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Universal Image Format (UIF)

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Abstract

This standard specifies ~~the~~ an extension to TIFF-FX known as Universal Image Format (UIF) by formally defining a series of TIFF-FX “profiles” distinguished primarily by the method of compression employed and color space used. 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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2 **1 Introduction**

3

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

11 ~~? A specification of precisely what parts of the TIFF-FX specification are to be supported.~~

12 ~~? How the UIF-capable Sender uses CONNEG to discover the UIF characteristics (resolution, drawing~~
13 ~~surface, etc.) of a potential UIF Receiver.~~

14 ~~? How the Sender specifies options for the transmission (reducing for example).~~

15

16 **2 Terminology**

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

18 **2.1 Conformance Terminology**

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

22 **2.2 Model**

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

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

25 **Implementation** – A Sender or Receiver

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

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

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

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

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

3 UIF Profile – A TIFF-FX profile used with a specific combination of the TIFF-FX extensions that are
4 described in section 3.1.

7 **3 TIFF-FX support**

8 A UIF Document is a TIFF file that adheres to the requirements of (1) Baseline TIFF (see [19]) and (2)
9 one or more UIF ~~profiles~~Profiles. A UIF ~~profile~~Profile is based on a collection of ITU-T facsimile
10 coding methods. The UIF ~~profiles~~Profiles listed below have been derived from TIFF-FX [4]. The
11 reader is referred to this document and the TIFF-FX Extensions Set 1 document [24] for a complete
12 description of each profile, as the subsections below briefly summarize each ~~profile~~UIF Profile and list
13 only the additional TIFF-FX extensions that MUST be used. ~~differences between the UIF version of~~
14 ~~the profile and TIFF-FX profile on which it is based.~~

15 Pages within a UIF Document MAY be encoded using different UIF ~~p~~Profiles.

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

19 **3.1 New TIFF-FX Extensions**

20 Five new TIFF-FX extensions are introduced as described in the following subsections.

21 **3.1.1 TIFF-FX Extension 20: Relaxed Image Widths and Resolutions**

22 The allowances shown below supersede the TIFF-FX requirements specified in [4] concerning the
23 ImageWidth, XResolution, and YResolution TIFF fields:

- 24 • The ImageWidth, XResolution, and YResolution TIFF fields are not constrained.

25 **3.1.2 TIFF-FX Extensions 21 – Required Resolution**

26 The requirement shown below supersedes the TIFF-FX requirements in [4] concerning the
27 XResolution, YResolution, and ResolutionUnit TIFF fields:

- 28 • Receivers MUST support XResolution=YResolution=200 and ResolutionUnit=2 (inches)

29 **3.1.3 TIFF-FX Extensions 22 – Required Resolution**

30 The requirement shown below supersedes the TIFF-FX requirements in [4] concerning the
31 XResolution, YResolution, and ResolutionUnit TIFF fields:

- 32 • Receivers MUST support XResolution=YResolution=300 and ResolutionUnit=2 (inches)

3.1.4 TIFF-FX Extensions 23 – Required Resolution

The requirement shown below supersedes the TIFF-FX requirements in [4] concerning the XResolution, YResolution, and ResolutionUnit TIFF fields:

- Receivers MUST support XResolution=YResolution=400 and ResolutionUnit=2 (inches)

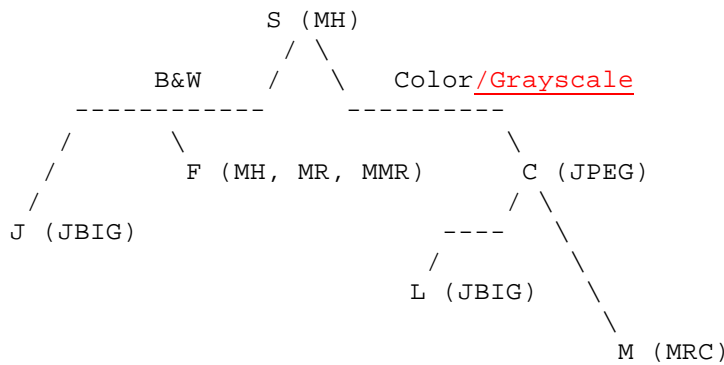
3.1.5 TIFF-FX Extensions 24 – Required Resolution

The requirement shown below supersedes the TIFF-FX requirements in [4] concerning the XResolution, YResolution, and ResolutionUnit TIFF fields:

- Receivers MUST support XResolution=YResolution=600 and ResolutionUnit=2 (inches)

3.2 Relationships among UIF Profiles

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



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

3.3 Summary of UIF Profiles

The following subsections summarize Implementation requirements for each of the UIF profiles and describe-list the TIFF-FX extensions that MUST be supported for each of the UIF Profiles-the differences between a given UIF profile and the corresponding TIFF-FX profile. Each subsection contains one or more tables that show the TIFF fields and field values that are REQUIRED,

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

11 **3.3.1 UIF Profile S**

12 When TIFF-FX Extensions 20, 21, 22, and 24 are applied to Profile S in TIFF-FX[4], the result is UIF
 13 Profile S. UIF Profile S is modeled after Profile S of TIFF-FX[4], which describes the minimal black-
 14 and-white subset of TIFF for facsimile. Tables ~~1 and 2~~, 2, and 3 summarize the fields and field values
 15 that are REQUIRED for all Implementations of UIF Profile S. A UIF Profile S Implementation MUST
 16 use 1-dimensional Modified Huffman (MH) compression as defined in ITU-T T.4 [11] and MUST
 17 adopt the same requirements and restrictions for Baseline Fields, Extension Fields, byte order, bit
 18 order, and image file directory (IFD) placement as stated in Section 3 of TIFF-FX[4] except where
 19 overridden by TIFF-FX Extensions 20,21,22, and 24. ~~with the exception of the following:~~

- 20 ~~1) ImageWidth is not constrained.~~
- 21 ~~2) XResolution is not constrained, but 200, 300, and 600dpi MUST be supported.~~
- 22 ~~3) 1) YResolution is not constrained, but 200, 300, and 600dpi MUST be supported.~~

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

26 All UIF Receivers MUST support the following Baseline, ~~and~~ Extension, and New Fields and
 27 accompanying field values. All UIF Senders MUST be capable of creating a UIF Document that
 28 contains the following Baseline, ~~and~~ Extension, and New Fields or MUST be otherwise capable of
 29 verifying that these fields are present before sending a Document. For a complete description of the
 30 Baseline and Extension Fields shown below, see the TIFF-FX specification [4] and TIFF-FX
 31 Extension Set 1[24].

