



A Project of the PWG IPPFAX Working Group

Universal Image Format (UIF)

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Abstract

This standard specifies the Universal Image Format (UIF). The UIF requirements [7] are derived from the requirements for IPPFAX [8] and Internet Fax [9].

In summary UIF is a raster image data format intended for use by, but not limited to, the IPPFAX protocol, which is used to provide a synchronous, reliable exchange of image Documents between Senders and Receivers. UIF is based on the TIFF-FX specification [4], which describes the TIFF (Tag Image File Format) representation of image data specified by the ITU-T Recommendations for black-and-white and color facsimile.

This document (1) formally defines a series of “UIF profiles” distinguished primarily by the method of compression employed and color space used; (2) describes the use of CONNEG in capabilities communication between two UIF-enabled Implementations; and (3) defines a set of baseline capabilities that permits a CONNEG implementation to be OPTIONAL.

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1

2 **1 Introduction**

3 This document specifies an image data format based on TIFF-FX [4] especially suited for use with
4 synchronous protocols (e.g., IPPFAX[10]). The increased conformance requirements found in this UIF
5 specification reflect the need for a data format where quality document transmission is the primary
6 concern. The complete support for TIFF-FX in this way is called Universal Image Format (UIF). There
7 are several pieces to this support:

- 8 ➤ A specification of precisely what parts of the TIFF-FX specification are to be supported.
- 9 ➤ How the UIF-capable Sender uses CONNEG to discover the UIF characteristics (resolution,
10 drawing surface, etc.) of a potential UIF Receiver.
- 11 ➤ How the Sender specifies options for the transmission (reducing for example).

12

13 **2 Terminology**

14 This section defines the following additional terms that are used throughout this standard.

15 **2.1 Conformance Terminology**

16 The key words **MUST**, **MUST NOT**, **REQUIRED**, **SHOULD**, **SHOULD NOT**,
17 **RECOMMENDED**, **MAY**, and **OPTIONAL** in this document are to be interpreted as described in
18 RFC 2119 [18].

19 **2.2 Model**

20 The following terms are introduced and capitalized in order to indicate their specific meaning:

21 **Baseline Field** – One of the core set of TIFF fields introduced by the TIFF specification [19]

22 **Implementation** – A Sender or Receiver

23 **Document** – The UIF-formatted electronic representation of a set of one or more pages that the Sender
24 sends to the Receiver.

25 **Extension Field** – One of the TIFF extension fields introduced by the current TIFF specification [19],
26 specification, the set of PageMaker TIFF Technical Notes [20], or TIFF Technical Note 2 [21].

27 **New Field** – One of the new TIFF fields introduced by the TIFF-FX specification [4]. Note that the
28 UIF specification does not introduce any new TIFF tags.

29 **Receiver** – This is the agent (software, hardware or some combination) that receives the Document
30 sent by the Sender.

31 **Sender** – This is the agent (software, hardware or some combination) that is used to create and
32 transmit a Document to a Receiver.

33

1 **3 TIFF-FX support**

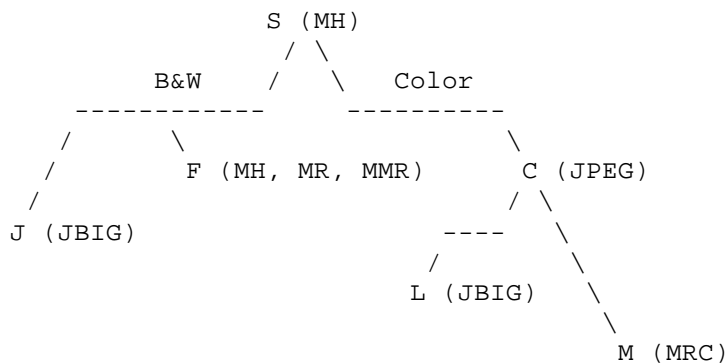
2 A UIF Document is a TIFF file that adheres to the requirements of (1) Baseline TIFF (see [19]) and (2)
3 one or more UIF profiles. A UIF profile is based on a collection of ITU-T facsimile coding methods.
4 The UIF profiles listed below have been derived from TIFF-FX [4]. The reader is referred to this
5 document for a complete description of each profile, as the subsections below briefly summarize each
6 profile and list only the differences between the UIF version of the profile and TIFF-FX profile on
7 which it is based.

8 Pages within a UIF Document MAY be encoded using different UIF profiles.

9 An Implementation that supports UIF MUST support at least UIF Profile S. Note that for the TIFF
10 fields “ImageDescription”, “DocumentName”, “Software”, and “DateTime”, Adobe Baseline TIFF
11 specifies only ASCII and does not provide a language tag or alternate character set facility.

12 **3.1 Relationships among UIF Profiles**

13 The following tree diagram, which is adapted from TIFF-FX[4], shows the relationship among UIF
14 profiles and between UIF profiles and coding methods.



28
29 All UIF Senders and/or Receivers MUST implement UIF Profile S, which is the root node of the tree.
30 All color Senders and/or Receivers of UIF MUST implement UIF Profile C. Senders and/or Receivers
31 that implement a particular profile MUST also implement those profiles on the path that connect it to
32 the root node, and MAY optionally implement profiles not on the path connecting it to the root node.
33 For example, a Sender and/or Receiver that implements UIF Profile M MUST also implement UIF
34 Profiles C and S, and MAY optionally implement UIF Profile F, J or L. For another example, a
35 Sender/Receiver that implements UIF Profile C MUST also implement UIF Profile S, and MAY
36 optionally implement UIF Profile F or J.

37

38 **3.2 Summary of UIF Profiles**

39 The following subsections summarize Implementation requirements for each of the UIF profiles and
40 describe the differences between a given UIF profile and the corresponding TIFF-FX profile. Each
41 subsection contains one or more tables that show the TIFF fields and field values that are REQUIRED,
42 RECOMMENDED, or OPTIONAL for UIF Implementations. For profiles other than UIF Profile S,

1 single asterisks (*) and double asterisks (**) indicate the level of Receiver conformance (see the
 2 legend below each table). For profiles other than UIF Profile S, the rightmost column is used to
 3 indicate Sender conformance, i.e., those fields that a user MUST, SHOULD, or MAY include in the
 4 Image File Directory (IFD) of a UIF Document. For fields that a Receiver MUST support, note that a
 5 Sender MUST support at least one of the REQUIRED field values that the Receiver MUST support.
 6 If there is a default value associated with a TIFF field, and the default value is a legal value for the
 7 given UIF profile, then the Sender MAY choose to physically omit this field from the UIF file, as the
 8 presence of the TIFF field and its value are implied. The Tables in the following subsections show
 9 default values for TIFF fields only when the default values are permitted.

10 **3.2.1 UIF Profile S**

11 UIF Profile S is modeled after Profile S of TIFF-FX[4], which describes the minimal black-and-white
 12 subset of TIFF for facsimile. Tables 1 and 2 summarize the fields and field values that are REQUIRED
 13 for all Implementations of UIF Profile S. A UIF Profile S Implementation MUST use 1-dimensional
 14 Modified Huffman (MH) compression as defined in ITU-T T.4 [11] and MUST adopt the same
 15 requirements and restrictions for Baseline Fields, Extension Fields, byte order, bit order, and image file
 16 directory (IFD) placement as stated in Section 3 of TIFF-FX[4] with the exception of the following:

- 17 1) ImageWidth is not constrained.
- 18 2) XResolution is not constrained, but 200, 300, and 600dpi MUST be supported.
- 19 3) YResolution is not constrained, but 200, 300, and 600dpi MUST be supported.

