INTERNATIONAL STANDARD

ISO/IEC
15444-6

Information technology — JPEG 2000 image coding system —

Part 6:
Compound image file format

AMENDMENT 1: Hidden text metadata

Technologies de l'information — Système de codage d'image JPEG 2000 —

Partie 6: Format de fichier d'image de composant

AMENDEMENT 1: Métadonnées de texte caché

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Foreword

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Amendment 1 to ISO/IEC 15444-6:2003 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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Information technology — JPEG 2000 image coding system —

Part 6:
Compound image file format

AMENDMENT 1: Hidden text metadata

Add the following normative references to 2.2:

IETF RFC 1950, *ZLIB Compressed Data Format Specification version 3.3*, May 1996

IETF RFC 1951, *DEFLATE Compressed Data Format Specification version 1.3*, May 1996

IETF RFC 2045, *Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies*

IETF RFC 2396, *Uniform Resource Identifiers (URI): Generic Syntax,* August 1998

W3C, *Cascading Style Sheets, level 1 (CSS1) Specification*, http://www.w3.org/pub/WWW/TR/REC-CSS1

W3C, *Cascading Style Sheets, level 2 (CSS2) Specification*, http://www.w3.org/TR/REC-CSS2

W3C, *HTML 4.01 Specification,* http://www.w3.org/TR/html401

W3C, *XHTML 1.0 Extensible HyperText Markup Language, Second Edition*, http://www.w3.org/TR/xhtml1

W3C, *XML Schema Part 0: Primer, Second Edition*, http://www.w3.org/TR/xmlschema-0

W3C, *XML Schema Part 1: Structures, Second Edition*, http://www.w3.org/TR/xmlschema-1

W3C, *XML Schema Part 2: Datatypes, Second Edition*, http://www.w3.org/TR/xmlschema-2

Add the following terms and definitions to Clause 3:

3.23
hidden text
symbolic representation for the characters and words found in an image

3.24
annotation
particular region of a page in a JPM document that has associated a URL reference, a note or a highlight

3.25
hidden text XML
XML data which describe hidden text and annotations for a single page in a JPM file and which conform to the schema in Annex H

3.26
compressed hidden text XML
hidden text XML data compressed using the mechanisms defined in F.2

3.27
hidden text UUID box
UUID box containing compressed hidden text XML

3.28
hidden text XML Schema
XML Schema for hidden text XML, as defined in H.1

Add the following abbreviations to Clause 4:

HTX   Hidden Text XML

Add the following subclause after 5.2.8:

5.3   Hidden Text Metadata

Hidden text metadata is data representing the text, text elements and text flow associated with an image. In the context of this standard, hidden text is associated with a particular region of a page in a JPM document.

Common uses for hidden text include text searching and highlighting, cut-and-paste, and text-to-speech processing. Hidden text describes the flow of the text on a page as well as the text elements.

JPM allows a rich, multiple content-type representation of a document. Each region of a page may be encoded with a compression technique best suited to its characteristics. In regions containing text, high fidelity reproduction of the source image is retained by not replacing the text regions with a character-based rendition through OCR, but rather by using advanced coding methods such as JBIG2. Even OCR results with a 99 percent accuracy contain substantial numbers of errors per page which require expensive human labour to correct. The searchable nature of a character-based rendition can be obtained instead by associating hidden "dirty OCR" results with the corresponding text image. This standard defines a format for hidden text metadata.

A key issue with hidden text is capturing the ambiguities seen by the OCR engine in a way that allows properly-constructed search engines to find whether and where a given word might be present in a text image. Properly captured, this information provides nearly as much searching precision as an approach using human-corrected "clean OCR" data, but at much lower cost. Search results are most useful where there are fewer false positives to weed through. Intelligent search engines can take account of such data as confidence and alternate characters or alternate words to appropriately alter the ranking of search hits on less certain characters.