32 **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)

1

2

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

4

Table 3. UIF Profile S New Fields

New Fields	Values
<u>GlobalParametersIFD</u>	<u>IFD: global parameters IFD</u>
<u>TIFF-FXExtensions</u>	<u>0x1700000 (Bits indicating use of TIFF-FX Extensions 20,21,22 and 24)</u>

5

3.3.2 UIF Profile F

7 This section defines UIF Profile F, which uses Modified Read and Modified Modified Read (MMR)
 8 compression (described in ITU-T T.4 [11] and ITU-T T.6 [12]) in addition to the Modified Huffman
 9 compression used for UIF Profile S. When TIFF-FX Extensions 20, 21, 22, and 24 are applied to
 10 Profile F in TIFF-FX[4], the result is UIF Profile F. UIF Profile F is based on TIFF-FX Profile F.
 11 Tables ~~3, 4, and 5~~, 4, 5, and 6 summarize the fields and field values that are REQUIRED /
 12 RECOMMENDED / OPTIONAL for UIF Profile F. Asterisks are used to denote levels of Receiver
 13 conformance, while the rightmost column indicates Sender conformance, i.e., those fields that a Sender
 14 MUST, SHOULD, or MAY include in an image file directory (IFD) of a UIF Document. For a
 15 complete description of the Baseline, Extension, and New Fields shown below, see the TIFF-FX
 16 specification [4] and TIFF-FX Extension Set 1[24]. A Sender/Receiver implementing this profile is
 17 REQUIRED to also implement UIF Profile S.

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

19 ~~1)ImageWidth is not constrained.~~

20 ~~2)XResolution is not constrained, but a Receiver MUST support 200, 300, and 600dpi.~~

21 ~~3)YResolution is not constrained, but a Receiver MUST support 200, 300, and 600dpi.~~

- 1 ~~4)A Receiver MUST support MMR coding (Compression=4) and the associated T4Options field,~~
 2 ~~while a Receiver MAY support MH (Compression=3).~~
- 3 ~~5)The following TIFF EX RECOMMENDED fields have been omitted: 'BadFaxLines',~~
 4 ~~'CleanFaxData', 'ConsecutiveBadFaxLines', and 'ProfileType'.~~
- 5 ~~6)UIF Implementations MUST support the GlobalParametersIFD field.~~
- 6 ~~7)The 'FaxProfile' TIFF tag introduced in [4] is re-interpreted as the 'UIFProfile' TIFF tag for UIF~~
 7 ~~Documents. The TIFF tag 'UIFProfile' uses the same TIFF field identifier (401) and the same~~
 8 ~~data type (Byte) as the TIFF tag 'FaxProfile'. The values for this field are redefined as follows:~~
 9 ~~—0: does not conform to a profile defined for UIF~~
 10 ~~—1: minimal black & white lossless, UIF Profile S~~
 11 ~~—2: extended black & white lossless, UIF Profile F~~
 12 ~~—3: lossless JBIG black & white, UIF Profile J~~
 13 ~~—4: lossy color and grayscale, UIF Profile C~~
 14 ~~—5: lossless color and grayscale, UIF Profile L~~
 15 ~~—6: Mixed Raster Content, UIF Profile M~~

Table 34. 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

- 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 **Table 45. 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

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

13 **Table 56. UIF Profile F New Fields**

New Fields	Values	Sender Conformance
GlobalParametersIFD**	IFD: global parameters IFD	MUST
<u>TIFF-FXExtensions</u>	<u>0x1700000** (Bits indicating use of TIFF-FX Extensions 20,21,22 and 24)</u>	<u>MUST</u>

<u>UIFFaxProfile*</u>	n: ITU-compatible <u>UIF-FAX</u> profile	SHOULD
<u>MultiProfiles*</u>	<u>n: profiles or profile(s) plus extension(s) applied within this file</u>	<u>SHOULD</u>
<u>CodingMethods*</u>	n: compression algorithms used in file	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.

7 3.3.3 UIF Profile J

8 This section defines Profile J for UIF, which uses lossless JBIG compression as it is defined in ITU-T
9 T.82 [16] subject to the application rules given in ITU-T T.85 [17]. When TIFF-FX Extensions 20, 21,
10 22, and 24 are applied to Profile J in TIFF-FX[4], the result is UIF Profile J. UIF Profile J is based on
11 TIFF-FX Profile J. Tables 6, 7, and 87, 8, and 9 summarize fields and field values that are REQUIRED
12 / RECOMMENDED / OPTIONAL. Asterisks are used to denote levels of Receiver conformance,
13 while the rightmost column indicates levels of Sender Conformance, i.e., those fields that a Sender
14 MUST, SHOULD, or MAY include in an IFD of a UIF document. For a complete description of the
15 Baseline, Extension, and New Fields shown below, see the TIFF-FX specification [4] and TIFF-FX
16 Extension Set 1[24]. A Sender/Receiver implementing this profile is REQUIRED to also implement
17 UIF Profile S.

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

20 ~~1)ImageWidth is not constrained.~~

21 ~~2)XResolution is not constrained, but a Receiver MUST support 200, 300, and 600dpi.~~

22 ~~3)YResolution is not constrained, but a Receiver MUST support 200, 300, and 600dpi.~~

23 ~~4)The following TIFF-FX RECOMMENDED field has been omitted: 'ProfileType'.~~

24 ~~5)UIF Implementations MUST support the GlobalParametersIFD field.~~

25 ~~6)The 'FaxProfile' TIFF tag introduced in [4] is re-interpreted as the 'UIFProfile' TIFF tag for UIF
26 Documents. The TIFF tag 'UIFProfile' uses the same TIFF field identifier (401) and the same
27 data type (Byte) as the TIFF tag 'FaxProfile'. The values for this field are redefined as follows:~~

28 ~~— 0: does not conform to a profile defined for UIF~~

29 ~~— 1: minimal black & white lossless, UIF Profile S~~

30 ~~— 2: extended black & white lossless, UIF Profile F~~

31 ~~— 3: lossless JBIG black & white, UIF Profile J~~

32 ~~— 4: lossy color and grayscale, UIF Profile C~~

33 ~~— 5: lossless color and grayscale, UIF Profile L~~

34 ~~— 6: Mixed Raster Content, UIF Profile M~~

1
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Table 67. 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) 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	MUST

3 * Receiver SHOULD support this field.
 4 ** (If double asterisk is in 'Baseline Fields' column) Receiver MUST support the given field and all values shown in
 5 'Values' column.
 6 (If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding
 7 the double asterisk.
 8

9 **Table 78. 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
--------------	---	------

* Receiver SHOULD support this field.

