be used for "external parsed entities". Note that [RFC3023] (Murata, M., St.Laurent, S., and D. Kohn, “XML Media Types,” January 2001.) (which this document obsoletes) recommended the use of text/xml and text/xml-external-parsed-entity for document entities and external parsed entities, respectively. Although these media types are still commonly used, this document deprecates them for future interoperability. The media type application/xml-dtd SHOULD be used for "external DTD subsets" or "external parameter entities". application/xml MUST NOT be used for "external parameter entities" or "external DTD subsets", and MUST NOT be used for "external parsed entities" unless they are also well-formed "document entities" and are referenced as such. Note that [RFC2376] (Whitehead, E. and M. Murata, “XML Media Types,” July 1998.) (which is obsolete) allowed such usage, although in practice it is likely to have been rare.

Neither external DTD subsets nor external parameter entities parse as XML documents, and while some XML document entities may be used as external parsed entities and vice versa, there are many cases where the two are not interchangeable. XML also has unparsed entities, internal parsed entities, and internal parameter entities, but they are not XML MIME entities.

Application/xml and application/xml-external-parsed-entity are recommended. Unlike [RFC2376] (Whitehead, E. and M. Murata, “XML Media Types,” July 1998.) or [RFC3023] (Murata, M., St.Laurent, S., and D. Kohn, “XML Media Types,” January 2001.), this document deprecates text/xml and text/xml-external-parsed-entity. The reasons are as follows:

> Conflicting specifications regarding the character encoding has caused confusion. On the one hand, [RFC2046] (Freed, N. and N. Borenstein, “Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types,” November 1996.) specifies "The default character set, which must be assumed in the absence of a charset parameter, is US-ASCII.", [RFC2616] (Fielding, R., Gettys, J., Mogul, J., Nielsen, H., Masinter, L., Leach, P., and T. Berners-Lee, “Hypertext Transfer Protocol -- HTTP/1.1,” June 1999.) Section 3.7.1, defines that "media subtypes of the 'text' type are defined to have a default charset value of 'ISO-8859-1'", and [RFC2376] (Whitehead, E. and M. Murata, “XML Media Types,” July 1998.) as well as [RFC3023] (Murata,

> M., St.Laurent, S., and D. Kohn, “XML Media Types,” January 2001.) specify the default charset is US-ASCII. On the other hand, implementors and users of XML parsers, following Appendix F of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, “Extensible Markup Language (XML) 1.0 (Fifth Edition),” November 2008.), assume that the default is provided by the XML encoding declaration or BOM. Note that this conflict does not exist for application/xml or application/xml-external-parsed-entity (see "Optional parameters" of application/xml registration in Section 3.2 (Application/xml Registration)).
>
> An XML document -- that is, the unprocessed, source XML document -- is unreadable by casual users. Note that MIME user agents that do not have explicit support for text/xml will treat it as text/plain, for example, by displaying the XML MIME entity as plain text.
>
> Using application/xml and application/xml-external-parsed-entity instead of text/xml and text/xml-external-parsed-entity does not loose any functionalities.
>
> The top-level media type "text" has some restrictions on MIME entities and they are described in [RFC2045] (Freed, N. and N. Borenstein, “Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies,” November 1996.) and [RFC2046] (Freed, N. and N. Borenstein, “Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types,” November 1996.). In particular, the UTF-16 family, UCS-4, and UTF-32 are not allowed (except over HTTP (Fielding, R., Gettys, J., Mogul, J., Nielsen, H., Masinter, L., Leach, P., and T. Berners-Lee, “Hypertext Transfer Protocol -- HTTP/1.1,” June 1999.) [RFC2616], which uses a MIME-like mechanism). However, section 4.3.3 of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, “Extensible Markup Language (XML) 1.0 (Fifth Edition),” November 2008.) says:
>
> > "Each external parsed entity in an XML document may use a different encoding for its characters. All XML processors MUST be able to read entities in both the UTF-8 and UTF-16 encodings."
>
> Thus, although all XML processors can read entities in at least UTF-16, if an XML document or external parsed entity is encoded in such character encoding schemes, it cannot be labeled as text/xml or text/xml-external-parsed-entity (except for HTTP).

XML provides a general framework for defining sequences of structured data. In some cases, it may be desirable to define new media types that use XML but define a specific application of XML, perhaps due to domain-specific display, editing, security considerations or runtime information. Furthermore, such media types may allow UTF-8 or UTF-16 only and prohibit other charsets. This document does not prohibit such

media types and in fact expects them to proliferate. However, developers of such media types are STRONGLY RECOMMENDED to use this document as a basis for their registration. In particular, the charset parameter SHOULD be used in the same manner, as described in Section 8.1 (Referencing), in order to enhance interoperability. An XML document labeled as application/xml, or with a +xml media type, (or text/xml) might contain namespace declarations, stylesheet-linking processing instructions (PIs), schema information, or other declarations that might be used to suggest how the document is to be processed. For example, a document might have the XHTML namespace and a reference to a CSS stylesheet. Such a document might be handled by applications that would use this information to dispatch the document for appropriate processing.

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### 3.1. Text/xml Registration (deprecated)

TOC

> **MIME media type name:** text
>
> **MIME subtype name:** xml
>
> **Mandatory parameters:** none
>
> **Optional parameters:** charset

> Although listed as an optional parameter, the use of the charset parameter is REQUIRED, unless the charset is us-ascii. The charset parameter can also be used to provide protocol-specific operations, such as charset-based content negotiation in HTTP. "utf-8" [RFC3629] (Yergeau, F., "UTF-8, a transformation format of ISO 10646," November 2003.) is the recommended value, representing the UTF-8 charset. UTF-8 is supported by all conforming processors of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.)
>
> If the XML MIME entity is transmitted via HTTP, which uses a MIME-like mechanism that is exempt from the restrictions on the text top-level type (see section 19.4.1 of [RFC2616] (Fielding, R., Gettys, J., Mogul, J., Nielsen, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1," June 1999.)), "utf-16" [RFC2781] (Hoffman, P. and F. Yergeau, "UTF-16, an encoding of ISO 10646," Februrary 2000.)) is also recommended. UTF-16 is supported by all conforming processors of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.). Since the handling of CR, LF and NUL for text types in most MIME applications would cause undesired transformations of individual

octets in UTF-16 multi-octet characters, gateways from HTTP to these MIME applications MUST transform the XML MIME entity from text/xml; charset="utf-16" to application/xml; charset="utf-16".

Conformant with [RFC2046] (Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types," November 1996.), if a text/xml entity is received with the charset parameter omitted, MIME processors and XML processors MUST use the default charset value of "us-ascii" (, "US-ASCII. Coded Character Set -- 7-Bit American Standard Code for Information Interchange," 1986.) [ASCII]. In cases where the XML MIME entity is transmitted via HTTP, the default charset value is still "us-ascii". (Note: There is an inconsistency between this specification and HTTP/1.1, which uses ISO-8859-1 (, "ISO-8859. International Standard -- Information Processing -- 8-bit Single-Byte Coded Graphic Character Sets -- Part 1: Latin alphabet No. 1, ISO-8859-1:1987," 1987.) [ISO8859] as the default for a historical reason. Since it is the intersection of UTF-8 and ISO-8859-1 and since it is already used by MIME, US-ASCII was chosen, as the default charset for text/xml. However, it is known that many servers and parsers ignore this default and rely on the XML encoding declaration or BOM. Thus, application/xml is a more suitable choice.

There are several reasons that the charset parameter was authoritative. First, some MIME processing engines do transcoding of MIME bodies of the top-level media type "text" without reference to any of the internal content. Thus, it is possible that some agent might change text/xml; charset="iso-2022-jp" to text/xml; charset="utf-8" without modifying the encoding declaration of an XML document. Second, text/xml must be compatible with text/plain, since MIME agents that do not understand text/xml will fallback to handling it as text/plain. If the charset parameter for text/xml were not authoritative, such fallback would cause data corruption. Third, recent web servers have been improved so that server administrators can specify the charset parameter. Fourth, [RFC2130] (Weider, C., Cecilia Preston, C., Simonsen, K., Alvestrand, H., Atkinson, R., Crispin, M., and P. Svanberg, "The Report of the IAB Character Set Workshop held 29 February - 1 March, 1996," April 1997.) (informative) specifies that the recommended specification scheme is the "charset" parameter.

Since the charset parameter is authoritative, the charset was sometimes not declared within an XML encoding declaration. Thus, special care was needed when the recipient stripped the MIME header and provided persistent storage of the received XML MIME entity (e.g., in a file system). Unless the charset is UTF-8 or UTF-16, the recipient SHOULD also persistently store information about the charset, perhaps by embedding a correct XML encoding declaration within the XML MIME entity.