In many cases, true ambiguity exists in the image and it would confuse a human observer as well. In these cases, saving confidence values for characters and their alternatives or describing several alternative parsings of a string of characters into words can amount to saving the state of the OCR process to allow the problem to be revisited in a later stage, perhaps by a different engine or by access to first a general dictionary and then a set of more specialized dictionaries.

As a last step, when a person is presented with the search results, they can dismiss a given search hit by comparison to the actual image data for a character or word. For this purpose (and to allow later-stage OCR processes to resume analysis on the image), bounding box rectangles can be defined for all the elements of the hidden text such as characters, words, lines, paragraphs and regions. By indicating a container relationship among these items, intelligent navigation and text selection can occur at character, word, line, paragraph boundaries. A reading order through these rectangles can be defined for what was in the image just a random placement of unrelated glyphs.

While it is primarily designed for use by machines such as search engines, the hidden text can also serve as a crude (if "dirty") or adequate (if "clean") alternate representation for an image region to allow it to display on character-based devices (such as mobile phones) or small-area graphics devices (such as PDAs).

Annotations are added to the document typically with a WYSIWYG editor to indicate URL references, notes, and to highlight key sections of the document text. Each annotation is associated with a particular region of a page in a JPM document.

XML is used for hidden text and annotations because it is a format widely used to store structured information, and can be machine processed.

Renumber the original 5.3 as 5.4.

Add the following rows at the correct alphabetical location in Table A.1 of A.4:

Table A.1 — Boxes defined or referenced within this International Standard

Box name	Type	Superbox	Comments (Informative)
Hidden Text Metadata	'htxb' (0x68747862)	Yes	This optional box contains hidden text and annotations.
HTX Reference Box	'phtx' (0x70687478)	No	This optional box can be used to point to Hidden Text Metadata box contents at top file level.

Add the following subclauses after B.6.4:

B.6.5   Hidden Text Metadata box (superbox)

Box type: 'htxb' (0x68747862)

Container: Page box or File

Mandatory: No

Quantity: At most one if the container is the Page box, any number if the container is the file

Location: Anywhere in the Page box after the Page Header box if the container is the Page box, or anywhere after the File Type box if the container is the file

The Hidden Text Metadata box ('htxb') serves as a container for hidden text data. It is a superbox that may contain an optional Label box and must contain one of two box types. It may either contain one XML box containing hidden text metadata, or it may contain one UUID box containing hidden text metadata as specified in F.2.

The type of a Hidden Text Metadata box shall be htxb' (0x68747862). The contents of a Hidden Text Metadata box shall be as in Figure B.25:
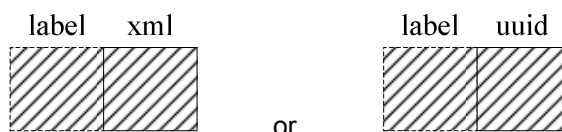

Figure B.25 — Organization of the contents of a Hidden Text Metadata box

B.6.6 HTX Reference box

Box type: 'phtx' (0x70687478)

Container: Page box

Mandatory: No

Quantity: At most one

Location: Anywhere in the Page box after the Page Header box

If the hidden text for a page is contained in a Hidden Text Metadata box within the corresponding Page box, this box must not appear. If the hidden text for a page is contained in a series of one or more Hidden Text Metadata boxes at the file level, one HTX reference box has to be included in the corresponding Page box.

The type of a HTX Reference box shall be 'phtx' (0x70687478). The contents of a HTX Reference box shall be as in Figure B.26:
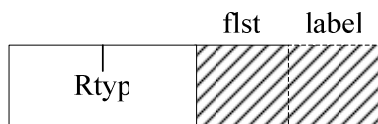

Figure B.26 — Organization of the contents of a HTX Reference box

Rtyp: Referenced box type. This field specifies the actual type (as would be found in the TBox field in an actual box header) of the box referenced by this HTX Reference box. However, a reader shall not attempt to locate a physically stored box header for the box represented by this HTX Reference box, as it is legal to use a HTX Reference box to create a new box that is not contiguously contained in other locations within this or other files, and thus the box header will not exist.