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

Table 89. UIF Profile J New Fields

New Fields	Values	Sender Conformance
GlobalParametersIFD**	IFD: global parameters IFD	MUST
<u>TIFF-FXExtensions</u>	<u>0x170000** (Bits indicating use of TIFF-FX Extensions 20,21,22 and 24)</u>	<u>MUST</u>
<u>UIFFaxProfile*</u>	n: ITU-compatible <u>UIF-FAX</u> profile	SHOULD
<u>MultiProfiles*</u>	<u>n: profiles or profile(s) plus extension(s) applied within this file</u>	<u>SHOULD</u>
T82Options**	0: T.85 profile of T.82	MUST
CodingMethods*	n: compression algorithms used in file	SHOULD

* Receiver SHOULD support this field.

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

3.3.4 UIF Profile C

This section defines Profile C for UIF, which uses lossy JPEG compression as it is defined in ITU-T T.81 [15]. When TIFF-FX Extensions 20, 21, and 22 are applied to Profile C in TIFF-FX[4], the result is UIF Profile C. UIF Profile C is based on TIFF-FX Profile C. Tables 9, 10, and 11, and 12 summarize fields and field values that are REQUIRED / RECOMMENDED / OPTIONAL. Asterisks are used to denote levels of Receiver conformance, while the rightmost column indicates levels of Sender Conformance, i.e., those fields that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF document. For a complete description of the Baseline, Extension, and New Fields shown below, see the TIFF-FX specification [4] and TIFF-FX Extension Set 1[24]. A Sender/Receiver that implements this profile is REQUIRED to also implement UIF Profile S.

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

~~ImageWidth is not constrained.~~

~~2) XResolution is not constrained, but a Receiver MUST support 200 and 300dpi.~~

~~3) YResolution MUST match XResolution, but it is otherwise not constrained; a Receiver MUST support 200 and 300dpi.~~

~~4) The following TIFF-FX RECOMMENDED field has been omitted: 'ProfileType'.~~

~~5) A Receiver MUST support the TIFF Extension Field 'JPEGTables' per [21]. A Sender MAY send this field.~~

~~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 910. 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	MUST

	YResolution fields MUST be equal.	
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 1011. 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 1112. 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
<u>TIFF-FXExtensions</u>	<u>0x1700000** (Bits indicating use of TIFF-FX Extensions 20,21,22 and 24)</u>	<u>MUST</u>
<u>UIFFaxProfile*</u>	n: ITU-compatible <u>UIFFAX</u> profile	SHOULD
<u>MultiProfiles*</u>	<u>n: profiles or profile(s) plus extension(s) applied within this file</u>	<u>SHOULD</u>
CodingMethods*	n: compression algorithms used in file	SHOULD
VersionYear*	byte sequence: year of ITU std	SHOULD

- 15 * Receiver SHOULD support this field.
- 16 ** (If double asterisk is in 'New Fields' column) Receiver MUST support the given field and all values shown in 'Values'
- 17 column.
- 18 (If double asterisk is in 'Values' column) Receiver MUST support the given field and the value immediately preceding
- 19 the double asterisk.

1

2 **3.3.5 UIF Profile L**

3 When TIFF-FX Extensions 20, 21, and 22 are applied to Profile L in TIFF-FX[4], the result is UIF
 4 Profile L. This profile is modeled after TIFF-FX Profile L. It This profile uses JBIG compression (see
 5 [16]), subject to the application rules specified in ITU-T Recommendation T.43 [13] to losslessly code
 6 three types of color and grayscale images: one bit per color CMY, CMYK and RGB images; a
 7 palletized (i.e. mapped) color image; and continuous tone color and grayscale images.

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

- 10 1) ImageWidth is not constrained.
- 11 2) XResolution is not constrained, but a Receiver MUST support 200 and 300dpi.
- 12 3) YResolution MUST match XResolution, but it is not otherwise constrained; a Receiver MUST
 13 support 200 and 300dpi.
- 14 4) The following TIFF-FX RECOMMENDED field has been omitted: ‘ProfileType’.
- 15 5) UIF Implementations MUST support the GlobalParametersIFD field.
- 16 6) The ‘FaxProfile’ TIFF tag introduced in [4] is re-interpreted as the ‘UIFProfile’ TIFF tag for
 17 UIF Documents. The TIFF tag ‘UIFProfile’ uses the same TIFF field identifier (~~401402~~) and
 18 the same data type (Byte) as the TIFF tag ‘FaxProfile’. The values for this field are redefined as
 19 follows:
 - 20 0: does not conform to a profile defined for UIF
 - 21 1: minimal black & white lossless, UIF Profile S
 - 22 2: extended black & white lossless, UIF Profile F
 - 23 3: lossless JBIG black & white, UIF Profile J
 - 24 4: lossy color and grayscale, UIF Profile C
 - 25 5: lossless color and grayscale, UIF Profile L
 - 26 6: Mixed Raster Content, UIF Profile M

27

28 Tables 12, 13, and 14 summarize fields and field values that are REQUIRED / RECOMMENDED /
 29 OPTIONAL for Implementations of UIF Profile L. Asterisks are used to denote levels of Receiver
 30 conformance, while the rightmost column indicates levels of Sender Conformance, i.e., those fields
 31 that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF document. For a complete
 32 description of the Baseline, Extension, and New Fields shown below, see the TIFF-FX specification
 33 [4] and TIFF-FX Extension Set 1[24]. A Sender / Receiver that chooses to implement this profile is
 34 REQUIRED to also implement UIF Profile S, and UIF Profile C.