**Encoding considerations:**

This media type MAY be encoded as appropriate for the charset and the capabilities of the underlying MIME transport. For 7-bit transports, data in UTF-8 MUST be encoded in quoted-printable or base64. For 8-bit clean transport (e.g., 8BITMIME (Klensin, J., Freed, N., Rose, M., Stefferud, E., and D. Crocker, "SMTP Service Extension for 8bit-MIMEtransport," July 1994.) [RFC1652] ESMTP or NNTP (Feather, B., "Network News Transfer Protocol," October 2006.) [RFC3977]), UTF-8 does not need to be encoded. Over HTTP (Fielding, R., Gettys, J., Mogul, J., Nielsen, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1," June 1999.) [RFC2616], no content-transfer-encoding is necessary and UTF-16 may also be used.

**Security considerations:** See Section 11 (Security Considerations).

**Interoperability considerations:** XML has proven to be interoperable across WebDAV clients and servers, and for import and export from multiple XML authoring tools. For maximum interoperability, validating processors are recommended. Although non-validating processors may be more efficient, they are not required to handle all features of XML. For further information, see sub-section 2.9 "Standalone Document Declaration" and section 5 "Conformance" of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.) .

**Published specification:** Extensible Markup Language (XML) 1.0 (Fifth Edition) (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.) [XML].

**Applications which use this media type:** XML is device-, platform-, and vendor-neutral and is supported by a wide range of Web user agents, WebDAV (Dusseault, L., "HTTP Extensions for Distributed Authoring -- WEBDAV," June 2007.) [RFC4918] clients and servers, as well as XML authoring tools.

**Additional information:**

**Magic number(s):** None.

Although no byte sequences can be counted on to always be present, XML MIME entities in ASCII-compatible charsets (including UTF-8) often begin with hexadecimal 3C 3F 78 6D 6C ("<?xml"), and those in UTF-16 often begin with hexadecimal FE FF 00 3C 00 3F 00 78 00 6D 00 6C or FF FE 3C 00 3F 00 78 00 6D 00 6C 00 (the Byte Order Mark (BOM) followed by "<?xml"). For more information, see Appendix F of [XML] (Bray, T., Paoli,

J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.).

**File extension(s):** .xml

**Macintosh File Type Code(s):** "TEXT"

**Person and email address for further information:**

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**Intended usage:** COMMON

**Author/Change controller:** The XML specification is a work product of the World Wide Web Consortium's XML Working Group, and was edited by:

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The W3C, and the W3C XML Core Working Group, have change control over the XML specification.

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### 3.2. Application/xml Registration

TOC

**MIME media type name:** application

**MIME subtype name:** xml

**Mandatory parameters:** none

**Optional parameters:** charset

Although listed as an optional parameter, the use of the charset parameter, when the charset is reliably known and agrees with the

encoding declaration, is RECOMMENDED, since this information can be used by non-XML processors to determine authoritatively the charset of the XML MIME entity. The charset parameter can also be used to provide protocol-specific operations, such as charset-based content negotiation in HTTP.

"utf-8" [RFC3629] (Yergeau, F., “UTF-8, a transformation format of ISO 10646,” November 2003.) and "utf-16" [RFC2781] (Hoffman, P. and F. Yergeau, “UTF-16, an encoding of ISO 10646,” Februrary 2000.) are the recommended values, representing the UTF-8 and UTF-16 charsets, respectively. These charsets are preferred since they are supported by all conforming processors of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, “Extensible Markup Language (XML) 1.0 (Fifth Edition),” November 2008.).

If an application/xml entity is received where the charset parameter is omitted, no information is being provided about the charset by the MIME Content-Type header. Conforming XML processors MUST follow the requirements in section 4.3.3 of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, “Extensible Markup Language (XML) 1.0 (Fifth Edition),” November 2008.) that directly address this contingency. However, MIME processors that are not XML processors SHOULD NOT assume a default charset if the charset parameter is omitted from an application/xml entity.

There are several reasons that the charset parameter is authoritative. First, recent web servers have been improved so that users can specify the charset parameter. Second, [RFC2130] (Weider, C., Cecilia Preston, C., Simonsen, K., Alvestrand, H., Atkinson, R., Crispin, M., and P. Svanberg, “The Report of the IAB Character Set Workshop held 29 February - 1 March, 1996,” April 1997.) (informative) specifies that the recommended specification scheme is the "charset" parameter.

On the other hand, it has been argued that the charset parameter should be omitted and the mechanism described in Appendix F of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, “Extensible Markup Language (XML) 1.0 (Fifth Edition),” November 2008.) (which is non-normative) should be solely relied on. This approach would allow users to avoid configuration of the charset parameter; an XML document stored in a file is likely to contain a correct encoding declaration or BOM (if necessary), since the operating system does not typically provide charset information for files. If users would like to rely on the encoding declaration or BOM and to hide charset information from protocols, they SHOULD determine not to use the parameter.

Since the charset parameter is authoritative, the charset is not always declared within an XML encoding declaration. However, since a

receiving application can, with very high reliability, determine the encoding of an XML document by reading it, the XML encoding declaration SHOULD be provided and SHOULD agree with the charset parameter. Special care is needed when the recipient strips the MIME header and provides persistent storage of the received XML MIME entity (e.g., in a file system). Unless the charset is UTF-8 or UTF-16, the recipient SHOULD also persistently store information about the charset, preferably by embedding a correct XML encoding declaration within the XML MIME entity.

**Encoding considerations:** This media type MAY be encoded as appropriate for the charset and the capabilities of the underlying MIME transport. For 7-bit transports, data in either UTF-8 or UTF-16 MUST be encoded in quoted-printable or base64. For 8-bit clean transport (e.g., 8BITMIME (Klensin, J., Freed, N., Rose, M., Stefferud, E., and D. Crocker, "SMTP Service Extension for 8bit-MIMEtransport," July 1994.) [RFC1652] ESMTP or NNTP (Feather, B., "Network News Transfer Protocol," October 2006.) [RFC3977]), UTF-8 is not encoded, but the UTF-16 family MUST be encoded in base64. For binary clean transports (e.g., HTTP (Fielding, R., Gettys, J., Mogul, J., Nielsen, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1," June 1999.) [RFC2616]), no content-transfer-encoding is necessary.

**Security considerations:** See Section 11 (Security Considerations).

**Interoperability considerations:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Published specification:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Applications which use this media type:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Additional information:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Person and email address for further information:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Intended usage:** COMMON

**Author/Change controller:** Same as Section 3.1 (Text/xml Registration (deprecated)).

### 3.3. Text/xml-external-parsed-entity Registration (deprecated) TOC

**MIME media type name:** text

**MIME subtype name:** xml-external-parsed-entity

**Mandatory parameters:** none

**Optional parameters:** charset

The charset parameter of text/xml-external-parsed-entity is handled the same as that of text/xml as described in Section 3.1 (Text/xml Registration (deprecated)).

**Encoding considerations:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Security considerations:** See Section 11 (Security Considerations).

**Interoperability considerations:** XML external parsed entities are as interoperable as XML documents, though they have a less tightly constrained structure and therefore need to be referenced by XML documents for proper handling by XML processors. Similarly, XML documents cannot be reliably used as external parsed entities because external parsed entities are prohibited from having standalone document declarations or DTDs. Identifying XML external parsed entities with their own content type should enhance interoperability of both XML documents and XML external parsed entities.

**Published specification:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Applications which use this media type:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Additional information:**

**Magic number(s):** Same as Section 3.1 (Text/xml Registration (deprecated)).

**File extension(s):** .xml or .ent

**Macintosh File Type Code(s):** "TEXT"

**Person and email address for further information:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Intended usage:** COMMON

**Author/Change controller:**

Same as Section 3.1 (Text/xml Registration (deprecated)).

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### 3.4. Application/xml-external-parsed-entity Registration

TOC

**MIME media type name:** application

**MIME subtype name:** xml-external-parsed-entity

**Mandatory parameters:** none

**Optional parameters:** charset

The charset parameter of application/xml-external-parsed-entity is handled the same as that of application/xml as described in Section 3.2 (Application/xml Registration).

**Encoding considerations:** Same as Section 3.2 (Application/xml Registration).

**Security considerations:** See Section 11 (Security Considerations).

**Interoperability considerations:** Same as those for text/xml-external-parsed-entity as described in Section 3.3 (Text/xml-external-parsed-entity Registration (deprecated)).

**Published specification:** Same as text/xml as described in Section 3.1 (Text/xml Registration (deprecated)).

**Applications which use this media type:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Additional information:**

**Magic number(s):** Same as Section 3.1 (Text/xml Registration (deprecated)).

**File extension(s):** .xml or .ent

**Macintosh File Type Code(s):** "TEXT"

**Person and email address for further information:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Intended usage:** COMMON

**Author/Change controller:**

Same as Section 3.1 (Text/xml Registration (deprecated)).