20 Note that ‘XResolution’ and ‘YResolution’ values refer to the resolutions that the Receiver is capable
 21 of processing, not necessarily the resolutions that the Receiver is physically capable of producing (e.g.,
 22 printer engine delivery).

23 All UIF Receivers MUST support the following Baseline and Extension Fields and field values. All
 24 UIF Senders MUST be capable of creating a UIF Document that contains the following Baseline and
 25 Extension Fields or MUST be otherwise capable of verifying that these fields are present before
 26 sending a Document. For a complete description of the Baseline and Extension Fields shown below,
 27 see the TIFF-FX specification [4].

28 **Table 1. UIF Profile S Baseline Fields**

Baseline Fields	Values
BitsPerSample	1
Compression	3: 1D Modified Huffman coding set T4Options = 0 or 4
FillOrder	2: least significant bit first
ImageWidth	m: width of image in pixels
ImageLength	n: length of image in pixels (total number of scanlines)
NewSubFileType	2: Bit 1 identifies single page of a multi-page Document
PhotometricInterpretation	0: pixel value 1 means black
ResolutionUnit	2: inch (Default = 2)
RowsPerStrip	number of scanlines per strip = ImageLength, with one strip
SamplesPerPixel	1
StripByteCounts	number of bytes in TIFF strip

StripOffsets	offset from beginning of file to single TIFF strip
XResolution	200, 300, 600, other resolutions are OPTIONAL (written in pixels per inch)
YResolution	200, 300, 600, other resolutions are OPTIONAL (written in pixels per inch)

Table 2. UIF Profile S Extension Fields

Extension Fields	Values
PageNumber	n,m: page number n followed by total page count m
T4Options	0: MH coding, EOLs not byte aligned (Default = 0) 4: MH coding, EOLs byte aligned

3.2.2 UIF Profile F

This section defines UIF Profile F, which uses Modified Read and Modified Modified Read (MMR) compression (described in ITU-T T.4 [11] and ITU-T T.6 [12]) in addition to the Modified Huffman compression used for UIF Profile S. UIF Profile F is based on TIFF-FX Profile F. Tables 3, 4, and 5 summarize the fields and field values that are REQUIRED / RECOMMENDED / OPTIONAL for UIF Profile F. Asterisks are used to denote levels of Receiver conformance, while the rightmost column indicates Sender conformance, i.e., those fields that a Sender MUST, SHOULD, or MAY include in an image file directory (IFD) of a UIF Document. For a complete description of the Baseline, Extension, and New Fields shown below, see the TIFF-FX specification [4]. A Sender/Receiver implementing this profile is REQUIRED to also implement UIF Profile S.

Here are the differences between TIFF-FX Profile F and UIF Profile F. For UIF Profile F,

- 1) ImageWidth is not constrained.
- 2) XResolution is not constrained, but a Receiver MUST support 200, 300, and 600dpi .
- 3) YResolution is not constrained, but a Receiver MUST support 200, 300, and 600dpi .
- 4) A Receiver MUST support MMR coding (Compression=4) and the associated T4Options field, while a Receiver MAY support MH (Compression=3).
- 5) The following TIFF-FX RECOMMENDED fields have been omitted: 'BadFaxLines', 'CleanFaxData', 'ConsecutiveBadFaxLines', and 'ProfileType'.
- 6) UIF Implementations MUST support the GlobalParametersIFD field.
- 7) The 'FaxProfile' TIFF tag introduced in [4] is re-interpreted as the 'UIFProfile' TIFF tag for UIF Documents. The TIFF tag 'UIFProfile' uses the same TIFF field identifier (401) and the same data type (Byte) as the TIFF tag 'FaxProfile'. The values for this field are redefined as follows:
 - 0: does not conform to a profile defined for UIF
 - 1: minimal black & white lossless, UIF Profile S
 - 2: extended black & white lossless, UIF Profile F
 - 3: lossless JBIG black & white, UIF Profile J
 - 4: lossy color and grayscale, UIF Profile C
 - 5: lossless color and grayscale, UIF Profile L

6: Mixed Raster Content, UIF Profile M

Table 3. UIF Profile F Baseline Fields

Baseline Fields	Values	Sender Conformance
BitsPerSample	1**	MUST
Compression	3: 1D Modified Huffman and 2D Modified Read coding 4**: 2D Modified Modified Read coding	MUST
DateTime*	{ASCII}: date/time in 24-hour format "YYYY:MM:DD HH:MM:SS"	SHOULD
FillOrder**	1: most significant bit first 2: least significant bit first (Default = 2)	MUST
ImageDescription*	{ASCII}: A string describing the contents of the image	SHOULD
ImageWidth**	n: width of image in pixels	MUST
ImageLength**	n: length of image in pixels (total number of scanlines)	MUST
NewSubFileType	2**: Bit 1 identifies single page of a multi-page Document	MUST
Orientation	1**-8, (Default = 1)	MUST
PhotometricInterpretation**	0: pixel value 1 means black 1: pixel value 1 means white	MUST
ResolutionUnit**	2: inch (Default = 2) 3: centimeter	MUST
RowsPerStrip**	n: number of scanlines per TIFF strip	MUST
SamplesPerPixel	1**	MUST
Software*	{ASCII}: name & release number of creator software	SHOULD
StripByteCounts**	n: number of bytes in TIFF strip	MUST
StripOffsets**	n: offset from beginning of file to each TIFF strip	MUST
XResolution	200**, 300**, 600**, other resolutions are OPTIONAL (written in pixels per inch)	MUST
YResolution	200**, 300**, 600** in pixels per inch with x-y aspect ratio (XResolution / YResolution) equal to 1; other resolutions and aspect ratios are OPTIONAL (written in pixels per inch)	MUST

* Receiver SHOULD support this field.

** (If double asterisk is in 'Baseline Fields' column) Receiver MUST support the given field and all values shown in 'Values' column.

1 (If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding
 2 the double asterisk.

3 **Table 4. UIF Profile F Extension Fields**

Extension Fields	Values	Sender Conformance
T4Options	0: REQUIRED if Compression is Modified Huffman (MH), EOLs are not byte aligned (Default = 0) 1: REQUIRED if Compression is 2D Modified Read (MR), EOLs are not byte aligned 4: REQUIRED if Compression is Modified Huffman, EOLs are byte aligned 5: REQUIRED if Compression is 2D Modified Read, EOLs are byte aligned	MUST if Compression=3
T6Options	0** : REQUIRED if Compression is 2D Modified Modified Read (MMR) (Default = 0)	MUST if Compression=4
DocumentName*	{ASCII}: name of UIF Document	SHOULD
PageNumber**	n,m: page number followed by total page count	MUST

4 * Receiver SHOULD support this field.

5 ** (If double asterisk is in 'Extension Fields' column) Receiver MUST support the given field and all values shown in
 6 'Values' column.

7 (If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding
 8 the double asterisk.

9
 10 **Table 5. UIF Profile F New Fields**

New Fields	Values	Sender Conformance
GlobalParametersIFD**	IFD: global parameters IFD	MUST
UIFProfile*	n: ITU-compatible UIF profile	SHOULD
CodingMethods*	n: compression algorithms used in file	SHOULD

11 * Receiver SHOULD support this field.

12 ** (If double asterisk is in 'New Fields' column) Receiver MUST support the given field and all values shown in 'Values'
 13 column.