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

37

38

Table ~~12~~13. UIF Profile L Baseline Fields

Baseline Fields	Values	Sender
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		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

- 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 1314. UIF Profile L 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
Indexed	0: not a palette-color image (Default = 0) 1: palette-color image	MUST if image uses palette

		color; otherwise, MAY
--	--	-----------------------------

- 1 * Receiver SHOULD support this field.
- 2 ** Receiver MUST support the given field and all values shown in 'Values' column.
- 3 Note: Fields that the Receiver MAY support have no asterisks in either the field name or the values column
- 4
- 5

Table 1415. UIF Profile L 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 is set to ITULAB
GlobalParametersIFD**	IFD: global parameters IFD	MUST
<u>TIFF-FXExtensions</u>	<u>0x1700000** (Bits indicating use of TIFF-FX Extensions 20,21,22 and 24)</u>	<u>MUST</u>
<u>UIFFaxProfile*</u>	n: ITU-compatible <u>UIF-FAX</u> profile	SHOULD
<u>MultiProfiles*</u>	<u>n: profiles or profile(s) plus extension(s) applied within this file</u>	<u>SHOULD</u>
CodingMethods*	n: compression algorithms used in file	SHOULD
VersionYear*	byte sequence: year of ITU std	SHOULD

- 7 * Receiver SHOULD support this field.
- 8 ** Receiver MUST support the given field and all values shown in 'Values' column.
- 9

10 3.3.6 UIF Profile M

11 When TIFF-FX Extensions 20, 21, 22, and 23 are applied to Profile M in TIFF-FX[4], the result is UIF
 12 Profile M. This profile is modeled after TIFF-FX Profile M, which uses Mixed Raster Content (MRC),
 13 defined in ITU-T Recommendation T.44 [14]. MRC enables different coding methods and resolutions
 14 within a single page. For a more detailed description of MRC and the Baseline, Extension, and New
 15 Fields shown below, see the TIFF-FX specification [4], ITU-T T.44 Mixed Raster Content [14], and
 16 TIFF-FX Extension Set 1 [24].-and-[14].

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

- 19 1)ImageWidth is not constrained.
- 20 2)XResolution is not constrained, but a Receiver MUST support 200 and 300dpi for the bi-level
 21 mask, foreground, and background layers.
- 22 3)YResolution MUST match XResolution, but it is not otherwise constrained; a Receiver MUST
 23 support 200 and 300 dpi for the bi-level mask, foreground, and background layers.

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

21

22 Tables ~~15, 16, and 17~~ 16, 17, and 18 summarize fields and field values that are REQUIRED /

23 RECOMMENDED / OPTIONAL for Implementations of UIF Profile M.. Asterisks are used to denote

24 levels of Receiver conformance, while the rightmost column indicates levels of Sender Conformance,

25 i.e., those fields that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF document. A

26 Sender/Receiver that chooses to implement this profile is REQUIRED to also implement UIF Profile

27 S, and UIF Profile C.

28

29 Optional fields have no asterisks in either the field name or the Values column, however, the Values

30 field may contain a condition which REQUIRES the field.

31

32 **Table ~~15~~16. UIF Profile M Baseline Fields**

Baseline Fields	Values	Sender Conformance
BitsPerSample	1** : binary mask, RGB, CMY(K) 2-8** : bits per color sample 9-16: OPTIONAL 12 bits/sample	MUST
Compression	1: None (ImageBaseColor IFD only) 3: Modified Huffman and Modified Read 4** : Modified Modified Read 7** : JPEG	MUST

	9: JBIG, per [16] 10: JBIG, per [13]	
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**, 400**: <u>binary mask</u> , background & foreground layers; other resolutions are OPTIONAL	MUST
YResolution	200**, 300**, 400**: <u>binary mask</u> , 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.
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 1617. 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

- 1 * Receiver SHOULD support this field.
- 2 ** (If double asterisk is in 'Extension 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 Note: Fields that the Receiver MAY support have no asterisks in either the field name or the values column
- 7
- 8

Table 4718. 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
<u>TIFF-FXExtensions</u>	<u>0x1700000** (Bits indicating use of TIFF-FX Extensions 20,21,22 and 24)</u>	<u>MUST</u>
<u>UIFFaxProfile*</u>	n: ITU-compatible <u>UIFFAX</u> profile	SHOULD
<u>MultiProfiles*</u>	<u>n: profiles or profile(s) plus extension(s) applied within this file</u>	<u>SHOULD</u>
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 **3.4 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.

10 **4 Sender requirements**

11 **4.1 Indicating Document format using MIME**

12 If the underlying transport protocol uses MIME as defined by RFC2046 [23], then a Sender MUST
 13 describe the TIFF-FX data using one of two possible MIME content types, depending on which UIF
 14 Profiles are included in the Document. If the Document contains only UIF Profile S and/or UIF Profile
 15 F, then the UIF data content MUST be described by the 'image/tiff' content type/subtype. Registration
 16 of the MIME type/sub-type 'image/tiff' is described in the TIFF MIME Sub-type Registration
 17 document [25]*. If the Document contains any UIF Profiles besides UIF Profile S and/or UIF Profile
 18 F, then the Sender MUST describe the UIF data using the 'image/tiffx' content type/subtype*.
 19 Registration of the 'image/tiffx' content type is described

20 * Note: TIFF-FX [4] will be registering a new MIME media type to accommodate profiles/codings
 21 that are not compatible with TIFF 6. TIFF-FX profiles that are not compatible with TIFF 6, namely
 22 profiles J, C, L, and M, will use the new MIME type. For the purposes of this draft, the 'image/tiffx'
 23 MIME type is shown as a working name, since it has been suggested through email by the Internet
 24 FAX Working Group. When the proper MIME type is agreed by the Internet FAX WG, this document
 25 will be updated.

26

1 adhere to the requirements found here in Section 5.1 and its subsections.
2 [22] describes the registration of the MIME content type image/tiff to refer to TIFF encoded image
3 data. In addition, an "application" parameter is defined for image/tiff to identify a particular
4 application's subset of TIFF and TIFF extensions for the encoded image data, if it is known. Typically,
5 this would be used to assist the Receiver in dispatching a suitable rendering package to handle the
6 display or processing of the image file.

7 **4.1.1 MIME content type**

8

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

11

12 **4.1.2 MIME content type application parameter**

13 The MIME content type application parameter indicates the UIF profiles used within the UIF
14 Document. All letters after the application parameter "uif" are reserved for use with UIF documents.