flst: Fragment List box. This box specifies the actual locations of the fragments of the referenced HTX element. When those fragments are concatenated, in order, as specified by the Fragment List box definition, the resulting byte-stream shall be the contents of the referenced HTX element, which contains hidden text data, and shall not include the box header fields. The format of the Fragment List box is specified in B.5.1.1. If Rtyp is 'uuid' and the UUID signals deflate compression as defined in F.2, the number of fragments of the Fragment List box must be one.

label: Label box. This optional box may contain a Label box which specifies a label or name for the hidden text of the corresponding page. The structure of a Label box is specified in B.6.3.

Table B.31 — HTX Reference box contents data structure values

Parameter	Size (bits)	Value
Rtyp	32	See Table B.32
flst	Variable	Variable
label	Variable	Variable

Table B.32 — Legal Rtyp values

Value	Meaning
xml\40	The referenced HTX data shall be contained in an XML box as described in Annex F. The XML box is defined in I.7.1 of ITU-T Rec T.800 (2002)	ISO/IEC 15444-1:2004.
uuid	The referenced HTX data shall be contained in a UUID box as described in Annex F. The UUID box is defined in I.7.2 of ITU-T Rec T.800 (2002)	ISO/IEC 15444-1:2004.
	All other values reserved

Renumber the original B.6.5 as B.6.7.

Add the following annexes after Annex E:

Annex F
(normative)

Hidden Text and Annotations Storage

F.1 Storage of HTX in JPM

A hidden text XML element is restricted to represent text for a single page. It is stored in a Hidden Text Metadata box as defined in B.6.5. The Hidden Text Metadata box either appears within the corresponding Page box or is placed at the top level of the file. If placed on top level, an HTX Reference box as defined in B.6.6 must be placed in the corresponding Page box to point to the Hidden Text Metadata boxes that composes the hidden text of the page.

When a Hidden Text Metadata box is small in size, it is reasonable to place it directly in Page box. In keeping with the usual JPM approach, large objects are generally placed at the top file level. In this case, the much smaller HTX Reference box is placed in the page box and points to the actual data. Also in this case a single HTX Reference box can point to multiple file level Hidden Text Metadata boxes. This can be used to compose the HTX for many pages from combinations of fixed page content (such as page headers and footers) and variable page content unique to each page.

XML data representing hidden text and annotations is defined using XML 1.0, and conforms to the schemas in Annex H. It shall be referred to as *Hidden Text XML or HTX*.

HTX shall be stored in a Hidden Text Metadata box as defined in B.6.5.

The storage of uncompressed HTX may increase file size considerably. In order to minimise the increase in file size, HTX may be compressed using the mechanisms defined in F.2.

F.2 Compression of HTX

HTX may be compressed using the zlib format defined in IETF RFC 1950 with DEFLATE compression defined in IETF RFC 1951.

UUID boxes shall be used for the storage of compressed HTX in the JPM file format.

Compressed HTX shall be stored in a UUID box, as defined in I.7.3 of ISO/IEC 15444-1:2004, with the following contents:

> **ID**   This field shall contain the following 16 hexadecimal bytes:
>
> > c2 f3 66 a4 27 ec 40 c4 a0 9a 7e 65 2f 36 eb 59
>
> **DATA**   This field will contain hidden text XML compressed to the DEFLATE format, as specified in F.1.

A UUID box with the above content shall be referred to as a *hidden text UUID box*.

The following URL may be used in a UUID Data Entry box, as defined in I.7.3.2 of ISO/IEC 15444-1:2004, to describe the format of the data contained in hidden text UUID boxes:

`http://www.jpeg.org/hiddentext/htx.html`

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Annex G
(normative)

Hidden Text and Annotations Types and Elements

G.1 Overview

This section describes each of the HTX types and elements, and how they are to be used and interpreted.

Annex H formally describes the schemas that the hidden text XML must conform to. Here the text is a description of each of the elements, what they are for, how they relate to each other, how often they can occur, how they are to be interpreted.