14
 15 **3.2.3 UIF Profile J**

16 This section defines Profile J for UIF, which uses lossless JBIG compression as it is defined in ITU-T
 17 T.82 [16] subject to the application rules given in ITU-T T.85 [17]. UIF Profile J is based on TIFF-FX
 18 Profile J. Tables 6, 7, and 8 summarize fields and field values that are REQUIRED /
 19 RECOMMENDED / OPTIONAL. Asterisks are used to denote levels of Receiver conformance, while
 20 the rightmost column indicates levels of Sender Conformance, i.e., those fields that a Sender MUST,
 21 SHOULD, or MAY include in an IFD of a UIF document. For a complete description of the Baseline,
 22 Extension, and New Fields shown below, see the TIFF-FX specification [4]. A Sender/Receiver
 23 implementing this profile is REQUIRED to also implement UIF Profile S.

1 Here are the differences between TIFF-FX Profile J as defined in [4] and UIF Profile J. For UIF Profile
 2 J,

- 3 1) ImageWidth is not constrained.
- 4 2) XResolution is not constrained, but a Receiver MUST support 200, 300, and 600dpi.
- 5 3) YResolution is not constrained, but a Receiver MUST support 200, 300, and 600dpi .
- 6 4) The following TIFF-FX RECOMMENDED field has been omitted: 'ProfileType'.
- 7 5) UIF Implementations MUST support the GlobalParametersIFD field.
- 8 6) The 'FaxProfile' TIFF tag introduced in [4] is re-interpreted as the 'UIFProfile' TIFF tag for
 9 UIF Documents. The TIFF tag 'UIFProfile' uses the same TIFF field identifier (401) and the
 10 same data type (Byte) as the TIFF tag 'FaxProfile'. The values for this field are redefined as
 11 follows:
 - 12 0: does not conform to a profile defined for UIF
 - 13 1: minimal black & white lossless, UIF Profile S
 - 14 2: extended black & white lossless, UIF Profile F
 - 15 3: lossless JBIG black & white, UIF Profile J
 - 16 4: lossy color and grayscale, UIF Profile C
 - 17 5: lossless color and grayscale, UIF Profile L
 - 18 6: Mixed Raster Content, UIF Profile M

19
 20
 21
 22 **Table 6. UIF Profile J Baseline Fields**

Baseline Fields	Values	Sender Conformance
BitsPerSample	1**	MUST
Compression	9** : JBIG coding	MUST
DateTime*	{ASCII}: date/time in 24-hour format "YYYY:MM:DD HH:MM:SS"	SHOULD
FillOrder**	1: most significant bit first 2: least significant bit first	MUST
ImageDescription*	{ASCII}: A string describing the contents of the image	SHOULD
ImageWidth**	n: width of image in pixels	MUST
ImageLength**	n: length of image in pixels (total number of scanlines)	MUST
NewSubFileType**	2: Bit 1 identifies single page of a multi-page Document	MUST
Orientation	1**-8, (Default = 1)	MUST
PhotometricInterpretation**	0: pixel value 1 means black 1: pixel value 1 means white	MUST
ResolutionUnit**	2: inch (Default = 2)	MUST

	3: centimeter	
RowsPerStrip**	n: number of scanlines per TIFF strip	MUST
SamplesPerPixel**	1	MUST
Software*	{ASCII}: name & release number of creator software	SHOULD
StripByteCounts**	n: number of bytes in TIFF strip	MUST
StripOffsets**	n: offset from beginning of file to each TIFF strip	MUST
XResolution	200**, 300**, 600**, other resolutions are OPTIONAL (written in pixels per inch)	MUST
YResolution	200**, 300**, 600** in pixels per inch with x-y aspect ratio (XResolution / YResolution) equal to 1; other resolutions and aspect ratios are OPTIONAL	MUST

1 * Receiver SHOULD support this field.

2 ** (If double asterisk is in 'Baseline Fields' column) Receiver MUST support the given field and all values shown in
3 'Values' column.

4 (If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding
5 the double asterisk.

6

7

Table 7. UIF Profile J Extension Fields

Extension Fields	Values	Sender Conformance
DocumentName*	{ASCII}: name of UIF Document	SHOULD
PageNumber**	n,m: page number followed by total page count	MUST

8 * Receiver SHOULD support this field.

9 ** Receiver MUST support the given field and all values shown in 'Values' column.

10

11

Table 8. UIF Profile J New Fields

New Fields	Values	Sender Conformance
GlobalParametersIFD**	IFD: global parameters IFD	MUST
UIFProfile*	n: ITU-compatible UIF profile	SHOULD
T82Options**	0: T.85 profile of T.82	MUST
CodingMethods*	n: compression algorithms used in file	SHOULD

12 * Receiver SHOULD support this field.

13 ** Receiver MUST support the given field and all values shown in 'Values' column.

14

15 3.2.4 UIF Profile C

16 This section defines Profile C for UIF, which uses lossy JPEG compression as it is defined in ITU-T
17 T.81 [15]. UIF Profile C is based on TIFF-FX Profile C. Tables 9, 10, and 11 summarize fields and
18 field values that are REQUIRED / RECOMMENDED / OPTIONAL. Asterisks are used to denote
19 levels of Receiver conformance, while the rightmost column indicates levels of Sender Conformance,
20 i.e., those fields that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF document. For a

1 complete description of the Baseline, Extension, and New Fields shown below, see the TIFF-FX
 2 specification [4]. A Sender/Receiver that implements this profile is REQUIRED to also implement UIF
 3 Profile S.

4 Here are the differences between TIFF-FX Profile C as defined in [4] and UIF Profile C. For UIF
 5 Profile C,

- 6 1) ImageWidth is not constrained.
- 7 2) XResolution is not constrained, but a Receiver MUST support 200 and 300dpi.
- 8 3) YResolution MUST match XResolution, but it is otherwise not constrained; a Receiver MUST
 9 support 200 and 300dpi .
- 10 4) The following TIFF-FX RECOMMENDED field has been omitted: 'ProfileType'.
- 11 5) A Receiver MUST support the TIFF Extension Field 'JPEGTables' per [21]. A Sender MAY
 12 send this field.
- 13 6) UIF Implementations MUST support the GlobalParametersIFD field.
- 14 7) The 'FaxProfile' TIFF tag introduced in [4] is re-interpreted as the 'UIFProfile' TIFF tag for
 15 UIF Documents. The TIFF tag 'UIFProfile' uses the same TIFF field identifier (401) and the
 16 same data type (Byte) as the TIFF tag 'FaxProfile'. The values for this field are redefined as
 17 follows:
 - 18 0: does not conform to a profile defined for UIF
 - 19 1: minimal black & white lossless, UIF Profile S
 - 20 2: extended black & white lossless, UIF Profile F
 - 21 3: lossless JBIG black & white, UIF Profile J
 - 22 4: lossy color and grayscale, UIF Profile C
 - 23 5: lossless color and grayscale, UIF Profile L
 - 24 6: Mixed Raster Content, UIF Profile M

25
26
27
28 **Table 9. UIF Profile C Baseline Fields**

Baseline Fields	Values	Sender Conformance
BitsPerSample	8**: 8 bits per color sample 12: OPTIONAL 12 bits/sample	MUST
Compression**	7: JPEG	MUST
DateTime*	{ASCII}: date/time in 24-hour format "YYYY:MM:DD HH:MM:SS"	SHOULD
FillOrder**	1: most significant bit first 2: least significant bit first	MUST
ImageDescription*	{ASCII}: A string describing the contents of the image	SHOULD
ImageWidth**	n: width of image in pixels	MUST