15 **4.1.2.1 Application parameter with non-MRC UIF profiles**

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

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

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

23 Content type: image/tiff; application=uif-ef

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

26 **4.1.2.2 Application parameter with UIF Profile M**

27 The MIME application value for all UIF Documents encoded using UIF Profile M MUST be "uif-m"
28 followed by one or more lower case letters representing the UIF profiles that are used in the Document.
29 UIF Profile M does not introduce any new types of encoding. Rather, UIF Profile M prescribes a way
30 to use other UIF profiles within the same page of a Document. Thus, one or more letters MUST follow
31 the lower case 'm' to indicate which UIF profiles are used within the UIF Profile M file. To reduce the
32 number of permutations, the lower case 'm' MUST appear before the lower case letter(s) used to
33 indicate the profiles used within the MRC file structure, and letters following the lower case 'm'
34 MUST be arranged alphabetically. For example, the Sender would use

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

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

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

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

4.2 Image-Reduction

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

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

4.3 Intra-Document media selection

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

65 References

- [1] deBry, Hastings, Herriot, Isaacson, Powell, "Internet Printing Protocol/1.1: Model and Semantics", RFC 2911, September 2000.
- [2] Herriot, Butler, Moore, Turner, Wenn. "Internet Printing Protocol/1.1: Encoding and Transport", RFC 2910, September 2000.
- [3] Hastings, Manros, Kugler, Holst, "Internet Printing Protocol/1.1: Implementer's Guide", work in progress, draft-ietf-ipp-implementers-guide-v11-???.txt.
- [4] McIntyre, Zilles, Buckley, Venable, Parsons, Rafferty "File Format for Internet Fax", RFC2301, March 1998.

- 1 [5] Klyne, McIntyre. "Content Feature Schema for Internet Fax (V2)", RFC2879, August 2000.
- 2 [6] PWG Standard 5100.4-2001 "Internet Printing Protocol (IPP): Override Attributes for
3 Documents and Pages". <ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.4.pdf>, February 7, 2001.
- 4 [7] Moore, P., "Universal Image Format requirements", October 16, 2000,
5 <ftp://ftp.pwg.org/pub/pwg/QUALDOCS/requirements/ifx-transport-requirements-01.pdf>
- 6 [8] Moore, P., "IPP Fax transport requirements", October 16, 2000,
7 <ftp://ftp.pwg.org/pub/pwg/QUALDOCS/requirements/ifx-transport-requirements-01.pdf>
- 8 [9] Masinter, "Terminology and Goals for Internet Fax", RFC2542, March 1999.
- 9 [10] Moore, Songer, Hastings, "IPP Fax Protocol" PWG Draft Standard D0.5, June 21, 2001
- 10 [11] ITU-T Recommendation T.4, Standardization of group 3 facsimile apparatus for document
11 transmission, October 1997
- 12 [12] ITU-T Recommendation T.6, Facsimile coding schemes and coding control functions for group
13 4 facsimile apparatus, November 1988
- 14 [13] ITU-T Recommendation T.43, Colour and gray-scale image representations using lossless
15 coding scheme for facsimile, February 1997
- 16 [14] ITU-T Recommendation T.44, Mixed Raster Content (MRC), April 1999.
- 17 [15] ITU-T Recommendation T.81, Information technology - Digital compression and coding of
18 continuous-tone still images - Requirements and guidelines, September 1992
- 19 [16] ITU-T Recommendation T.82, Information technology - Coded representation of picture and
20 audio information - Progressive bi-level image compression, March 1995
- 21 [17] ITU-T Recommendation T.85, Application profile for Recommendation T.82 - Progressive bi-
22 level image compression (JBIG coding scheme) for facsimile apparatus, August 1995
- 23 [18] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119,
24 March 1997.
- 25 [19] Tag Image File Format, Revision 6.0, Adobe Developers Association, June 3, 1992,
26 <http://partners.adobe.com/asn/developer/pdfs/tn/TIFF6.pdf>
- 27 The TIFF 6.0 specification dated June 3, 1992 specification (c) 1986-1988, 1992 Adobe
28 Systems Incorporated. All Rights Reserved.
- 29 [20] Adobe PageMaker 6.0 TIFF Technical Notes, Sept. 14, 1995,
30 <http://partners.adobe.com/asn/developer/pdfs/tn/TIFFPM6.pdf>
- 31 [21] Draft TIFF Technical Note 2, Replacement TIFF/JPEG specification, March 17, 1995,
32 <ftp://ftp.sgi.com/graphics/tiff/TTN2.draft.txt>
- 33 [22] Parsons, G., Rafferty J. and S. Zilles, "Tag Image File Format (TIFF) - image/tiff MIME Sub-
34 type Registration", work in progress, draft-ietf-fax-tiff-regbis-???.txt.
- 35 Note: [22] is being progressed as BCP and is expected to be issued prior to the issuing of TIFF-
36 FX as a Draft Standard.
- 37 [23] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part Two: Media
38 Types", RFC 2046, November 1996.

1 [\[24\] McIntyre, Abercrobie, Rucklidge, Buckley, "TIFF-FX Extension Set 1", July 20, 2001.](#)

2 [\[25\] Klyne, G., "A Syntax for Describing Media Feature Sets", RFC 2533, March 1999.](#)

5 **6 Outstanding Issues**

6 **6.1 Outstanding Issues**

7
8 1. Is it still OK for a Sender to describe UIF Profile S or F TIFF data using the "image/tiff" MIME
9 subtype since UIF Profile S relies on several TIFF-FX extensions which require the use of two
10 TIFF fields not recognized by TIFF 6 (namely, the GlobalParametersIFD and TIFF-FXExtensions
11 fields)

12
13
14 ~~1. Should the capabilities discovery portion of this spec be removed and placed into a specification~~
15 ~~that deals solely with how IPPFAX uses capabilities discovery? Advantages: other applications~~
16 ~~interested in using UIF simply as a data format can do so (no prohibitive excess baggage).~~

17 ~~2. Should we break UIF Profile C into two profiles—one to represent a baseline grayscale~~
18 ~~configuration and the other to represent a baseline color configuration? This way, a greater number~~
19 ~~of device capabilities configurations would be allowed without requiring an implementation of~~
20 ~~CONNNEG. (The same could apply to UIF Profile L)~~