Hidden text can be encoded using subelements at different levels of detail as described in this section. This can be used to structure the hidden text and give it a text flow in regions, paragraphs, lines, words, etc. Whenever this kind of structured information is not available, the hidden text can be directly put into the appropriate elements, omitting specific positioning of lines inside paragraphs, words inside lines, etc. The following picture gives an overview of the various elements that can be used to store the hidden text of a page:
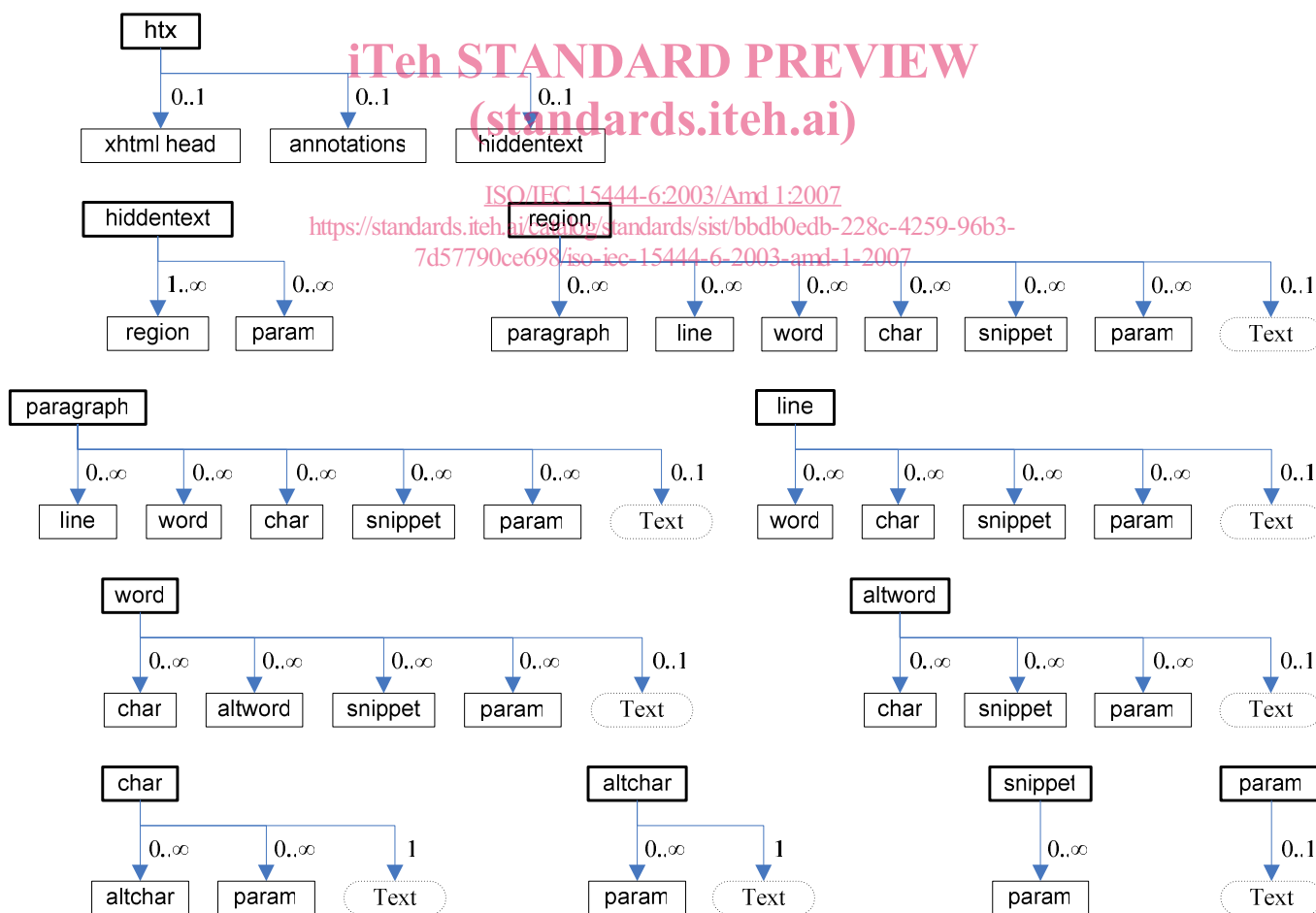

Figure G.1 — Structure of HTX

The hidden text XML schema (see H.1) uses some types and elements defined in the XHTML 1.0 XML Schema. See the XHTML 1.0 reference for full details of these types and elements.