ImageLength**	n: length of image in pixels (total number of scanlines)	MUST
NewSubFileType**	2: Bit 1 identifies single page of a multi-page Document	MUST
Orientation	1**-8, (Default = 1)	MUST
PhotometricInterpretation	10**: ITULAB	MUST
ResolutionUnit**	2: inch (Default = 2) 3: centimeter	MUST
RowsPerStrip**	n: number of scanlines per TIFF strip	MUST
SamplesPerPixel**	1**: L* (lightness) 3: LAB	MUST
Software*	{ASCII}: name & release number of creator software	SHOULD
StripByteCounts**	n: number of bytes in TIFF strip	MUST
StripOffsets**	n: offset from beginning of file to each TIFF strip	MUST
XResolution	200**, 300** other resolutions are OPTIONAL (written in pixels per inch). XResolution and YResolution fields MUST be equal.	MUST
YResolution	equal to XResolution (pixels MUST be square)	MUST

- 1 * Receiver SHOULD support this field.
2 ** (If double asterisk is in 'Baseline Fields' column) Receiver MUST support the given field and all values shown in
3 'Values' column.
4 (If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding
5 the double asterisk.
6
7

Table 10. UIF Profile C Extension Fields

Extension Fields	Values	Sender Conformance
DocumentName*	{ASCII}: name of UIF Document	SHOULD
PageNumber**	n,m: page number followed by total page count	MUST
ChromaSubSampling	(1,1), (2, 2)** (1, 1): equal numbers of lightness and chroma samples horizontally and vertically (2, 2): twice as many lightness samples as chroma samples horizontally and vertically	MUST
ChromaPositioning	1**: centered	MUST
JPEGTables**	n: file pointer to JPEG quantization and/or Huffman tables	MAY

- 8 * Receiver SHOULD support this field.
9 ** (If double asterisk is in 'Extension Fields' column) Receiver MUST support the given field and all values shown in
10 'Values' column.
11 (If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding
12 the double asterisk.
13
14

Table 11. UIF Profile C New Fields

New Fields	Values	Sender Conformance
Decode**	minL, maxL, mina, maxa, minb, maxb: minimum and maximum values for L*a*b*	MUST
GlobalParametersIFD**	IFD: global parameters IFD	MUST
UIFProfile*	n: ITU-compatible UIF profile	SHOULD
CodingMethods*	n: compression algorithms used in file	SHOULD
VersionYear*	byte sequence: year of ITU std	SHOULD

1 * Receiver SHOULD support this field.

2 ** (If double asterisk is in 'New Fields' column) Receiver MUST support the given field and all values shown in 'Values'

3 column.
4 (If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding

5 the double asterisk.

6

7 3.2.5 UIF Profile L

8 This profile is modeled after TIFF-FX Profile L. It uses JBIG compression (see [16]), subject to the
9 application rules specified in ITU-T Recommendation T.43 [13] to losslessly code three types of color
10 and grayscale images: one bit per color CMY, CMYK and RGB images; a palletized (i.e. mapped)
11 color image; and continuous tone color and grayscale images.

12 Here are the differences between TIFF-FX Profile L as defined in [4] and UIF Profile L. For UIF
13 Profile L,

- 14 1) ImageWidth is not constrained.
- 15 2) XResolution is not constrained, but a Receiver MUST support 200 and 300dpi.
- 16 3) YResolution MUST match XResolution, but it is not otherwise constrained; a Receiver MUST
- 17 support 200 and 300dpi.
- 18 4) The following TIFF-FX RECOMMENDED field has been omitted: 'ProfileType'.
- 19 5) UIF Implementations MUST support the GlobalParametersIFD field.
- 20 6) The 'FaxProfile' TIFF tag introduced in [4] is re-interpreted as the 'UIFProfile' TIFF tag for
- 21 UIF Documents. The TIFF tag 'UIFProfile' uses the same TIFF field identifier (401) and the
- 22 same data type (Byte) as the TIFF tag 'FaxProfile'. The values for this field are redefined as
- 23 follows:

- 24 0: does not conform to a profile defined for UIF
- 25 1: minimal black & white lossless, UIF Profile S
- 26 2: extended black & white lossless, UIF Profile F
- 27 3: lossless JBIG black & white, UIF Profile J
- 28 4: lossy color and grayscale, UIF Profile C
- 29 5: lossless color and grayscale, UIF Profile L
- 30 6: Mixed Raster Content, UIF Profile M

31

32 Tables 12, 13, and 14 summarize fields and field values that are REQUIRED / RECOMMENDED /
33 OPTIONAL for Implementations of UIF Profile L. Asterisks are used to denote levels of Receiver

1 conformance, while the rightmost column indicates levels of Sender Conformance, i.e., those fields
 2 that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF document. For a complete
 3 description of the Baseline, Extension, and New Fields shown below, see the TIFF-FX specification
 4 [4]. A Sender / Receiver that chooses to implement this profile is REQUIRED to also implement UIF
 5 Profile S, and UIF Profile C.

6 Optional fields have no asterisks in either the field name or the Values column, however, the Values
 7 field may contain a condition which REQUIRES the field.

8
 9

Table 12. UIF Profile L Baseline Fields

Baseline Fields	Values	Sender Conformance
BitsPerSample	1: Binary RGB, CMY(K) 8**: 8 bits per color sample 9-16: OPTIONAL	MUST
Compression	10**: JBIG, per T.43	MUST
DateTime*	{ASCII}: date/time in 24-hour format "YYYY:MM:DD HH:MM:SS"	SHOULD
FillOrder**	1: most significant bit first 2: least significant bit first	MUST
ImageDescription*	{ASCII}: A string describing the contents of the image	SHOULD
ImageWidth**	n: width of image in pixels	MUST
ImageLength**	n: length of image in pixels (total number of scanlines)	MUST
NewSubFileType	2**: Bit 1 identifies single page of a multi-page Document	MUST
Orientation	1**-8, (Default = 1)	MUST
PhotometricInterpretation	2: RGB 5: CMYK 10**: ITULAB	MUST
ResolutionUnit**	2: inch (Default = 2)	MUST
RowsPerStrip**	n: number of scanlines per TIFF strip	MUST
SamplesPerPixel	1**: L* (lightness) 3: LAB, RGB, CMY 4: CMYK	MUST
Software*	{ASCII}: name & release number of creator software	SHOULD
StripByteCounts**	n: number of bytes in TIFF strip	MUST
StripOffsets**	n: offset from beginning of file to each TIFF strip	MUST
XResolution	200**, 300** other resolutions are OPTIONAL (written in pixels per inch)	MUST
YResolution	equal to XResolution (pixels MUST be square)	MUST

10 * Receiver SHOULD support this field.

- 1 2) XResolution is not constrained, but a Receiver MUST support 200 and 300dpi for the bi-level
2 mask, foreground, and background layers.
- 3 3) YResolution MUST match XResolution, but it is not otherwise constrained; a Receiver MUST
4 support 200 and 300 dpi for the bi-level mask, foreground, and background layers.
- 5 4) A Receiver MUST support Modified Modified Read coding (Compression=4) and the
6 associated T6Options field; Receiver support for Modified Huffman and Modified Read coding
7 (Compression=3) and the associated T4Options field is OPTIONAL.
- 8 5) The following TIFF-FX RECOMMENDED field has been omitted: 'ProfileType'.
- 9 6) A Receiver MUST support the TIFF Extension Field 'JPEGTables' per [21]. A Sender MAY
10 send this field.
- 11 7) UIF Implementations MUST support the GlobalParametersIFD field.
- 12 8) The 'FaxProfile' TIFF tag introduced in [4] is re-interpreted as the 'UIFProfile' TIFF tag for
13 UIF Documents. The TIFF tag 'UIFProfile' uses the same TIFF field identifier (401) and the
14 same data type (Byte) as the TIFF tag 'FaxProfile'. The values for this field are redefined as
15 follows:
- 16 0: does not conform to a profile defined for UIF
17 1: minimal black & white lossless, UIF Profile S
18 2: extended black & white lossless, UIF Profile F
19 3: lossless JBIG black & white, UIF Profile J
20 4: lossy color and grayscale, UIF Profile C
21 5: lossless color and grayscale, UIF Profile L
22 6: Mixed Raster Content, UIF Profile M
- 23 9) Receivers are REQUIRED to support the following fields: 'RowsPerStrip', 'StripRowCounts',
24 'Decode', 'SubIFD', 'XPosition', 'YPosition', 'ImageLayer', 'ImageBaseColor', and
25 'ChromaPositioning'.