21 ~~3. Should we add the CONNEG tag "profile" and tag values "uif s", "uif f", "uif c", etc., to represent~~
22 ~~the incremental differences between minimum capabilities strings listed in sections 4.1.2.1 through~~
23 ~~4.1.2.5? This would cut down on the length of the CONNEG strings, especially for the composite~~
24 ~~UIF profile M) and would make it immediately apparent from a human's perspective any~~
25 ~~OPTIONAL features that are advertised.~~

26
27 Define "profile=uif s" to mean

28
29 ~~—— (& (image-file-structure=TIFF-minimal)~~
30 ~~—— (MRC-mode=0)~~
31 ~~—— (image-coding=MH)~~
32 ~~—— (color=Binary)~~
33 ~~—— (dpi=[200,300,600])~~
34 ~~—— (dpi-xyratio=1)——)~~
35

36 Define "profile=uif f" to mean

37 ~~—— (& (image-file-structure=TIFF-limited-uif)~~
38 ~~—— (MRC-mode=0)~~
39 ~~—— (image-coding=MMR)~~
40 ~~—— (color=Binary)~~
41 ~~—— (dpi=[200,300,600])~~
42 ~~—— (dpi-xyratio=1)——)~~

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Define “profile=uif j” to mean

~~(& (image-file-structure=TIFF-limited-uif)
(MRC-mode=0)
(image-coding=JBIG)
(image-coding-constraint=JBIG-T85)
(color=Binary)
(JBIG-stripe-size=128)
(dpi=[200,300,600])
(dpi-xyratio=1))~~

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Define “profile=uif c” to mean

~~(& (image-file-structure=TIFF-limited-uif)
(MRC-mode=0)
(color=full)
(image-coding=JPEG)
(image-coding-constraint=JPEG-T4E)
(color-subsampling="4:1:1")
(color-levels<=16777216)
(color-space=CIELAB)
(color-illuminant=D50)
(CIELAB-L-min>=0)
(CIELAB-L-max<=100)
(CIELAB-a-min>=-85)
(CIELAB-a-max<=85)
(CIELAB-b-min>=-75)
(CIELAB-b-max<=125)
(dpi=[200,300])
(dpi-xyratio=1))~~

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Define “profile=uif l” to mean

~~(& (image-file-structure=TIFF-limited-uif)
(MRC-mode=0)
(color=grey)
(image-coding=JBIG)
(image-coding-constraint=JBIG-T43)
(JBIG-stripe-size=128)
(image-interleave=stripe)
(color-space=CIELAB)
(color-levels<=256)
(color-illuminant=D50)
(CIELAB-L-min>=0)
(CIELAB-L-max<=100)
(dpi=[200,300])
(dpi-xyratio=1))~~

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

~~(+ (profile=[uif-s,uif-c])
(& (image-file-structure=TIFF-MRC-limited)
(MRC-mode=1)
(MRC-max-stripe-size<=256)
(profile=[uif-s,uif-c]))~~

```

1      ————— (dpi=[200,300]) ————>
2      As another example, if we would like to advertise a Receiver that can support UIF Profiles S, F, J
3      with optional resolution of 1200 dpi for the black & white profiles and optional resolution of
4      600dpi for the color profile, we can say
5          |— (& (profile=[uif-s,uif-f])
6          ————— (dpi=[200,300,600,1200]) ————>
7          ————— (& (profile=uif-c)
8          ————— (dpi=[200,300,600]) ————>

```

9 **7.2 Resolved Issues**

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

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

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

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

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

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

33 ~~5. Rename "uif-conneg" IPP attribute to "uif-receiver-capabilities"?— Yes. The IFX spec should be~~
 34 ~~changed to reflect this. The UIF spec has been changed using more generic terminology to~~
 35 ~~reflect this.~~

36 ~~6. Should additional resolutions be made mandatory?— Yes. X & Y Resolution values of 200 & 300~~
 37 ~~(in addition to 600dpi) are now also REQUIRED for UIF Profiles S, F, and J. X & Y~~
 38 ~~Resolution values of 200dpi (in addition to 300 dpi) are now REQUIRED for UIF Profiles C~~
 39 ~~and L. For UIF Profile M, REQUIRED binary, foreground, and background X & Y resolutions~~
 40 ~~have been changed to include only 200 and 300 dpi.~~

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

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

~~9. The term "default conneg" is a different meaning for "default", than used in IPP. In IPP, "default" means what the Printer does if the Sender doesn't supply some attribute. The "default conneg" is what the Implementation MUST support for a given profile if the implementer doesn't choose to do more.~~

~~Resolution: the spec has been changed so "Minimum" is used instead of "default".~~

7 Actions

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

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

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

~~3. Need to register CONNEG tags and tag values introduced with UIF. Namely, the tag value 'tiff limited uif' must be registered as a legal value for the feature tag "image file structure".~~

~~Next meeting: Toronto. Wednesday, August 1, 2001.~~

7 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.
<u>D0.6</u>	7/25/01	John Pulera, Minolta	Expanded Sender conformance requirements for UIF profiles and MIME; other modifications per June teleconference.
<u>D0.7</u>	<u>10/16/01</u>	<u>John Pulera, Minolta</u>	<u>Redefined UIF Profiles to be TIFF-FX profiles using TIFF-FX extensions; moved capabilities communication to an informative appendix.</u>

1
2

1

2 **Appendix A. Capabilities communication (Informative)**

3 This informative appendix is intended to suggest a means of capabilities communication that would
4 allow a protocol using the UIF data format to discover what a potential UIF-compatible Receiver
5 supports in terms of resolution, encoding, drawing surface, etc. As such, the conformance terminology
6 used in this Appendix applies only to protocols that choose to implement capabilities communication
7 as it is described in this Appendix. Section A.6 lists the Conformance requirements for protocols that
8 implement capabilities communication as it is described in this appendix.

9 To discover a potential Receiver's ~~A Sender needs to discover what a potential UIF-compatible~~
10 ~~Receiver supports in terms of resolution, encoding, drawing surface etc. To do this, a capabilities, a~~ UIF
11 Sender MUST query in a protocol-specific manner either the UIF ~~p~~P profiles supported (see section
12 ~~4.2A.2~~) or the Receiver capabilities string (see section ~~4.1A.1~~). If the Sender wants to send a UIF file
13 using any OPTIONAL features outside the profile-specific baseline level (~~see section 4.1.2~~ see baseline
14 levels shown in section A.1.1), 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 ~~p~~P profiles supported, media supported, and media ready
17 are excluded from the Receiver capabilities string so that a full Sender-side implementation of
18 CONNEG is unnecessary if a UIF Sender decides to support only the minimum capabilities for a given
19 profile (see Section 4.1.2).