The following additional types and elements are defined:

G.2 Types

G.2.1 Shape

The **Shape** type is used to describe the shape of a region in the document and is defined by the following XML schema declaration:

```
<xs:simpleType name="Shape">
  <xs:annotation>
        <xs:documentation>Enumeration of shapes.</xs:documentation>
  </xs:annotation>
    <xs:restriction base="xs:token">
        <xs:enumeration value="rect"/>
        <xs:enumeration value="poly"/>
    </xs:restriction>
</xs:simpleType>
```

G.2.2 Coordinates

The **Coords** type is used to store a comma separated sequence of non-negative integer values. This type is similar to the XHTML 1.0 **Coords** type but excludes negative and percentage values. The attribute specifies the position and shape of the area. The number and order of values depends on the value of the shape attribute. Possible combinations:

- **rect**: left-x, top-y, right-x, bottom-y.

- **poly**: x1, y1, x2, y2, ..., xN, yN.
  If the first and last x and y coordinate pairs are not the same, user agents must infer an additional coordinate pair to close the polygon.

The **Coords** element is defined by the following XML schema declaration:

```
<xs:simpleType name="Coords">
    <xs:annotation>
       <xs:documentation>
            Comma separated list of integer values.
       </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:string">
        <xs:pattern value="\d+,\s*\d+(,\s*\d+,\s*\d+)+"/>
    </xs:restriction>
</xs:simpleType>
```

G.2.3 Percentage

A simple type **Percentage** is defined to store a string that holds a percent value indicating the confidence of a hidden text word or character match. **Percentage** is defined as follows:

```
<xs:simpleType name="Percentage">
   <xs:annotation>
      <xs:documentation>Percentage value.</xs:documentation>
   </xs:annotation>
   <xs:restriction base="xs:string">
      <xs:pattern value="\d+(\.\d+)?%?"/>
   </xs:restriction>
</xs:simpleType>
```

G.2.4 Angle

A simple type **Angle** is defined to store a string that indicates an angle for use in hidden text. The **Angle** type is defined as follows:

```
<xs:simpleType name="Angle">
    <xs:annotation>
        <xs:documentation>
            nn for radian measure or nn° for degree
        </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:string">
        <xs:pattern value="[\-\+]?\d+(\.\d+)?°?"/>
    </xs:restriction>
</xs:simpleType>
```

G.2.5 Resolution

A simple type **Resolution** is defined to store a string that indicates a resolution for use with coordinates in hidden text and annotations. The **Resolution** type is defined as follows:

```
<xs:simpleType name="Resolution">
    <xs:annotation>
        <xs:documentation>
            Resolution value in dots per inch (dpi). A single number stands
for
            horizontal and vertical resolution having the same values.
            Two numbers can be used to define different resolutions for
horizontal
            (first number) and vertical (second number).
        </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:string">
        <xs:pattern value="\d+(\.\d+)?(,\*s\d+(\.\d+)?)?"/>
    </xs:restriction>
</xs:simpleType>
```

G.3 Common Attributes

G.3.1 Core Attributes

Coreattrs, a set of core attributes that are common to most elements, is defined as follows:

```
<xs:attributeGroup name="coreattrs">
    <xs:annotation>
        <xs:documentation>
            core attributes common to most elements
            id          document-wide unique id
            class       space separated list of classes
            lang        language code (backwards compatible)
            xml:lang    language code (as per XML 1.0 spec)
            dir         direction for weak/neutral text
            iref        URI of the image corresponding to the region
        </xs:documentation>
    </xs:annotation>
    <xs:attribute name="id"    type="xs:ID"       />
    <xs:attribute name="class" type="xs:NMTOKENS" />
    <xs:attribute name="iref"  type="xs:anyURI" />
    <xs:attributeGroup ref="xhtml:i18n"/>
</xs:attributeGroup>
```