26

27 Tables 15, 16, and 17 summarize fields and field values that are REQUIRED / RECOMMENDED /
28 OPTIONAL for Implementations of UIF Profile M.. Asterisks are used to denote levels of Receiver
29 conformance, while the rightmost column indicates levels of Sender Conformance, i.e., those fields
30 that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF document. A Sender/Receiver
31 that chooses to implement this profile is REQUIRED to also implement UIF Profile S, and UIF Profile
32 C.

33

34 Optional fields have no asterisks in either the field name or the Values column, however, the Values
35 field may contain a condition which REQUIRES the field.

36

37 **Table 15. UIF Profile M Baseline Fields**

Baseline Fields	Values	Sender Conformance
BitsPerSample	1***: binary mask, RGB, CMY(K)	MUST

	2-8**: bits per color sample 9-16: OPTIONAL 12 bits/sample	
Compression	1: None (ImageBaseColor IFD only) 3: Modified Huffman and Modified Read 4**: Modified Modified Read 7**: JPEG 9: JBIG, per [16] 10: JBIG, per [13]	MUST
DateTime*	{ASCII}: date/time in 24-hour format "YYYY:MM:DD HH:MM:SS"	SHOULD
FillOrder**	1: most significant bit first 2: least significant bit first	MUST
ImageDescription*	{ASCII}: A string describing the contents of the image	SHOULD
ImageWidth**	n: width of image in pixels	MUST
ImageLength**	n: length of image in pixels (total number of scanlines)	MUST
NewSubFileType**	16, 18: Bit 1 indicates single page of a multi-page Document on Primary IFD Bit 4 indicates MRC model	MUST
Orientation	1**-8, (Default = 1)	MUST
PhotometricInterpretation	0**: WhiteIsZero (Mask Layer) 2: RGB 5: CMYK 10**: ITULAB	MUST
ResolutionUnit**	2: inch (Default = 2)	MUST
RowsPerStrip**	n: number of scanlines per TIFF strip	MUST
SamplesPerPixel	1**: L* (lightness) 3: LAB, RGB, CMY 4: CMYK	MUST
Software*	{ASCII}: name & release number of creator software	SHOULD
StripByteCounts**	n: number of bytes in TIFF strip	MUST
StripOffsets**	n: offset from beginning of file to each TIFF strip	MUST
XResolution	200**, 300**: background & foreground layers; other resolutions are OPTIONAL	MUST
YResolution	200**, 300**: background & foreground layers; other resolutions are OPTIONAL; MUST be equal to XResolution (pixels MUST be square)	MUST

1 * Receiver SHOULD support this field.
2 ** (If double asterisk is in 'Baseline Fields' column) Receiver MUST support the given field and all values shown in
3 'Values' column.

(If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding the double asterisk.

Table 16. UIF Profile M Extension Fields

Extension Fields	Values	Sender Conformance
T4Options	0: REQUIRED if Compression is Modified Huffman, EOLs not byte aligned (Default = 0) 1: REQUIRED if Compression 2D Modified Read, EOLs are not byte aligned 4: REQUIRED if Compression Modified Huffman, EOLs byte aligned 5: REQUIRED if Compression 2D Modified Read, EOLs are byte aligned	MUST if Compression=3
T6Options	0**: REQUIRED if Compression is 2D Modified Modified Read (Default = 0)	MUST if Compression=4
DocumentName*	{ASCII}: name of scanned Document	SHOULD
PageNumber**	n,m: page number followed by total page count	MUST
ChromaSubSampling	(1,1), (2, 2)** (1, 1): equal numbers of lightness and chroma samples horizontally & vertically (2, 2): twice as many lightness samples as chroma horizontally and vertically	MUST if Compression=7 and Photometric-Interpretation=10
ChromaPositioning**	1: centered (default = 1)	MAY if Compression=7 and Photometric-Interpretation=10
Indexed	0: not a palette-color image (Default = 0) 1: palette-color image	MUST if image uses palette color; otherwise, MAY
SubIFDs**	<IFD>: byte offset to FG/BG IFDs	MAY
XPosition**	horizontal offset in primary IFD resolution units	MAY
YPosition**	vertical offset in primary IFD resolution units	MAY
JPEGTables**	n: file pointer to JPEG quantization and/or Huffman tables	MAY

* Receiver SHOULD support this field.

** (If double asterisk is in 'Extension Fields' column) Receiver MUST support the given field and all values shown in 'Values' column.

(If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding the double asterisk.

Note: Fields that the Receiver MAY support have no asterisks in either the field name or the values column

Table 17. UIF Profile M New Fields

New Fields	Values	Sender Conformance
-------------------	---------------	---------------------------

Decode**	minL, maxL, mina, maxa, minb, maxb: minimum and maximum values for L*a*b*	MUST if Photometric-Interpretation=10
ImageBaseColor**	a,b,c: background color in ITULAB	MAY
StripRowCounts**	n: number of scanlines in each strip	MAY
ImageLayer**	n, m: layer number, imaging sequence (e.g., strip number)	MAY
T82Options	0: T.85 profile of T.82 coding	MUST if Compression=9
GlobalParametersIFD**	IFD: global parameters IFD	MUST
UIFProfile*	n: ITU-compatible UIF profile	SHOULD
CodingMethods*	n: compression algorithms used in file	SHOULD
ModeNumber*	n: version of T.44 standard	SHOULD
VersionYear*	byte sequence: year of ITU std	SHOULD

- 1 * Receiver SHOULD support this field.
2 ** Receiver MUST support the given field and all values shown in 'Values' column.

3 **3.3 Potential UIF profiles**

4 While this specification was being written, a new profile, designated 'T', was being introduced as an
5 extension to TIFF-FX. This new TIFF-FX profile would allow JBIG2 to be used for the lossless and
6 lossy coding of black-and-white image data. JBIG2 coding can be used for UIF Documents as soon as
7 the RFC for TIFF-FX Profile T is published, and the IPPFAX Working Group publishes the additional
8 requirements that are needed for UIF Profile T.

9 **4 Capabilities communication**

10 A Sender needs to discover what a potential UIF-compatible Receiver supports in terms of resolution,
11 encoding, drawing surface etc. To do this, a UIF Sender MUST query in a protocol-specific manner
12 either the UIF profiles supported (see section 4.2) or the Receiver capabilities string (see section 4.1).
13 If the Sender wants to send a UIF file using any OPTIONAL features outside the profile-specific
14 baseline level (see section 4.1.2), then the Sender MUST query the Receiver for the capabilities string.
15 The Sender MUST also query the Receiver to determine the media that is supported, and the media
16 that is not only supported but ready. The UIF profiles supported, media supported, and media ready are
17 excluded from the Receiver capabilities string so that a full Sender-side implementation of CONNEG
18 is unnecessary if a UIF Sender decides to support only the minimum capabilities for a given profile
19 (see Section 4.1.2).

20 **4.1 Receiver capabilities string**

21 A valid Receiver capabilities string MUST be any well-formed CONNEG string obeying the syntax of
22 RFC2879 [5]. A UIF Sender MAY request the Receiver capabilities string. A UIF Receiver MUST
23 return a Receiver capabilities string if a Sender requests it.