20 **A.1 Receiver capabilities string**

21 A valid Receiver capabilities string MUST be any well-formed CONNEG string obeying the syntax
22 ~~of~~ specified in RFC2533 [25] and using the feature tag and tag values described in RFC2879 [5]. A
23 UIF Sender MAY request the Receiver capabilities string. A UIF Receiver MUST return a Receiver
24 capabilities string if a Sender requests it.

25 ~~This~~ The Receiver capabilities string is not expected to be more than 32Kb in length. The capabilities
26 announced by the Receiver SHOULD indicate those things that it can do without operator intervention.
27 For example if the Receiver has a manually interchangeable print cartridge with only the black
28 cartridge loaded, it SHOULD only indicate support for "color=binary". The method of transport is
29 protocol-dependent and beyond the scope of this document.

30

31 **A.1.1 Minimum Receiver capabilities**

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

34 The CONNEG expressions listed in the following subsections summarize the minimum set of
35 capabilities that a Receiver MUST support before advertising support for a given profile. See ~~the~~
36 ~~CONNEG specification~~ RFC2879 [5] for a complete description of the feature tags tokens. The color
37 profiles (UIF Profiles C and L) have been broken down further into minimum capabilities specification
38 for both grayscale-only and full-color implementations.

1 **A.1.1.1 Minimum capabilities for UIF Profile S**

```
2 (& (image-file-structure=TIFF-minimal)
3   (MRC-mode=0)
4   (image-coding=MH)
5   (color=Binary)
6   (dpi=[200,300,600])
7   (dpi-xyratio=1) )
```

8 **A.1.1.2 Minimum capabilities for UIF Profile F**

```
9 (| (& (image-file-structure=TIFF-minimal)
10   (MRC-mode=0)
11   (image-coding=MH)
12   (color=Binary)
13   (dpi=[200,300,600])
14   (dpi-xyratio=1) )
15 (& (image-file-structure=TIFF-limited-uif)
16   (MRC-mode=0)
17   (image-coding=MMR)
18   (color=Binary)
19   (dpi=[200,300,600])
20   (dpi-xyratio=1) ) )
```

22 **A.1.1.3 Minimum capabilities for UIF Profile J**

```
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=JBIG)
32   (image-coding-constraint=JBIG-T85)
33   (color=Binary)
34   (JBIG-stripe-size=128)
35   (dpi=[200,300,600])
36   (dpi-xyratio=1) ) )
```

37 **A.1.1.4 Minimum capabilities for UIF Profile C**

38 Minimum capabilities for UIF Profile C can be subdivided into a listing of minimum capabilities for a
 39 baseline grayscale implementation and a listing of minimum capabilities for a full color
 40 implementation. Subdividing the minimum capabilities in such a way gives the Sender the flexibility to
 41 encode grayscale and/or full color data without the need for a full CONNEG implementation.

42 **A.1.1.4.1 Minimum grayscale capabilities for UIF Profile C**

```
43 (| (& (image-file-structure=TIFF-minimal)
44   (MRC-mode=0)
45   (image-coding=MH)
46   (color=Binary)
47   (dpi=[200,300,600])
48   (dpi-xyratio=1) )
```

```

1      (& (image-file-structure=TIFF-limited-uif)
2      (MRC-mode=0)
3      (color=fullgrey)
4      (image-coding=JPEG)
5      (image-coding-constraint=JPEG-T4E)
6      (color-subsampling="4:1:1")
7      (color-levels<=16777216256)
8      (color-space=CIELAB)
9      (color-illuminant=D50)
10     (CIELAB-L-min>=0)
11     (CIELAB-L-max<=100)
12     (CIELAB-a-min>=-85)
13     (CIELAB-a-max<=85)
14     (CIELAB-b-min>=-75)
15     (CIELAB-b-max<=125)
16     (dpi=[200,300])
17     (dpi-xyratio=1) ) )
18

```

19 ***AI.1.4.2 Minimum full color capabilities for UIF Profile C***

```

20 (| (& (image-file-structure=TIFF-minimal)
21 (MRC-mode=0)
22 (image-coding=MH)
23 (color=Binary)
24 (dpi=[200,300,600])
25 (dpi-xyratio=1) )
26 (& (image-file-structure=TIFF-limited)
27 (MRC-mode=0)
28 (color=grey)
29 (image-coding=JPEG)
30 (image-coding-constraint=JPEG-T4E)
31 (color-levels<=256)
32 (color-space=CIELAB)
33 (color-illuminant=D50)
34 (CIELAB-L-min>=0)
35 (CIELAB-L-max<=100)
36 (dpi=[200,300])
37 (dpi-xyratio=1) )
38 (& (image-file-structure=TIFF-limited)
39 (MRC-mode=0)
40 (color=full)
41 (image-coding=JPEG)
42 (image-coding-constraint=JPEG-T4E)
43 (color-subsampling="4:1:1")
44 (color-levels<=16777216)
45 (color-space=CIELAB)
46 (color-illuminant=D50)
47 (CIELAB-L-min>=0)
48 (CIELAB-L-max<=100)
49 (CIELAB-a-min>=-85)
50 (CIELAB-a-max<=85)
51 (CIELAB-b-min>=-75)
52 (CIELAB-b-max<=125)
53 (dpi=[200,300])
54 (dpi-xyratio=1) ) )

```

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2 **A.1.1.5 Minimum capabilities for UIF Profile L**

3 As with UIF Profile C, minimum capabilities for UIF Profile L can be subdivided into a listing of
 4 minimum capabilities for a baseline grayscale implementation and a listing of minimum capabilities
 5 for a full color implementation. Subdividing the minimum capabilities in such a way gives the Sender
 6 the flexibility to encode grayscale and/or full color data without the need for a full CONNEG
 7 implementation.