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### 3.5. Application/xml-dtd Registration

TOC

**MIME media type name:** application

**MIME subtype name:** xml-dtd

**Mandatory parameters:** none

**Optional parameters:** charset

The charset parameter of application/xml-dtd is handled the same as that of application/xml as described in Section 3.2 (Application/xml Registration).

**Encoding considerations:** Same as Section 3.2 (Application/xml Registration).

**Security considerations:** See Section 11 (Security Considerations).

**Interoperability considerations:** XML DTDs have proven to be interoperable by DTD authoring tools and XML browsers, among others.

**Published specification:** Same as text/xml as described in Section 3.1 (Text/xml Registration (deprecated)).

**Applications which use this media type:** DTD authoring tools handle external DTD subsets as well as external parameter entities. XML browsers may also access external DTD subsets and external parameter entities.

**Additional information:**

**Magic number(s):** Same as Section 3.1 (Text/xml Registration (deprecated)).

**File extension(s):** .dtd or .mod

**Macintosh File Type Code(s):** "TEXT"

**Person and email address for further information:** Same as Section 3.1 (Text/xml Registration (deprecated)).

**Intended usage:**

COMMON

**Author/Change controller:** Same as Section 3.1 (Text/xml Registration (deprecated)).

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### 3.6. Summary

TOC

The following list applies to application/xml, application/xml-external-parsed-entity, application/xml-dtd, and XML-based media types under top-level types other than "text" that define the charset parameter according to this specification:

* Charset parameter is recommended, if it agrees with the xml encoding declaration, and if present, it takes precedence.

* If the charset parameter is omitted, conforming XML processors MUST follow the requirements in section 4.3.3 of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.) or [XML1.1] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., Yergeau, F., and J. Cowan, "Extensible Markup Language (XML) 1.1," April 2004.) as appropriate.

Although text/xml, text/xml-external-parsed-entity, and subtypes of "text" having the "+xml" suffix are deprecated, the next list applies to these media types:

* Charset parameter is strongly recommended.

* If the charset parameter is not specified, the default is "us-ascii". The default of "iso-8859-1" in HTTP is explicitly overridden.

* No error handling provisions.

* An encoding declaration, if present, is irrelevant, but when saving a received resource as a file, the correct encoding declaration SHOULD be inserted.

---

TOC

## 4. The Byte Order Mark (BOM) and Conversions to/from the UTF-16 Charset

Section 4.3.3 of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.) specifies that XML MIME entities in the charset "utf-16" MUST begin with a byte order mark (BOM), which is a hexadecimal octet sequence 0xFE 0xFF (or 0xFF 0xFE, depending on endian). The XML Recommendation further states that the BOM is an encoding signature, and is not part of either the markup or the character data of the XML document.

Due to the presence of the BOM, applications that convert XML from "utf-16" to a non-Unicode encoding MUST strip the BOM before conversion. Similarly, when converting from another encoding into "utf-16", the BOM MUST be added after conversion is complete.

In addition to the charset "utf-16", [RFC2781] (Hoffman, P. and F. Yergeau, "UTF-16, an encoding of ISO 10646," Februrary 2000.) introduces "utf-16le" (little endian) and "utf-16be" (big endian) as well. The BOM is prohibited for these charsets. When an XML MIME entity is encoded in "utf-16le" or "utf-16be", it MUST NOT begin with the BOM but SHOULD contain an encoding declaration. Conversion from "utf-16" to "utf-16be" or "utf-16le" and conversion in the other direction MUST strip or add the BOM, respectively.

---

## 5. Fragment Identifiers

TOC

Uniform Resource Identifiers (URIs) may contain fragement identifiers (see Section 3.5 of [RFC3986] (Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifiers (URI): Generic Syntax.," January 2005.)). Likewise, Internationalized Resource Identifiers (IRIs) [RFC3987] (DÜerst, M. and M. Suignard, "Internationalized Resource Identifiers (IRIs)," July 2005.) may contain fragement identifiers.

A family of specifications define fragment identifiers for XML media types. The fragment identifier syntax for application/xml is defined by two W3C Recommendations in this family, namely [XPointerFramework] (Grosso, P., Maler, E., Marsh, J., and N. Walsh, "XPointer Framework," March 2003.) and [XPointerElement] (Grosso, P., Maler, E., Marsh, J., and N. Walsh, "XPointer element() Scheme," March 2003.). Schemes other than the element scheme MUST NOT be specified as part of fragment identifiers for these media types. In particular, the xpointer scheme MUST NOT be specified since it is still at the W3C working draft stage.

When an XML-based MIME media type follows the naming convention '+xml', the fragment identifier syntax for this media type SHALL include the fragment identifier syntax for application/xml and application/xml-

external-parsed-entity. It MAY further allow other registered schemes such as the xmlns scheme and other schemes.
A registry of XPointer schemes (Hazaël-Massieux, D., "XPointer Registry," 2005.) [XPtrReg] is maintained at the W3C. Unregistered schemes SHOULD NOT be used.
If [XPointerFramework] (Grosso, P., Maler, E., Marsh, J., and N. Walsh, "XPointer Framework," March 2003.) and [XPointerElement] (Grosso, P., Maler, E., Marsh, J., and N. Walsh, "XPointer element() Scheme," March 2003.) are inappropriate for some XML-based media type, it SHOULD NOT follow the naming convention '+xml'.
When a URI has a fragment identifier, it is encoded by a limited subset of the repertoire of US-ASCII [ASCII] (, "US-ASCII. Coded Character Set -- 7-Bit American Standard Code for Information Interchange," 1986.) characters, as defined in [RFC3986] (Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifiers (URI): Generic Syntax.," January 2005.). When a IRI contains a fragment identifier, it is encoded by a much wider repertoire of characters. The conversion between IRI fragment identifiers and URI fragment identifiers is presented in Section 7 of [RFC3987] (DÜerst, M. and M. Suignard, "Internationalized Resource Identifiers (IRIs)," July 2005.).
An XPointer fragment identifier does not have to be resolved even when an XML document is retrieved.

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## 6. The Base URI

TOC

Section 5.1 of [RFC3986] (Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifiers (URI): Generic Syntax.," January 2005.) specifies that the semantics of a relative URI reference embedded in a MIME entity is dependent on the base URI. The base URI is either (1) the base URI embedded in context, (2) the base URI from the encapsulating entity, (3) the base URI from the Retrieval URI, or (4) the default base URI, where (1) has the highest precedence. [RFC3986] (Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifiers (URI): Generic Syntax.," January 2005.) further specifies that the mechanism for embedding the base URI is depaendent on the media type.
The media type dependent mechanism for embedding the base URI in a MIME entity of type application/xml or application/xml-external-parsed-entity is to use the xml:base attribute described in detail in [XBase] (Marsh, J., "XML Base," June 2001.).
Note that the base URI may be embedded in a different MIME entity, since the default value for the xml:base attribute may be specified in an external DTD subset or external parameter entity.

---

TOC

## 7. XML Versions

application/xml, application/xml-external-parsed-entity, and application/xml-dtd, text/xml(deprecated) and text/xml-external-parsed-entity(deprecated) are to be used with [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.) In all examples herein where version="1.0" is shown, it is understood that version="1.1" may also be used, providing the content does indeed conform to [XML1.1] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., Yergeau, F., and J. Cowan, "Extensible Markup Language (XML) 1.1," April 2004.).

The normative requirement of this specification upon XML is to follow the requirements of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.), section 4.3.3. Except for minor clarifications, that section is substantially identical from the first edition to the current (5th) edition of XML 1.0, and for XML 1.1. Therefore, this specification may be used with any version or edition of XML 1.0 or 1.1.

Specifications and recommendations based on or referring to this RFC SHOULD indicate any limitations on the particular versions of XML to be used. For example, a particular specification might indicate: "content MUST be represented using media-type application/xml, and the document must either (a) carry an xml declaration specifying version="1.0" or (b) omit the XML declaration, in which case per the XML recommendation the version defaults to 1.0"

---

## 8. A Naming Convention for XML-Based Media Types

TOC

This document recommends the use of a naming convention (a suffix of '+xml') for identifying XML-based MIME media types, whatever their particular content may represent. This allows the use of generic XML processors and technologies on a wide variety of different XML document types at a minimum cost, using existing frameworks for media type registration.

Although the use of a suffix was not considered as part of the original MIME architecture, this choice is considered to provide the most functionality with the least potential for interoperability problems or lack of future extensibility. The alternatives to the '+xml' suffix and the reason for its selection are described in Appendix A (Why Use the '+xml' Suffix for XML-Based MIME Types?).