24 This string is not expected to be more than 32Kb in length. The capabilities announced by the Receiver
25 SHOULD indicate those things that it can do without operator intervention. For example if the
26 Receiver has a manually interchangeable print cartridge with only the black cartridge loaded, it

1 SHOULD only indicate support for “color=binary”. The method of transport is protocol-dependent
2 and beyond the scope of this document.

3 **4.1.1 New CONNEG tags and values**

4 Section 3.7 of CONNEG[5] describes the feature tag names that have to do with image coding. The
5 “image-file-structure” CONNEG tag describes how the coded image data is wrapped and formatted. In
6 addition to the legal values for the “image-file-structure” tag presented in CONNEG[5], UIF formatted
7 data MAY also use “tiff-limited-uif”. The “tiff-limited-uif” tag MUST be interpreted as “tiff-limited”,
8 except the recommendation for one TIFF strip per page is relaxed.

9 **4.1.2 Minimum Receiver capabilities**

10 Requiring a minimum set of Receiver capabilities on a profile-specific basis is useful because it
11 guarantees a baseline level of compatibility between a Sender and a Receiver.

12 The CONNEG expressions listed in the following subsections summarize the minimum set of
13 capabilities that a Receiver MUST support before advertising support for a given profile. See the
14 CONNEG specification [5] for a complete description of the feature tags tokens.

15 **4.1.2.1 Minimum capabilities for UIF Profile S**

```
16 (& (image-file-structure=TIFF-minimal)  
17 (MRC-mode=0)  
18 (image-coding=MH)  
19 (color=Binary)  
20 (dpi=[200,300,600])  
21 (dpi-xyratio=1) )
```

22 **4.1.2.2 Minimum capabilities for UIF Profile F**

```
23 (| (& (image-file-structure=TIFF-minimal)  
24 (MRC-mode=0)  
25 (image-coding=MH)  
26 (color=Binary)  
27 (dpi=[200,300,600])  
28 (dpi-xyratio=1) )  
29 (& (image-file-structure=TIFF-limited-uif)  
30 (MRC-mode=0)  
31 (image-coding=MMR)  
32 (color=Binary)  
33 (dpi=[200,300,600])  
34 (dpi-xyratio=1) ) )  
35
```

36 **4.1.2.3 Minimum capabilities for UIF Profile J**

```
37 (| (& (image-file-structure=TIFF-minimal)  
38 (MRC-mode=0)  
39 (image-coding=MH)  
40 (color=Binary)  
41 (dpi=[200,300,600])  
42 (dpi-xyratio=1) )  
43 (& (image-file-structure=TIFF-limited-uif)  
44 (MRC-mode=0)
```

```
1      (image-coding=JBIG)
2      (image-coding-constraint=JBIG-T85)
3      (color=Binary)
4      (JBIG-stripe-size=128)
5      (dpi=[200,300,600])
6      (dpi-xyratio=1) ) )
```

7 **4.1.2.4 Minimum capabilities for UIF Profile C**

```
8      ( | (& (image-file-structure=TIFF-minimal)
9          (MRC-mode=0)
10         (image-coding=MH)
11         (color=Binary)
12         (dpi=[200,300,600])
13         (dpi-xyratio=1) )
14
15         (& (image-file-structure=TIFF-limited-uif)
16           (MRC-mode=0)
17           (color=full)
18           (image-coding=JPEG)
19           (image-coding-constraint=JPEG-T4E)
20           (color-subsampling="4:1:1")
21           (color-levels<=16777216)
22           (color-space=CIELAB)
23           (color-illuminant=D50)
24           (CIELAB-L-min>=0)
25           (CIELAB-L-max<=100)
26           (CIELAB-a-min>=-85)
27           (CIELAB-a-max<=85)
28           (CIELAB-b-min>=-75)
29           (CIELAB-b-max<=125)
30           (dpi=[200,300])
31           (dpi-xyratio=1) ) ) )
```

32 **4.1.2.5 Minimum capabilities for UIF Profile L**

```
33      ( | (& (image-file-structure=TIFF-minimal)
34          (MRC-mode=0)
35          (color=Binary)
36          (image-coding=MH)
37          (dpi=[200,300,600])
38          (dpi-xyratio=1) )
39
40         (& (image-file-structure=TIFF-limited-uif)
41           (MRC-mode=0)
42           (& (color=grey)
43             ( | (& (image-coding=JPEG)
44                 (image-coding-constraint=JPEG-T4E) )
45                 (& (image-coding=JBIG)
46                   (image-coding-constraint=JBIG-T43)
47                   (JBIG-stripe-size=128)
48                   (image-interleave=stripe) ) )
49             (color-space=CIELAB)
50             (color-levels<=256)
51             (color-illuminant=D50)
52             (CIELAB-L-min>=0)
53             (CIELAB-L-max<=100)
54             (dpi=[200,300]) (dpi-xyratio=1) ) ) ) )
```


1 **4.1.2.6 Minimum capabilities for UIF Profile M**

```
2 (| (& (image-file-structure=TIFF-minimal)
3     (MRC-mode=0)
4     (color=Binary)
5     (image-coding=MH)
6     (dpi=[200,300,600])
7     (dpi-xyratio=1) )
8 (& (image-file-structure=TIFF-limited-uif)
9     (MRC-mode=0)
10    (color=full)
11    (image-coding=JPEG)
12    (image-coding-constraint=JPEG-T4E)
13    (color-subsampling="4:1:1")
14    (color-levels<=16777216)
15    (color-space=CIELAB)
16    (color-illuminant=D50)
17    (CIELAB-L-min>=0)
18    (CIELAB-L-max<=100)
19    (CIELAB-a-min>=-85)
20    (CIELAB-a-max<=85)
21    (CIELAB-b-min>=-75)
22    (CIELAB-b-max<=125)
23    (dpi=[200,300])(dpi-xyratio=1)
24 (& (image-file-structure=TIFF-MRC-limited)
25     (MRC-mode=1)
26     (MRC-max-stripe-size<=256)
27     (| (& (image-file-structure=TIFF-minimal)
28         (color=Binary)
29         (image-coding=MH)
30         (dpi=[200,300])
31         (dpi-xyratio=1) )
32     (& (image-file-structure=TIFF-limited-uif)
33         (color=full)
34         (image-coding=JPEG)
35         (image-coding-constraint=JPEG-T4E)
36         (color-subsampling="4:1:1")
37         (color-levels<=16777216)
38         (color-space=CIELAB)
39         (color-illuminant=D50)
40         (CIELAB-L-min>=0)
41         (CIELAB-L-max<=100)
42         (CIELAB-a-min>=-85)
43         (CIELAB-a-max<=85)
44         (CIELAB-b-min>=-75)
45         (CIELAB-b-max<=125)
46         (dpi=[200,300])
47         (dpi-xyratio=1) ) ) ) )
```

48 **4.2 UIF profiles supported**

49 A UIF Sender **MUST** query the potential UIF Receiver for the UIF profiles supported by the Receiver.
50 A UIF Receiver **MUST** respond with the UIF profiles that it supports. When a Receiver indicates the
51 document formats / profiles that are supported, the list **MUST** include all the UIF profiles described in
52 this document that are supported and, if UIF Profile M is supported, all of the combinations with UIF-
53 Profile M that are supported. The Sender **MUST** interpret a missing or otherwise invalid response as an

1 indication that the Receiver does not support UIF. The method of transport and the actual data values
2 used to indicate supported UIF profiles are protocol-specific and beyond the scope of this document.