The following attributes are members of the **Coreattrs** group:

- **lang**   (optional)

  An optional attribute of type **LanguageCode** to indicate the default language for text in the hidden text XML. Refer to the XHTML 1.0 specification for further details.

- **xml:lang**   (optional)

  An optional attribute of type **xml:lang** to indicate the default language for text in the hidden text XML. Refer to the XHTML 1.0 specification for further details.

- **dir**   (optional)

  An optional attribute containing the string **rtl** or **ltr**, indicating the default direction for text in the hidden text XML. Refer to the XHTML 1.0 specification for further details.

- **id**   (optional)

  An optional attribute of type xs:ID. Contains an id that is unique in the scope of this document. This attribute can be used for referencing a certain element (e.g. in a style sheet). See XML Schema specification for further details.

- **class**   (optional)

  This attribute can contain a space separated list of classes. Useful for convenient style sheet usage.

- **iref**   (optional)

  URI which points to an image file corresponding to the region.
  (ex.1 iref="http://jpeg.org/image.jp2", ex.2 iref="jpip://jpeg.org/image.jp2?fsize=32,32&rsiz=32,32")

G.3.2 Position Attributes

Posattrs, a set of position attributes that are common to most visual elements, is defined as follows:

```
    <xs:attributeGroup name="posattrs">
      <xs:annotation>
        <xs:documentation>
            positioning attributes common to most elements
            shape       shape of an element
            coords      coordinates of an element
            angle       angle of text direction
                        0 is horizontal to the right, positive values
                        mean counter-clockwise rotation
            baseline    angle of the characters in a line of
                        text
        </xs:documentation>
      </xs:annotation>
    <xs:attribute name="shape"    type="Shape" default="rect"   />
    <xs:attribute name="coords"   type="Coords"                 />
    <xs:attribute name="angle"    type="Angle" default="0"      />
      <xs:attribute name="baseline" type="Angle" default="0"    />
  </xs:attributeGroup>
```

The following attributes are members of the **Posattrs** group:

- **shape** (optional)

  An optional attribute of type **Shape** containing the shape of the region bounding the element. Possible values are 'rect' for a rectangle and 'poly' for a polygon.The default value for this attribute is **rect.** If this attribute is missing then the bounding shape for this element is the bounding shape of the parent element (which is the whole page in case of hiddentext).

- **coords** (optional)

  The logical coordinates of the shape bounding the hidden text for this page. The unit is pixels. A resolution can be defined as an attribute on the htx element. If this attribute is missing then the bounding shape for this element is the bounding shape of the parent element (which is the whole page in case of hiddentext). How the value of cords is to interpreted depends on the shape attribute. The coord values unit is pixel, no percentage or any length unit like inch or centimetre.

  The origin (coordinates '0, 0') is the upper left corner of the page.

- **angle** (optional)

  An attribute of type Angle that indicates the angle of orientation of the element, relative to the direction of the element's parent.

  Can either be in degree (value followed by a ° sign) or radian measure (value without unit). A value of 0 means same direction as the element's parent, positive values mean rotating counter-clockwise relative to that direction. Default value is '0'.

- **baseline** (optional)

  An attribute of type Angle that indicates the relative orientation of the sub elements and direct content contained in the element with respect to the direction given by the angle attribute.

  Can either be in degree (value followed by a ° sign) or radian measure (value without unit). A value of 0 means same direction as the element, positive values mean rotating counter-clockwise relative to that direction. Default value is '0'.

The values of shape and cords attribute should be interpreted as described in HTML 4.01 subclause 13.6.1 section "AREA attribute definitions".