As XML development continues, new XML document types are appearing rapidly. Many of these XML document types would benefit from the identification possibilities of a more specific MIME media type than text/xml or application/xml can provide, and it is likely that many new

media types for XML-based document types will be registered in the near and ongoing future.
While the benefits of specific MIME types for particular types of XML documents are significant, all XML documents share common structures and syntax that make possible common processing.
Some areas where 'generic' processing is useful include:

*Browsing - An XML browser can display any XML document with a provided [CSS] (Bos, B., Lie, H., Lilley, C., and I. Jacobs, "Cascading Style Sheets, level 2 (CSS2) Specification," May 1998.) or [XSLT] (Clark , J., "XSL Transformations (XSLT) Version 1.0," November 1999.) style sheet, whatever the vocabulary of that document.

*Editing - Any XML editor can read, modify, and save any XML document.

*Fragment identification - XPointers (see Section 5 (Fragment Identifiers)) can work with any XML document, whatever vocabulary it uses.

*Hypertext linking - XLink (work in progress) hypertext linking is designed to connect any XML documents, regardless of vocabulary.

*Searching - XML-oriented search engines, web crawlers, agents, and query tools should be able to read XML documents and extract the names and content of elements and attributes even if the tools are ignorant of the particular vocabulary used for elements and attributes.

*Storage - XML-oriented storage systems, which keep XML documents internally in a parsed form, should similarly be able to process, store, and recreate any XML document.

*Well-formedness and validity checking - An XML processor can confirm that any XML document is well-formed and that it is valid (i.e., conforms to its declared DTD or Schema).

When a new media type is introduced for an XML-based format, the name of the media type SHOULD end with '+xml'. This convention will allow applications that can process XML generically to detect that the MIME entity is supposed to be an XML document, verify this assumption by invoking some XML processor, and then process the XML document accordingly. Applications may match for types that represent XML MIME entities by comparing the subtype to the pattern '*/*+xml'. (Of course, 4 of the 5 media types defined in this document -- text/xml, application/xml, text/xml-external-parsed-entity, and application/xml-external-parsed-entity -- also represent XML MIME entities while not conforming to the '*/*+xml' pattern.)

> NOTE: Section 14.1 of HTTP (Fielding, R., Gettys, J., Mogul, J., Nielsen, H., Masinter, L., Leach, P., and T. Berners-Lee, “Hypertext Transfer Protocol -- HTTP/1.1,” June 1999.) [RFC2616] does not support Accept headers of the form "Accept: */*+xml" and so this header MUST NOT be used in this way. Instead, content negotiation (Klyne, G., “Protocol-independent Content Negotiation Framework,” September 1999.) [RFC2703] could potentially be used if an XML-based MIME type were needed.

Media types following the naming convention '+xml' SHOULD introduce the charset parameter for consistency, since XML-generic processing applies the same program for any such media type. However, there are some cases that the charset parameter needs not be introduced. For example:

> When an XML-based media type is restricted to UTF-8, it is not necessary to introduce the charset paramter. "UTF-8 only" is a generic principle and UTF-8 is the default of XML.
>
> When an XML-based media type is restricted to UTF-8 and UTF-16, it might not be unreasonable to omit the charset parameter. Neither UTF-8 nor UTF-16 require encoding declarations of XML.
>
> Note: Some argue that XML-based media types should not introduce the charset parameter, although others disagree.

XML generic processing is not always appropriate for XML-based media types. For example, authors of some such media types may wish that the types remain entirely opaque except to applications that are specifically designed to deal with that media type. By NOT following the naming convention '+xml', such media types can avoid XML-generic processing. Since generic processing will be useful in many cases, however -- including in some situations that are difficult to predict ahead of time -- those registering media types SHOULD use the '+xml' convention unless they have a particularly compelling reason not to. The registration process for these media types is described in [RFC4288] (Freed, N. and J. Klensin, “Media Type Specifications and Registration Procedures,” December 2005.) and [RFC4289] (Freed, N. and J. Klensin, “Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures,” December 2005.) . The registrar for the IETF tree will encourage new XML-based media type registrations in the IETF tree to follow this guideline. Registrars for other trees SHOULD follow this convention in order to ensure maximum interoperability of their XML-based documents. Similarly, media subtypes that do not represent XML MIME entities MUST NOT be allowed to register with a '+xml' suffix.

---

TOC

### 8.1. Referencing

Registrations for new XML-based media types under the top-level type "text" are discouraged for the same reasons that text/xml and text/xml-external-parsed-entity are deprecated.
Registrations for new XML-based media types under top-level types other than "text" SHOULD, in specifying the charset parameter and encoding considerations, define them as: "Same as [charset parameter / encoding considerations] of application/xml as specified in RFC XXXX."
The use of the charset parameter is STRONGLY RECOMMENDED, since this information can be used by XML processors to determine authoritatively the charset of the XML MIME entity. If there are some reasons not to follow this advice, they SHOULD be included as part of the registration. As shown above, two such reasons are "UTF-8 only" or "UTF-8 or UTF-16 only".
These registrations SHOULD specify that the XML-based media type being registered has all of the security considerations described in RFC XXXX plus any additional considerations specific to that media type.
These registrations SHOULD also make reference to RFC XXXX in specifying magic numbers, fragment identifiers, base URIs, and use of the BOM.
These registrations MAY reference the applicaiton/xml registration in RFC XXXX in specifying interoperability considerations, if these considerations are not overridden by issues specific to that media type.

---

## 9. Examples

TOC

The examples below give the value of the MIME Content-type header and the XML declaration (which includes the encoding declaration) inside the XML MIME entity. For UTF-16 examples, the Byte Order Mark character is denoted as "{BOM}", and the XML declaration is assumed to come at the beginning of the XML MIME entity, immediately following the BOM. Note that other MIME headers may be present, and the XML MIME entity may contain other data in addition to the XML declaration; the examples focus on the Content-type header and the encoding declaration for clarity.

---

### 9.1. Text/xml (deprecated) with UTF-8 Charset

TOC

```
Content-type: text/xml; charset="utf-8"
<?xml version="1.0" encoding="utf-8"?>
```

This is the recommended charset value for use with text/xml. Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as UTF-8 encoded.
If sent using a 7-bit transport (e.g. SMTP (Klensin, J., “Simple Mail Transfer Protocol,” October 2008.) [RFC5321]), the XML MIME entity MUST use a content-transfer-encoding of either quoted-printable or base64. For an 8-bit clean transport (e.g., 8BITMIME ESMTP or NNTP), or a binary clean transport (e.g., HTTP), no content-transfer-encoding is necessary.

---

### 9.2. Text/xml (deprecated) with UTF-16 Charset

TOC

Content-type: text/xml; charset="utf-16"
{BOM}<?xml version='1.0' encoding='utf-16'?>
or
{BOM}<?xml version='1.0'?>
This is possible only when the XML MIME entity is transmitted via HTTP, which uses a MIME-like mechanism and is a binary-clean protocol, hence does not perform CR and LF transformations and allows NUL octets. As described in [RFC2781] (Hoffman, P. and F. Yergeau, “UTF-16, an encoding of ISO 10646,” Februrary 2000.), the UTF-16 family MUST NOT be used with media types under the top-level type "text" except over HTTP (see section 19.4.1 of [RFC2616] (Fielding, R., Gettys, J., Mogul, J., Nielsen, H., Masinter, L., Leach, P., and T. Berners-Lee, “Hypertext Transfer Protocol -- HTTP/1.1,” June 1999.) for details).
Since HTTP is binary clean, no content-transfer-encoding is necessary.

---

### 9.3. Text/xml (deprecated) with UTF-16BE Charset

TOC

Content-type: text/xml; charset="utf-16be"
<?xml version='1.0' encoding='utf-16be'?>
Observe that the BOM does not exist. This is again possible only when the XML MIME entity is transmitted via HTTP.

---

### 9.4. Text/xml (deprecated) with ISO-2022-KR Charset

TOC

Content-type: text/xml; charset="iso-2022-kr"
<?xml version="1.0" encoding='iso-2022-kr'?>
This example shows text/xml with a Korean charset (e.g., Hangul) encoded following the specification in [RFC1557] (Choi, U., Chon, K., and H. Park, “Korean Character Encoding for Internet Messages,”

December 1993.). Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as encoded per RFC 1557. Since ISO-2022-KR has been defined to use only 7 bits of data, no content-transfer-encoding is necessary with any transport.

---

### 9.5. Text/xml (deprecated) with Omitted Charset

TOC

Content-type: text/xml
{BOM}<?xml version="1.0" encoding="utf-16"?>
or
{BOM}<?xml version="1.0"?>
This example shows text/xml with the charset parameter omitted. In this case, MIME and XML processors MUST assume the charset is "us-ascii", the default charset value for text media types specified in [RFC2046] (Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types," November 1996.). The default of "us-ascii" holds even if the text/xml entity is transported using HTTP. Omitting the charset parameter is NOT RECOMMENDED for text/xml. For example, even if the contents of the XML MIME entity are UTF-16 or UTF-8, or the XML MIME entity has an explicit encoding declaration, XML and MIME processors MUST assume the charset is "us-ascii".