3

4 **4.3 Media supported**

5 A UIF Sender MUST query the potential UIF Receiver for media supported. A UIF Receiver MUST
6 respond with the media supported by the Receiver (e.g., letter, legal, A4, etc.). The method of
7 transport, the valid range of media, and the actual data values used to indicate supported media are
8 protocol-specific and beyond the scope of this document; however, the Sender MUST be able to infer
9 actual dimensions from the media values used.

10 **4.4 Media ready**

11 A UIF Sender MUST query the potential UIF Receiver for media ready. A UIF Receiver MUST
12 respond with the subset of media supported that is ready to print with no user intervention. The method
13 of transport, the valid range of media, and the actual data values used to indicate ready media are
14 protocol-specific and beyond the scope of this document; however, the Sender MUST be able to infer
15 actual dimensions from the media values used.

16 **4.5 Image reduction supported**

17 A UIF Sender MAY query the potential UIF Receiver to determine whether or not image reduction is
18 supported. A Receiver MUST be capable of indicating whether or not it supports image reduction. The
19 method by which this query occurs is protocol-specific and beyond the scope of this document.

20

21 **5 Sender requirements**

22 **5.1 Indicating Document format using MIME**

23 If the underlying transport protocol uses MIME as defined by RFC2046 [23], then a Sender MUST
24 adhere to the requirements found here in Section 5.1 and its subsections.

25 [22] describes the registration of the MIME content-type image/tiff to refer to TIFF encoded image
26 data. In addition, an "application" parameter is defined for image/tiff to identify a particular
27 application's subset of TIFF and TIFF extensions for the encoded image data, if it is known. Typically,
28 this would be used to assist the Receiver in dispatching a suitable rendering package to handle the
29 display or processing of the image file.

30 **5.1.1 MIME content type**

31 If the underlying transport protocol uses MIME, the TIFF content defined by this document MUST be
32 described by an 'image/tiff' content type.

1 **5.1.2 MIME content type application parameter**

2 The MIME content type application parameter indicates the UIF profiles used within the UIF
3 Document. All letters after the application parameter “uif-” are reserved for use with UIF documents.

4 ***5.1.2.1 Application parameter with non-MRC UIF profiles***

5 The MIME application value for all non-MRC-structured UIF Documents MUST be “uif-” followed
6 by one or more single lower case letters representing the UIF profiles (i.e., ‘s’, ‘f’, ‘j’, ‘c’, or ‘l’) that
7 are used in the Document. For example, the Sender would use

8 Content type: image/tiff; application=uif-s

9 to represent a Document of one or more pages in which only UIF Profile S is used. To reduce the
10 number of permutations, the lower case letters following “uif” MUST be arranged in alphabetical
11 order. For example, a Sender would use

12 Content type: image/tiff; application=uif-cf

13 to represent a Document in which one or more pages are encoded using UIF Profile C, and one or more
14 pages are encoded using UIF Profile F.

15 ***5.1.2.2 Application parameter with UIF Profile M***

16 The MIME application value for all UIF Documents encoded using UIF Profile M MUST be “uif-m”
17 followed by one or more lower case letters representing the UIF profiles that are used in the Document.
18 UIF Profile M does not introduce any new types of encoding. Rather, UIF Profile M prescribes a way
19 to use other UIF profiles within the same page of a Document. Thus, one or more letters MUST follow
20 the lower case ‘m’ to indicate which UIF profiles are used within the UIF Profile M file. To reduce the
21 number of permutations, the lower case ‘m’ MUST appear before the lower-case letter(s) used to
22 indicate the profiles used within the MRC file structure, and letters following the lower case ‘m’
23 MUST be arranged alphabetically. For example, the Sender would use

24 Content type: image/tiff; application=uif-mcf

25 to represent a Document in which there are one or more UIF Profile M-structured pages that use UIF
26 Profile C to code the foreground/background layers and UIF Profile F to code the binary mask layer.
27 As another example, the Sender would use

28 Content type: image/tiff; application=uif-mcls

29 to represent a Document in which there are one or more UIF Profile M-structure pages that use UIF
30 Profile C or L to code the foreground/background layers and UIF Profile S to code the binary mask
31 layer.

32

33

34

1 **5.2 Image-Reduction**

2 It is possible that a Sender might send an image that does not match the announced drawing surface of
3 the Receiver (for example a Sender may have an image that it cannot change). In this case the Sender
4 MAY indicate to the Receiver in a protocol-specific manner whether or not the Receiver is to reduce
5 the image.

6 If the Receiver does not support image reduction (see section 4.5) and the received image dimensions
7 are larger than what is allowed by the supported media, then the Receiver MUST flow extra data to the
8 next page. If the Receiver does support image reduction, then the Sender MAY request in a protocol-
9 specific manner that the Receiver use image-reduction if necessary. If the Receiver receives such a
10 request, and the received image dimensions are larger than what is allowed by the supported media,
11 then the Receiver MUST reduce the image so as to fit it to the page while maintaining the aspect ratio.
12 If the Receiver uses image reduction, the Receiver MUST determine if reduction is necessary for each
13 page and if so, apply reduction. The scaling is calculated separately for each page. The scaling applies
14 to all pages of the Document unless the protocol used by the Sender and Receiver supports a means of
15 specifying image reduction on a page-by-page basis (e.g., IPPFAX's potential use of page level
16 overrides[6]).

17 **5.3 Intra-Document media selection**

18 When the image dimensions are different on a page-by-page basis such that use of a single type of
19 media is not possible without scaling, the Sender / Receiver protocol MUST arbitrate media selection.
20 The ImageWidth and ImageLength TIFF tags MUST NOT select the media.

21 **6 Conformance Requirements**

22 For the listed operations, Table 18 below shows conformance requirements that apply to the protocol
23 used to transport UIF data.

24 **Table 18. Underlying Protocol Conformance.**

Operation	UIF-capable Sender	UIF-capable Receiver	Section
Receiver capabilities string	MAY	MUST	4.1
UIF profiles supported	MUST	MUST	4.1.2
Media supported	MUST	MUST	4.1.3
Media ready	MUST	MUST	4.1.4
Image reduction supported	MAY	MUST	4.1.5

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- 23 [17] ITU-T Recommendation T.85, Application profile for Recommendation T.82 - Progressive bi-
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3

4 **8 Issues**

5 **8.1 Outstanding Issues**

6
7

- 8 1. Should the capabilities discovery portion of this spec be removed and placed into a specification
9 that deals solely with how IPPFAX uses capabilities discovery? Advantages: other applications
10 interested in using UIF simply as a data format can do so (no prohibitive excess baggage).
- 11 2. Should we break UIF Profile C into two profiles—one to represent a baseline grayscale
12 configuration and the other to represent a baseline color configuration? This way, a greater number
13 of device capabilities configurations would be allowed without requiring an implementation of
14 CONNEG. (The same could apply to UIF Profile L)
- 15 3. Should we add the CONNEG tag “profile” and tag values “uif-s”, “uif-f”, “uif-c”, etc., to represent
16 the incremental differences between minimum capabilities strings listed in sections 4.1.2.1 through
17 4.1.2.5? This would cut down on the length of the CONNEG strings, especially for the composite
18 UIF profile M) and would make it immediately apparent from a human’s perspective any
19 OPTIONAL features that are advertised.

20

21 Define “profile=uif-s” to mean

22

```
23     (& (image-file-structure=TIFF-minimal)  
24        (MRC-mode=0)  
25        (image-coding=MH)  
26        (color=Binary)  
27        (dpi=[200,300,600])  
28        (dpi-xyratio=1) )
```

29

30 Define “profile=uif-f” to mean

```
31     (& (image-file-structure=TIFF-limited-uif)  
32        (MRC-mode=0)  
33        (image-coding=MMR)  
34        (color=Binary)  
35        (dpi=[200,300,600])  
36        (dpi-xyratio=1) )
```

37

38 Define “profile=uif-j” to mean

```
39     (& (image-file-structure=TIFF-limited-uif)  
40        (MRC-mode=0)  
41        (image-coding=JBIG)  
42        (image-coding-constraint=JBIG-T85)  
43        (color=Binary)  
44        (JBIG-stripe-size=128)
```

```

1      (dpi=[200,300,600])
2      (dpi-xyratio=1) )
3
4  Define “profile=uif-c” to mean
5      (& (image-file-structure=TIFF-limited-uif)
6          (MRC-mode=0)
7          (color=full)
8          (image-coding=JPEG)
9          (image-coding-constraint=JPEG-T4E)
10         (color-subsampling="4:1:1")
11         (color-levels<=16777216)
12         (color-space=CIELAB)
13         (color-illuminant=D50)
14         (CIELAB-L-min>=0)
15         (CIELAB-L-max<=100)
16         (CIELAB-a-min>=-85)
17         (CIELAB-a-max<=85)
18         (CIELAB-b-min>=-75)
19         (CIELAB-b-max<=125)
20         (dpi=[200,300])
21         (dpi-xyratio=1) )
22

```

```

23 Define “profile=uif-l” to mean
24     (& (image-file-structure=TIFF-limited-uif)
25         (MRC-mode=0)
26         (color=grey)
27         (image-coding=JBIG)
28         (image-coding-constraint=JBIG-T43)
29         (JBIG-stripe-size=128)
30         (image-interleave=stripe)
31         (color-space=CIELAB)
32         (color-levels<=256)
33         (color-illuminant=D50)
34         (CIELAB-L-min>=0)
35         (CIELAB-L-max<=100)
36         (dpi=[200,300])
37         (dpi-xyratio=1) )
38

```

39 Then, for example, we can rewrite the minimum capabilities string for UIF Profile M shown in
40 Section 4.1.2.6 as

```

41     (| (profile=[uif-s,uif-c])
42         (& (image-file-structure=TIFF-MRC-limited)
43             (MRC-mode=1)
44             (MRC-max-stripe-size<=256)
45             (profile=[uif-s,uif-c])
46             (dpi=[200,300]) ) ) )

```

47 As another example, if we would like to advertise a Receiver that can support UIF Profiles S, F, J
48 with optional resolution of 1200 dpi for the black & white profiles and optional resolution of
49 600dpi for the color profile, we can say

```

50     (| (& (profile=[uif-s,uif-f])
51         (dpi=[200,300,600,1200]) )
52         (& (profile=uif-c)
53             (dpi=[200,300,600]) ) ) )

```

1 **8.2 Resolved Issues**

2 1. Add description of new CONNEG tag used to indicate capabilities that are available *with*
3 user intervention? We're going to use media ready.

4 2. What should be done concerning media selection when the TIFF image sizes are different on a
5 page by page basis? Either determine media size by media size attribute or let the Receiver
6 determine for itself the media to be used on each page

7 At the May 30 telecon, We agreed that for now, the TIFF "ImageWidth" and "ImageLength"
8 tags do NOT select the media, but that the IPPFAX "media" Job Template attribute does. This
9 decision works fine for documents where the image size is the same for all pages in the
10 document. For documents that have differing image sizes within the same document, we'll
11 wait for a future requirement/extension to see whether to add another Job Template attribute so
12 that the Sender can request that the TIFF image tags be used to select media (or not). We also
13 agreed NOT to bring in the IPP "page-overrides" attribute to allow the protocol to select media
14 on a page by page basis (though an IPP Printer might support such a thing). Incorporate this
15 information into the IPPFAX spec.

16 3. Should the IPP attribute descriptions be moved to the IFX spec so that UIF can be made
17 independent of the IPPFAX protocol in case other protocols would like to use it? Yes.
18 Definitions of IPP attributes have been removed from the UIF spec, and requirements have
19 been restated in a non protocol-specific manner.

20 Now the IPPFAX document will include two levels of conformance: 'uif-only' and
21 'authenticated'. The level being used needs to be reflected in a Printer Description attribute.
22 Make the appropriate changes to the IFX document.

23 4. Change "uif-scale" attribute name to "uif-reduce"? Yes. The IFX spec should be changed to
24 reflect this. The UIF spec has been changed using more generic terminology to reflect this.

25 5. Rename "uif-conneg" IPP attribute to "uif-receiver-capabilities"? Yes. The IFX spec should be
26 changed to reflect this. The UIF spec has been changed using more generic terminology to
27 reflect this.

28 6. Should additional resolutions be made mandatory? Yes. X & Y Resolution values of 200 &
29 300 (in addition to 600dpi) are now REQUIRED for UIF Profiles S, F, and J. X & Y
30 Resolution values of 200dpi (in addition to 300 dpi) are now REQUIRED for UIF Profiles C
31 and L. For UIF Profile M, REQUIRED binary, foreground, and background X &Y resolutions
32 have been changed to include only 200 and 300 dpi.

33 7. Should we change the minimum required compression for Profile F from MH to MMR? Yes,
34 this has been done to reflect industry practice. The minimum CONNEG expressions have been
35 changed to reflect this.

36 8. Should we change the minimum required color space for Profile C from grayscale to color?
37 Yes, this has been done to reflect industry practice. The minimum CONNEG expressions have
38 been changed to reflect this.

39 9. The term "default conneg" is a different meaning for "default", than used in IPP. In IPP,
40 "default" means what the Printer does if the Sender doesn't supply some attribute. The "default

1 conneg” is what the Implementation MUST support for a given profile if the implementer
2 doesn’t choose do to more.

3 Resolution: the spec has been changed so “Minimum” is used instead of “default”.

5 9 Actions

6 1. Tom Hastings will investigate whether it is acceptable to use a comma-separated list of values
7 for the MIME content type application parameter. If we can use a comma-separated list, this
8 would allow us to avoid potentially confusing single values like ‘Content type: image/tiff;
9 application=uif-clsmcs’ to indicate support for Profile C, L, S, and M, where only profiles C
10 and S are allowed inside a Profile M structure.

11 2. The following UIF usage of the MIME application value must be registered with the ABNF :

```
12 "uif-" (lowalpha | "m" +lowalpha)  
13 lowalpha = "a" | "b" | "c" | "d" | "e" | "f" | "g" | "h" | "i" |  
14 "j" | "k" | "l" | "m" | "n" | "o" | "p" | "q" | "r" |  
15 "s" | "t" | "u" | "v" | "w" | "x" | "y" | "z"
```

16
17 3. Need to register CONNEG tags and tag values introduced with UIF. Namely, the tag value
18 ‘tiff-limited-uif’ must be registered as a legal value for the feature tag “image-file-structure”.

19
20 Next meeting: Toronto. Wednesday, August 1, 2001.

23 10 Revision History (to be removed when standard is approved)

Revision	Date	Author	Notes
1	1/16/01	Paul Moore, Neteon	Initial version
2	1/28/01	Gail Songer, Neteon	Added formal definition of new attributes
3	4/11/01	John Pulera, Minolta	Added UIF-specific Profile U and described UIF support for other TIFF-FX profiles
4	5/07/01	John Pulera, Minolta	Modifications made at Portland meeting.
5	6/14/01	John Pulera, Minolta	Added description of UIF profiles and minimal capabilities strings; generalized document so there is no dependence on IPP.
6	7/25/01	John Pulera, Minolta	Expanded Sender conformance requirements for UIF profiles and MIME; other modifications per

			June teleconference.
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1