---

### 9.6. Application/xml with UTF-16 Charset

TOC

Content-type: application/xml; charset="utf-16"
{BOM}<?xml version="1.0" encoding="utf-16"?>
or
{BOM}<?xml version="1.0"?>
This is a recommended charset value for use with application/xml. Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as UTF-16 encoded.
If sent using a 7-bit transport (e.g., SMTP) or an 8-bit clean transport (e.g., 8BITMIME ESMTP or NNTP), the XML MIME entity MUST be encoded in quoted-printable or base64. For a binary clean transport (e.g., HTTP), no content-transfer-encoding is necessary.

---

### 9.7. Application/xml with UTF-16BE Charset

TOC

Content-type: application/xml; charset="utf-16be"
<?xml version='1.0' encoding='utf-16be'?>

Observe that the BOM does not exist. Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as UTF-16BE encoded.

---

### 9.8. Application/xml with ISO-2022-KR Charset

TOC

Content-type: application/xml; charset="iso-2022-kr"
<?xml version="1.0" encoding="iso-2022-kr"?>
This example shows application/xml with a Korean charset (e.g., Hangul) encoded following the specification in [RFC1557] (Choi, U., Chon, K., and H. Park, "Korean Character Encoding for Internet Messages," December 1993.). Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as encoded per RFC 1557, independent of whether the XML MIME entity has an internal encoding declaration (this example does show such a declaration, which agrees with the charset parameter).
Since ISO-2022-KR has been defined to use only 7 bits of data, no content-transfer-encoding is necessary with any transport.

---

### 9.9. Application/xml with Omitted Charset and UTF-16 XML MIME Entity

TOC

Content-type: application/xml
{BOM}<?xml version='1.0' encoding="utf-16"?>
or
{BOM}<?xml version='1.0'?>
For this example, the XML MIME entity begins with a BOM. Since the charset has been omitted, a conforming XML processor follows the requirements of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.), section 4.3.3. Specifically, the XML processor reads the BOM, and thus knows deterministically that the charset is UTF-16.
An XML-unaware MIME processor SHOULD make no assumptions about the charset of the XML MIME entity.

---

### 9.10. Application/xml with Omitted Charset and UTF-8 Entity

TOC

Content-type: application/xml
<?xml version='1.0'?>

In this example, the charset parameter has been omitted, and there is no BOM. Since there is no BOM, the XML processor follows the requirements in section 4.3.3, and optionally applies the mechanism described in Appendix F (which is non-normative) of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.) to determine the charset encoding of UTF-8. The XML MIME entity does not contain an encoding declaration, but since the encoding is UTF-8, this is still a conforming XML MIME entity.
An XML-unaware MIME processor SHOULD make no assumptions about the charset of the XML MIME entity.

---

### 9.11. Application/xml with Omitted Charset and Internal Encoding Declaration

TOC

Content-type: application/xml
<?xml version='1.0' encoding="iso-10646-ucs-4"?>
In this example, the charset parameter has been omitted, and there is no BOM. However, the XML MIME entity does have an encoding declaration inside the XML MIME entity that specifies the entity's charset.
Following the requirements in section 4.3.3, and optionally applying the mechanism described in Appendix F (non-normative) of [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.), the XML processor determines the charset encoding of the XML MIME entity (in this example, UCS-4).
An XML-unaware MIME processor SHOULD make no assumptions about the charset of the XML MIME entity.

---

### 9.12. Text/xml-external-parsed-entity (deprecated) with UTF-8 Charset

TOC

Content-type: text/xml-external-parsed-entity; charset="utf-8"
<?xml encoding="utf-8"?>
This is the recommended charset value for use with text/xml-external-parsed-entity. Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as UTF-8 encoded.
If sent using a 7-bit transport (e.g. SMTP), the XML MIME entity MUST use a content-transfer-encoding of either quoted-printable or base64. For an 8-bit clean transport (e.g., 8BITMIME ESMTP or NNTP), or a binary clean transport (e.g., HTTP) no content-transfer-encoding is necessary.

---

### 9.13. Application/xml-external-parsed-entity with UTF-16 Charset

TOC

Content-type: application/xml-external-parsed-entity; charset="utf-16"
{BOM}<?xml encoding="utf-16"?>
or
{BOM}<?xml?>
This is a recommended charset value for use with application/xml-external-parsed-entity. Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as UTF-16 encoded. If sent using a 7-bit transport (e.g., SMTP) or an 8-bit clean transport (e.g., 8BITMIME ESMTP or NNTP), the XML MIME entity MUST be encoded in quoted-printable or base64. For a binary clean transport (e.g., HTTP), no content-transfer-encoding is necessary.

---

### 9.14. Application/xml-external-parsed-entity with UTF-16BE Charset

TOC

Content-type: application/xml-external-parsed-entity;
charset="utf-16be"
<?xml encoding="utf-16be"?>
Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as UTF-16BE encoded.

---

### 9.15. Application/xml-dtd

TOC

Content-type: application/xml-dtd; charset="utf-8"
<?xml encoding="utf-8"?>
Charset "utf-8" is a recommended charset value for use with application/xml-dtd. Since the charset parameter is provided, MIME and XML processors MUST treat the enclosed entity as UTF-8 encoded.

---

### 9.16. Application/mathml+xml

TOC

Content-type: application/mathml+xml
<?xml version="1.0" ?>
MathML documents are XML documents whose content describes mathematical information, as defined by [MathML] (Carlisle, D., Ion, P., Miner, R., and N. Poppelier, “Mathematical Markup Language (MathML) Version 2.0 (Second Edition),” October 2003.). As a format based on XML, MathML

documents SHOULD use the '+xml' suffix convention in their MIME content-type identifier. However, no content type has yet been registered for MathML and so this media type should not be used until such registration has been completed.

---

### 9.17. Application/xslt+xml

TOC

Content-type: application/xslt+xml
<?xml version="1.0" ?>
Extensible Stylesheet Language (XSLT) documents are XML documents whose content describes stylesheets for other XML documents, as defined by [XSLT] (Clark , J., “XSL Transformations (XSLT) Version 1.0,” November 1999.). As a format based on XML, XSLT documents SHOULD use the '+xml' suffix convention in their MIME content-type identifier. However, no content type has yet been registered for XSLT and so this media type should not be used until such registration has been completed.

---

### 9.18. Application/rdf+xml

TOC

Content-type: application/rdf+xml
<?xml version="1.0" ?>
Resources identified using the application/rdf+xml media type are XML documents whose content describe RDF metadata. This media type has been registered at IANA and is fully defined in [RFC3870] (3870, A., “application/rdf+xml Media Type Registration,” September 2004.).

---

### 9.19. Image/svg+xml

TOC

Content-type: image/svg+xml
<?xml version="1.0" ?>
Scalable Vector Graphics (SVG) documents are XML documents whose content describes graphical information, as defined by [SVG] (Ferraiolo, J., Fujisawa, F., and D. Jackson, “Scalable Vector Graphics (SVG) 1.1 Specification,” January 2004.). As a format based on XML, SVG documents SHOULD use the '+xml' suffix convention in their MIME content-type identifier. Content type registration for SVG is in progress, [SVGMediaType] (Anderson, O., “Media Type Registration for image/svg+xml,” December 2008.) but depends on the present document.

---

### 9.20. model/x3d+xml

TOC

Content-type: model/x3d+xml
<?xml version="1.0" ?>
X3D is derived from VRML and is used for 3D models. Besides the XML representation, it may also be serialised in classic VRML syntax and using a fast infoset. Separate, but clearly related media types are used for these serialisations (model/x3d+vrml and model/x3d+fastinfoset respectively)..

---

### 9.21. INCONSISTENT EXAMPLE: Text/xml (deprecated) with UTF-8 Charset

TOC

Content-type: text/xml; charset="utf-8"
<?xml version="1.0" encoding="iso-8859-1"?>
Since the charset parameter is provided in the Content-Type header, MIME and XML processors MUST treat the enclosed entity as UTF-8 encoded. That is, the "iso-8859-1" encoding MUST be ignored.
Processors generating XML MIME entities MUST NOT label conflicting charset information between the MIME Content-Type and the XML declaration.

---

### 9.22. application/xml

TOC

Content-type: application/xml
<?xml version="1.0" encoding="iso-8859-1"?>
Since the charset parameter is not provided in the Content-Type header, MIME and XML processors MUST treat the "iso-8859-1" encoding as authoritative.
Processors generating XML MIME entities MUST NOT label conflicting charset information between the MIME Content-Type and the XML declaration.

---

### 9.23. Application/soap+xml

TOC

Content-type: application/soap+xml
<?xml version="1.0" ?>
Resources identified using the application/soap+xml media type are SOAP 1.2 message envelopes that have been serialized with XML 1.0. This media type has been registered at IANA and is fully defined in

[RFC3902] (Baker, M. and M. Nottingham, “The "application/soap+xml" media type,” September 2004.).

---

## 10. IANA Considerations

TOC

As described in Section 8 (A Naming Convention for XML-Based Media Types), this document updates the [RFC4288] (Freed, N. and J. Klensin, “Media Type Specifications and Registration Procedures,” December 2005.) and [RFC4289] (Freed, N. and J. Klensin, “Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures,” December 2005.) registration process for XML-based MIME types.

---

## 11. Security Considerations

TOC

XML, as a subset of SGML, has all of the same security considerations as specified in [RFC1874] (Levinson, E., “SGML Media Types,” December 1995.), and likely more, due to its expected ubiquitous deployment.

To paraphrase section 3 of RFC 1874, XML MIME entities contain information to be parsed and processed by the recipient's XML system. These entities may contain and such systems may permit explicit system level commands to be executed while processing the data. To the extent that an XML system will execute arbitrary command strings, recipients of XML MIME entities may be a risk. In general, it may be possible to specify commands that perform unauthorized file operations or make changes to the display processor's environment that affect subsequent operations.

In general, any information stored outside of the direct control of the user -- including CSS style sheets, XSL transformations, entity declarations, and DTDs -- can be a source of insecurity, by either obvious or subtle means. For example, a tiny "whiteout attack" modification made to a "master" style sheet could make words in critical locations disappear in user documents, without directly modifying the user document or the stylesheet it references. Thus, the security of any XML document is vitally dependent on all of the documents recursively referenced by that document.

The entity lists and DTDs for XHTML 1.0 (Pemberton, S. and et al, “XHTML 1.0: The Extensible HyperText Markup Language,” December 1999.) [XHTML], for instance, are likely to be a commonly used set of information. Many developers will use and trust them, few of whom will know much about the level of security on the W3C's servers, or on any similarly trusted repository.

The simplest attack involves adding declarations that break validation. Adding extraneous declarations to a list of character entities can

effectively "break the contract" used by documents. A tiny change that produces a fatal error in a DTD could halt XML processing on a large scale. Extraneous declarations are fairly obvious, but more sophisticated tricks, like changing attributes from being optional to required, can be difficult to track down. Perhaps the most dangerous option available to crackers is redefining default values for attributes: e.g., if developers have relied on defaulted attributes for security, a relatively small change might expose enormous quantities of information.

Apart from the structural possibilities, another option, "entity spoofing," can be used to insert text into documents, vandalizing and perhaps conveying an unintended message. Because XML 1.0 permits multiple entity declarations, and the first declaration takes precedence, it's possible to insert malicious content where an entity is used, such as by inserting the full text of Winnie the Pooh in every occurrence of —.

Use of the digital signatures work currently underway by the xmldsig working group may eventually ameliorate the dangers of referencing external documents not under one's own control.

Use of XML is expected to be varied, and widespread. XML is under scrutiny by a wide range of communities for use as a common syntax for community-specific metadata. For example, the Dublin Core (Kunze, J. and T. Baker, “Dublin Core Metadata for Resource Discovery,” August 2007.) [RFC5013] group is using XML for document metadata, and a new effort has begun that is considering use of XML for medical information. Other groups view XML as a mechanism for marshalling parameters for remote procedure calls. More uses of XML will undoubtedly arise.

Security considerations will vary by domain of use. For example, XML medical records will have much more stringent privacy and security considerations than XML library metadata. Similarly, use of XML as a parameter marshalling syntax necessitates a case by case security review.

XML may also have some of the same security concerns as plain text. Like plain text, XML can contain escape sequences that, when displayed, have the potential to change the display processor environment in ways that adversely affect subsequent operations. Possible effects include, but are not limited to, locking the keyboard, changing display parameters so subsequent displayed text is unreadable, or even changing display parameters to deliberately obscure or distort subsequent displayed material so that its meaning is lost or altered. Display processors SHOULD either filter such material from displayed text or else make sure to reset all important settings after a given display operation is complete.

Some terminal devices have keys whose output, when pressed, can be changed by sending the display processor a character sequence. If this is possible the display of a text object containing such character sequences could reprogram keys to perform some illicit or dangerous action when the key is subsequently pressed by the user. In some cases

not only can keys be programmed, they can be triggered remotely, making it possible for a text display operation to directly perform some unwanted action. As such, the ability to program keys SHOULD be blocked either by filtering or by disabling the ability to program keys entirely.

Note that it is also possible to construct XML documents that make use of what XML terms "entity references" (using the XML meaning of the term "entity" as described in Section 2 (Notational Conventions)), to construct repeated expansions of text. Recursive expansions are prohibited by [XML] (Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, "Extensible Markup Language (XML) 1.0 (Fifth Edition)," November 2008.) and XML processors are required to detect them. However, even non-recursive expansions may cause problems with the finite computing resources of computers, if they are performed many times. (Entity A consists of 100 copies of entity B, which in turn consists of 100 copies of entity C, and so on)

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## 12. References

TOC

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### 12.1. Normative References

TOC


| | |
|---|---|
| [ASCII] | "US-ASCII. Coded Character Set -- 7-Bit American Standard Code for Information Interchange," ANSI X3.4-1986, 1986. |
| [CSS] | Bos, B., Lie, H., Lilley, C., and I. Jacobs, "Cascading Style Sheets, level 2 (CSS2) Specification," World Wide Web Consortium Recommendation REC-CSS2, May 1998. |
| [ISO8859] | "ISO-8859. International Standard -- Information Processing -- 8-bit Single-Byte Coded Graphic Character Sets -- Part 1: Latin alphabet No. 1, ISO-8859-1:1987," 1987. |
| [MathML] | Carlisle, D., Ion, P., Miner, R., and N. Poppelier, "Mathematical Markup Language (MathML) Version 2.0 (Second Edition)," World Wide Web Consortium Recommendation REC-MathML2, October 2003. |
| [PNG] | Boutell, T., "PNG (Portable Network Graphics) Specification," World Wide Web Consortium Recommendation REC-png, October 1996. |
| [RFC1652] | Klensin, J., Freed, N., Rose, M., Stefferud, E., and D. Crocker, "SMTP Service Extension for 8bit-MIMEtransport," RFC 1652, July 1994. |

| | |
|---|---|
| [RFC2045] | Freed, N. and N. Borenstein, “Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies,” RFC 2045, November 1996. |
| [RFC2046] | Freed, N. and N. Borenstein, “Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types,” RFC 2046, November 1996. |
| [RFC2077] | Nelson, S., Parks, C., and Mitra, “The Model Primary Content Type for Multipurpose Internet Mail Extensions,” RFC 2077, January 1997. |
| [RFC2119] | Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels,” BCP 14, RFC 2119, March 1997. |
| [RFC2445] | Dawson, F. and D. Stenerson, “Internet Calendaring and Scheduling Core Object Specification (iCalendar),” RFC 2445, November 1998. |
| [RFC2616] | Fielding, R., Gettys, J., Mogul, J., Nielsen, H., Masinter, L., Leach, P., and T. Berners-Lee, “Hypertext Transfer Protocol -- HTTP/1.1,” RFC 2616, June 1999. |
| [RFC3023] | Murata, M., St.Laurent, S., and D. Kohn, “XML Media Types,” January 2001. |
| [RFC3501] | Crispin, M., “Internet Message Access Protocol - Version 4rev1,” RFC 3501, March 2003. |
| [RFC3629] | Yergeau, F., “UTF-8, a transformation format of ISO 10646,” RFC 3629, November 2003. |
| [RFC3977] | Feather, B., “Network News Transfer Protocol,” RFC 3977, October 2006. |
| [RFC3986] | Berners-Lee, T., Fielding, R., and L. Masinter, “Uniform Resource Identifiers (URI): Generic Syntax.,” RFC 3986, January 2005. |
| [RFC3987] | DÜerst, M. and M. Suignard, “Internationalized Resource Identifiers (IRIs),” RFC 3987, July 2005. |
| [RFC4288] | Freed, N. and J. Klensin, “Media Type Specifications and Registration Procedures,” RFC 4288, December 2005. |
| [RFC4289] | Freed, N. and J. Klensin, “Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures,” RFC 4289, December 2005. |
| [RFC4918] | Dusseault, L., “HTTP Extensions for Distributed Authoring -- WEBDAV,” RFC 4918, June 2007. |
| [RFC5321] | Klensin, J., “Simple Mail Transfer Protocol,” RFC 5321, October 2008. |
| [SGML] | International Standard Organization, “Information Processing -- Text and Office |

| | |
|---|---|
| | Systems -- Standard Generalized Markup Language (SGML),” ISO 8879, October 1986. |
| [SVG] | Ferraiolo, J., Fujisawa, F., and D. Jackson, “Scalable Vector Graphics (SVG) 1.1 Specification,” World Wide Web Consortium Recommendation SVG, January 2004. |
| [SVGMediaType] | Anderson, O., “Media Type Registration for image/svg+xml,” December 2008. |
| [TAGMIME] | Bray, T., Ed., “Internet Media Type registration, consistency of use,” April 2004. |
| [UML] | Object Management Group, “OMG Unified Modeling Language Specification, Version 1.3,” OMG Specification ad/99-06-08, June 1999. |
| [XBase] | Marsh, J., “XML Base,” World Wide Web Consortium Recommendation xmlbase, June 2001. |
| [XHTML] | Pemberton, S. and et al, “XHTML 1.0: The Extensible HyperText Markup Language,” World Wide Web Consortium Recommendation xhtml1, December 1999. |
| [XML] | Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., and F. Yergeau, “Extensible Markup Language (XML) 1.0 (Fifth Edition),” World Wide Web Consortium Recommendation REC-xml, November 2008. |
| [XML1.1] | Bray, T., Paoli, J., Sperberg-McQueen, C., Maler, E., Yergeau, F., and J. Cowan, “Extensible Markup Language (XML) 1.1,” World Wide Web Consortium Recommendation REC-xml, April 2004. |
| [XPointerElement] | Grosso, P., Maler, E., Marsh, J., and N. Walsh, “XPointer element() Scheme,” World Wide Web Consortium Recommendation REC-XPointer-Element, March 2003. |
| [XPointerFramework] | Grosso, P., Maler, E., Marsh, J., and N. Walsh, “XPointer Framework,” World Wide Web Consortium Recommendation REC-XPointer-Framework, March 2003. |
| [XPointerXmlns] | DeRose, S., Daniel, R., Maler, E., and J. Marsh, “XPointer xmlns() Scheme,” World Wide Web Consortium Recommendation REC-XPointer-Xmlns, March 2003. |
| [XPtrReg] | Hazaël-Massieux, D., “XPointer Registry,” 2005. |
| [XSLT] | Clark , J., “XSL Transformations (XSLT) Version 1.0,” World Wide Web Consortium Recommendation xslt, November 1999. |

### 12.2. Informative References

TOC


| | |
|---|---|
| [RFC1557] | Choi, U., Chon, K., and H. Park, “Korean Character Encoding for Internet Messages,” RFC 1557, December 1993. |
| [RFC1874] | Levinson, E., “SGML Media Types,” RFC 1874, December 1995. |
| [RFC2130] | Weider, C., Cecilia Preston, C., Simonsen, K., Alvestrand, H., Atkinson, R., Crispin, M., and P. Svanberg, “The Report of the IAB Character Set Workshop held 29 February - 1 March, 1996,” RFC 2130, April 1997. |
| [RFC2376] | Whitehead, E. and M. Murata, “XML Media Types,” RFC 2376, July 1998. |
| [RFC2703] | Klyne, G., “Protocol-independent Content Negotiation Framework,” RFC 2703, September 1999. |
| [RFC2781] | Hoffman, P. and F. Yergeau, “UTF-16, an encoding of ISO 10646,” RFC 2781, Februrary 2000. |
| [RFC2801] | Burdett, D., “Internet Open Trading Protocol - IOTP Version 1.0,” RFC 2801, April 2000. |
| [RFC3870] | 3870, A., “application/rdf+xml Media Type Registration,” RFC 3870, September 2004. |
| [RFC3902] | Baker, M. and M. Nottingham, “The "application/soap+xml" media type,” RFC 3902, September 2004. |
| [RFC5013] | Kunze, J. and T. Baker, “Dublin Core Metadata for Resource Discovery,” RFC 5013, August 2007. |


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## Appendix A. Why Use the '+xml' Suffix for XML-Based MIME Types?

TOC

Although the use of a suffix was not considered as part of the original MIME architecture, this choice is considered to provide the most functionality with the least potential for interoperability problems or lack of future extensibility. The alternatives to the '+xml' suffix and the reason for its selection are described below.

---

### A.1. Why not just use text/xml or application/xml and let the XML processor dispatch to the correct application based on the referenced DTD?

TOC

text/xml and application/xml remain useful in many situations, especially for document-oriented applications that involve combining XML with a stylesheet in order to present the data. However, XML is also used to define entirely new data types, and an XML-based format

such as image/svg+xml fits the definition of a MIME media type exactly as well as image/png (Boutell, T., “PNG (Portable Network Graphics) Specification,” October 1996.) [PNG] does. (Note that image/svg+xml is not yet registered.) Although extra functionality is available for MIME processors that are also XML processors, XML-based media types -- even when treated as opaque, non-XML media types -- are just as useful as any other media type and should be treated as such.
Since MIME dispatchers work off of the MIME type, use of text/xml or application/xml to label discrete media types will hinder correct dispatching and general interoperability. Finally, many XML documents use neither DTDs nor namespaces, yet are perfectly legal XML.

---

### A.2. Why not create a new subtree (e.g., image/xml.svg) to represent XML MIME types?

TOC

The subtree under which a media type is registered -- IETF, vendor (*/vnd.*), or personal (*/prs.*); see [RFC4288] (Freed, N. and J. Klensin, “Media Type Specifications and Registration Procedures,” December 2005.) and [RFC4289] (Freed, N. and J. Klensin, “Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures,” December 2005.) for details -- is completely orthogonal from whether the media type uses XML syntax or not. The suffix approach allows XML document types to be identified within any subtree. The vendor subtree, for example, is likely to include a large number of XML-based document types. By using a suffix, rather than setting up a separate subtree, those types may remain in the same location in the tree of MIME types that they would have occupied had they not been based on XML.

---

### A.3. Why not create a new top-level MIME type for XML-based media types?

TOC

The top-level MIME type (e.g., model/* (Nelson, S., Parks, C., and Mitra, “The Model Primary Content Type for Multipurpose Internet Mail Extensions,” January 1997.) [RFC2077]) determines what kind of content the type is, not what syntax it uses. For example, agents using image/* to signal acceptance of any image format should certainly be given access to media type image/svg+xml, which is in all respects a standard image subtype. It just happens to use XML to describe its syntax. The two aspects of the media type are completely orthogonal.
XML-based data types will most likely be registered in ALL top-level categories. Potential, though currently unregistered, examples could include application/mathml+xml (Carlisle, D., Ion, P., Miner, R., and N. Poppelier, “Mathematical Markup Language (MathML) Version 2.0 (Second Edition),” October 2003.) [MathML], model/uml+xml (Object

Management Group, “OMG Unified Modeling Language Specification, Version 1.3,” June 1999.) [UML], and image/svg+xml (Ferraiolo, J., Fujisawa, F., and D. Jackson, “Scalable Vector Graphics (SVG) 1.1 Specification,” January 2004.) [SVG].

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### A.4. Why not just have the MIME processor 'sniff' the content to determine whether it is XML?

TOC

Rather than explicitly labeling XML-based media types, the processor could look inside each type and see whether or not it is XML. The processor could also cache a list of XML-based media types.
Although this method might work acceptably for some mail applications, it would fail completely in many other uses of MIME. For instance, an XML-based web crawler would have no way of determining whether a file is XML except to fetch it and check. The same issue applies in some IMAP4 (Crispin, M., “Internet Message Access Protocol - Version 4rev1,” March 2003.) [RFC3501] mail applications, where the client first fetches the MIME type as part of the message structure and then decides whether to fetch the MIME entity. Requiring these fetches just to determine whether the MIME type is XML could have significant bandwidth and latency disadvantages in many situations.
Sniffing XML also isn't as simple as it might seem. DOCTYPE declarations aren't required, and they can appear fairly deep into a document under certain unpreventable circumstances. (E.g., the XML declaration, comments, and processing instructions can occupy space before the DOCTYPE declaration.) Even sniffing the DOCTYPE isn't completely reliable, thanks to a variety of issues involving default values for namespaces within external DTDs and overrides inside the internal DTD. Finally, the variety in potential character encodings (something XML provides tools to deal with), also makes reliable sniffing less likely.

---

### A.5. Why not use a MIME parameter to specify that a media type uses XML syntax?

TOC

For example, one could use "Content-Type: application/iotp; alternate-type=text/xml" or "Content-Type: application/iotp; syntax=xml".
Section 5 of [RFC2045] (Freed, N. and N. Borenstein, “Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies,” November 1996.) says that "Parameters are modifiers of the media subtype, and as such do not fundamentally affect the nature of the content". However, all XML-based media types are by their nature always XML. Parameters, as they have been defined in the MIME

architecture, are never invariant across all instantiations of a media type.
More practically, very few if any MIME dispatchers and other MIME agents support dispatching off of a parameter. While MIME agents on the receiving side will need to be updated in either case to support (or fall back to) generic XML processing, it has been suggested that it is easier to implement this functionality when acting off of the media type rather than a parameter. More important, sending agents require no update to properly tag an image as "image/svg+xml", but few if any sending agents currently support always tagging certain content types with a parameter.

---

### A.6. How about labeling with parameters in the other direction (e.g., application/xml; Content-Feature=iotp)?

TOC

This proposal fails under the simplest case, of a user with neither knowledge of XML nor an XML-capable MIME dispatcher. In that case, the user's MIME dispatcher is likely to dispatch the content to an XML processing application when the correct default behavior should be to dispatch the content to the application responsible for the content type (e.g., an ecommerce engine for application/iotp+xml (Burdett, D., "Internet Open Trading Protocol - IOTP Version 1.0," April 2000.) [RFC2801], once this media type is registered).
Note that even if the user had already installed the appropriate application (e.g., the ecommerce engine), and that installation had updated the MIME registry, many operating system level MIME registries such as .mailcap in Unix and HKEY_CLASSES_ROOT in Windows do not currently support dispatching off a parameter, and cannot easily be upgraded to do so. And, even if the operating system were upgraded to support this, each MIME dispatcher would also separately need to be upgraded.

---

### A.7. How about a new superclass MIME parameter that is defined to apply to all MIME types (e.g., Content-Type: application/iotp; $superclass=xml)?

TOC

This combines the problems of Appendix A.5 (Why not use a MIME parameter to specify that a media type uses XML syntax?) and Appendix A.6 (How about labeling with parameters in the other direction (e.g., application/xml; Content-Feature=iotp)?).
If the sender attaches an image/svg+xml file to a message and includes the instructions "Please copy the French text on the road sign", someone with an XML-aware MIME client and an XML browser but no support for SVG can still probably open the file and copy the text. By

contrast, with superclasses, the sender must add superclass support to her existing mailer AND the receiver must add superclass support to his before this transaction can work correctly.
If the receiver comes to rely on the superclass tag being present and applications are deployed relying on that tag (as always seems to happen), then only upgraded senders will be able to interoperate with those receiving applications.

---

### A.8. What about adding a new parameter to the Content-Disposition header or creating a new Content-Structure header to indicate XML syntax?

TOC

This has nearly identical problems to Appendix A.7 (How about a new superclass MIME parameter that is defined to apply to all MIME types (e.g., Content-Type: application/iotp; $superclass=xml)?), in that it requires both senders and receivers to be upgraded, and few if any operating systems and MIME dispatchers support working off of anything other than the MIME type.

---

### A.9. How about a new Alternative-Content-Type header?

TOC

This is better than Appendix A.8 (What about adding a new parameter to the Content-Disposition header or creating a new Content-Structure header to indicate XML syntax?), in that no extra functionality needs to be added to a MIME registry to support dispatching of information other than standard content types. However, it still requires both sender and receiver to be upgraded, and it will also fail in many cases (e.g., web hosting to an outsourced server), where the user can set MIME types (often through implicit mapping to file extensions), but has no way of adding arbitrary HTTP headers.

---

### A.10. How about using a conneg tag instead (e.g., accept-features: (syntax=xml))?

TOC

When the conneg protocol is fully defined, this may potentially be a reasonable thing to do. But given the limited current state of conneg (Klyne, G., “Protocol-independent Content Negotiation Framework,” September 1999.) [RFC2703] development, it is not a credible replacement for a MIME-based solution.
Also, note that adding a content-type parameter doesn't work with conneg either, since conneg only deals with media types, not their

parameters. This is another illustration of the limits of parameters for MIME dispatchers.

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### A.11. How about a third-level content-type, such as text/xml/rdf?

TOC

MIME explicitly defines two levels of content type, the top-level for the kind of content and the second-level for the specific media type. [RFC4288] (Freed, N. and J. Klensin, “Media Type Specifications and Registration Procedures,” December 2005.) and [RFC4289] (Freed, N. and J. Klensin, “Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures,” December 2005.) extends this in an interoperable way by using prefixes to specify separate trees for IETF, vendor, and personal registrations. This specification also extends the two-level type by using the '+xml' suffix. In both cases, processors that are unaware of these later specifications treat them as opaque and continue to interoperate. By contrast, adding a third-level type would break the current MIME architecture and cause numerous interoperability failures.

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### A.12. Why use the plus ('+') character for the suffix '+xml'?

TOC

As specified in Section 5.1 of [RFC2045] (Freed, N. and N. Borenstein, “Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies,” November 1996.), a tspecial can't be used:

```
tspecials :=
"(" / ")" / "<" / ">" / "@" /
"," / ";" / ":" / "\" / <">
"/" / "[" / "]" / "?" / "="
```

It was thought that "." would not be a good choice since it is already used as an additional hierarchy delimiter. Also, "*" has a common wildcard meaning, and "-" and "_" are common word separators and easily confused. The characters %'`#& are frequently used for quoting or comments and so are not ideal.
That leaves: ~!$^+{}|
Note that "-" is used heavily in the current registry. "$" and "_" are used once each. The others are currently unused.
It was thought that '+' expressed the semantics that a MIME type can be treated (for example) as both scalable vector graphics AND ALSO as XML; it is both simultaneously.

---

### A.13. What is the semantic difference between application/foo and application/foo+xml?

TOC

MIME processors that are unaware of XML will treat the '+xml' suffix as completely opaque, so it is essential that no extra semantics be assigned to its presence. Therefore, application/foo and application/foo+xml SHOULD be treated as completely independent media types. Although, for example, text/calendar+xml could be an XML version of text/calendar (Dawson, F. and D. Stenerson, "Internet Calendaring and Scheduling Core Object Specification (iCalendar)," November 1998.) [RFC2445], it is possible that this (hypothetical) new media type would include new semantics as well as new syntax, and in any case, there would be many applications that support text/calendar but had not yet been upgraded to support text/calendar+xml.

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### A.14. What happens when an even better markup language (e.g., EBML) is defined, or a new category of data?

TOC

In the ten years that MIME has existed, XML is the first generic data format that has seemed to justify special treatment, so it is hoped that no further suffixes will be necessary. However, if some are later defined, and these documents were also XML, they would need to specify that the '+xml' suffix is always the outermost suffix (e.g., application/foo+ebml+xml not application/foo+xml+ebml). If they were not XML, then they would use a regular suffix (e.g., application/foo+ebml).

---

### A.15. Why must I use the '+xml' suffix for my new XML-based media type?

TOC

You don't have to, but unless you have a good reason to explicitly disallow generic XML processing, you should use the suffix so as not to curtail the options of future users and developers.

Whether the inventors of a media type, today, design it for dispatch to generic XML processing machinery (and most won't) is not the critical issue. The core notion is that the knowledge that some media type happens to use XML syntax opens the door to unanticipated kinds of processing beyond those envisioned by its inventors, and on this basis identifying such encoding is a good and useful thing.

Developers of new media types are often tightly focused on a particular type of processing that meets current needs. But there is no need to rule out generic processing as well, which could make your media type more valuable over time. It is believed that registering with the

'+xml' suffix will cause no interoperability problems whatsoever, while it may enable significant new functionality and interoperability now and in the future. So, the conservative approach is to include the '+xml' suffix.

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### A.16. Why not redefine text/xml instead of deprecating it

TOC

Since many XML processors do not follow RFC 3023 (they treat the xml encoding declaration as authoritative) it has been suggested that text/xml be redefined to follow the same behavior as application/xml in this specification. However, this pragmatic solution would not be compatible with the definition of the text/* type for non-HTTP transports.

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## Appendix B. Changes from RFC 3023

TOC

There are numerous and significant differences between this specification and [RFC3023] (Murata, M., St.Laurent, S., and D. Kohn, "XML Media Types," January 2001.), which it obsoletes. This appendix summarizes the major differences only.
First, text/xml and text/xml-external-parsed-entity are deprecated. Second, XPointer ([XPointerFramework] (Grosso, P., Maler, E., Marsh, J., and N. Walsh, "XPointer Framework," March 2003.) and [XPointerElement] (Grosso, P., Maler, E., Marsh, J., and N. Walsh, "XPointer element() Scheme," March 2003.) and [XPointerXmlns] (DeRose, S., Daniel, R., Maler, E., and J. Marsh, "XPointer xmlns() Scheme," March 2003.)) has been added as fragment identifier syntax for "application/xml", and the XPointer Registry ([XPtrReg] (Hazaël-Massieux, D., "XPointer Registry," 2005.)) mentioned. Third, [XBase] (Marsh, J., "XML Base," June 2001.) has been added as a mechanism for specifying base URIs. Fourth, the language regarding charsets was updated to correspond to the W3C TAG finding Internet Media Type registration, consistency of use (Bray, T., Ed., "Internet Media Type registration, consistency of use," April 2004.) [TAGMIME]. Fifth, many references are updated.

---

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TOC

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