8 **A.1.1.5.1 Minimum grayscale capabilities for UIF Profile L**

9

```
10 (| (& (image-file-structure=TIFF-minimal)
11     (MRC-mode=0)
12     (color=Binary)
13     (image-coding=MH)
14     (dpi=[200,300,600])
15     (dpi-xyratio=1) )
16 (& (image-file-structure=TIFF-limited-uif)
17     (MRC-mode=0)
18     &(color=grey)
19     (| (& (image-coding=JPEG)
20         (image-coding-constraint=JPEG-T4E) )
21         (& (image-coding=JBIG)
22             (image-coding-constraint=JBIG-T43)
23             (JBIG-stripe-size=128)
24             (image-interleave=stripe) ) )
25     (color-space=CIELAB)
26     (color-levels<=256)
27     (color-illuminant=D50)
28     (CIELAB-L-min>=0)
29     (CIELAB-L-max<=100)
30     (dpi=[200,300])
31     (dpi-xyratio=1) ) )→
```

32 **A.1.1.5.2 Minimum full color capabilities for UIF Profile L**

33

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

```

1      (color-levels<=256)
2      (color-illuminant=D50)
3      (CIELAB-L-min>=0)
4      (CIELAB-L-max<=100)
5      (dpi=[200,300])
6      (dpi-xyratio=1) )
7      (& (image-file-structure=TIFF-limited)
8          (MRC-mode=0)
9          (color=full)
10         (| (& (image-coding=JPEG)
11             (image-coding-constraint=JPEG-T4E)
12             (color-subsampling=["1:1:1","4:1:1"]) ))
13         (& (image-coding=JBIG)
14             (image-coding-constraint=JBIG-T43)
15             (JBIG-stripe-size=128)
16             (image-interleave=stripe) ) ))
17         (color-levels<=16777216)
18         (color-space=CIELAB)
19         (color-illuminant=D50)
20         (CIELAB-L-min>=0)
21         (CIELAB-L-max<=100)
22         (CIELAB-a-min>=-85)
23         (CIELAB-a-max<=85)
24         (CIELAB-b-min>=-75)
25         (CIELAB-b-max<=125)
26         (dpi=[100,200,300])
27         (dpi-xyratio=1) ) )
28

```

29 **A.1.1.6 Minimum capabilities for UIF Profile M**

```

30      (| (& (image-file-structure=TIFF-minimal)
31          (MRC-mode=0)
32          (color=Binary)
33          (image-coding=MH)
34          (dpi=[200,300,600])
35          (dpi-xyratio=1) ))
36      (& (image-file-structure=TIFF-limited-uif)
37          (MRC-mode=0)
38          (color=full)
39          (image-coding=JPEG)
40          (image-coding-constraint=JPEG-T4E)
41          (color-subsampling="4:1:1")
42          (color-levels<=16777216)
43          (color-space=CIELAB)
44          (color-illuminant=D50)
45          (CIELAB-L-min>=0)
46          (CIELAB-L-max<=100)
47          (CIELAB-a-min>=-85)
48          (CIELAB-a-max<=85)
49          (CIELAB-b-min>=-75)
50          (CIELAB-b-max<=125)
51          (dpi=[200,300])(dpi-xyratio=1)
52          (& (image-file-structure=TIFF-MRC-limited)
53              (MRC-mode=1)
54              (MRC-max-stripe-size<=256)
55              (| (& (image-file-structure=TIFF-minimal)

```

```

1      (color=Binary)
2      (image-coding=MH)
3      (dpi=[200,300,400])
4      (dpi-xyratio=1) )
5      (& (image-file-structure=TIFF-limited-uif)
6      (color=full)
7      (image-coding=JPEG)
8      (image-coding-constraint=JPEG-T4E)
9      (color-subsampling="4:1:1")
10     (color-levels<=16777216)
11     (color-space=CIELAB)
12     (color-illuminant=D50)
13     (CIELAB-L-min>=0)
14     (CIELAB-L-max<=100)
15     (CIELAB-a-min>=-85)
16     (CIELAB-a-max<=85)
17     (CIELAB-b-min>=-75)
18     (CIELAB-b-max<=125)
19     (dpi=[200,300,400])
20     (dpi-xyratio=1) ) ) ) )

```

21 A.1.2 New CONNEG tags and values

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

27 In addition to the CONNEG tags and tag values defined in RFC2879[5], the capabilities string MAY
28 include tag and tag values defined in the following subsections.

29 A.1.2.1 Definition of ‘profile’ tag and tag values

30 The new CONNEG tag ‘profile’ and accompanying tag values ‘uif-s’, ‘uif-f’, ‘uif-j’, ‘uif-cg’, ‘uif-c’,
31 ‘uif-lg’, ‘uif-l’, and ‘uif-m’ shall be registered with the relevant authoritative body. This new tag and
32 its tag values have been introduced to represent the *incremental* differences between minimum
33 capabilities strings listed in sections A.1.1.1 through A.1.1.5. This cuts down on the length of the
34 CONNEG strings and makes it immediately apparent from a human’s perspective any OPTIONAL
35 features that are advertised.

36
37 The CONNEG string “profile=uif-s” is defined to expand as

```

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

```

44
45 The CONNEG string “profile=uif-f” is defined to expand as

1 (& (image-file-structure=TIFF-limited)
 2 (MRC-mode=0)
 3 (image-coding=MMR)
 4 (color=Binary)
 5 (dpi=[200,300,600])
 6 (dpi-xyratio=1))

7

8 The CONNEG string “profile=uif-j” is defined to expand as

9 (& (image-file-structure=TIFF-limited)
 10 (MRC-mode=0)
 11 (image-coding=JBIG)
 12 (image-coding-constraint=JBIG-T85)
 13 (color=Binary)
 14 (JBIG-stripe-size=128)
 15 (dpi=[200,300,600])
 16 (dpi-xyratio=1))

17

18 The CONNEG string “profile=uif-cg” is defined to expand as

19 (& (image-file-structure=TIFF-limited)
 20 (MRC-mode=0)
 21 (color=grey)
 22 (image-coding=JPEG)
 23 (image-coding-constraint=JPEG-T4E)
 24 (color-levels<=256)
 25 (color-space=CIELAB)
 26 (color-illuminant=D50)
 27 (CIELAB-L-min>=0)
 28 (CIELAB-L-max<=100)
 29 (dpi=[200,300])
 30 (dpi-xyratio=1))

31

32 The CONNEG string “profile=uif-c” is defined to expand as

33 (& (image-file-structure=TIFF-limited)
 34 (MRC-mode=0)
 35 (color=full)
 36 (image-coding=JPEG)
 37 (image-coding-constraint=JPEG-T4E)
 38 (color-subsampling="4:1:1")
 39 (color-levels<=16777216)
 40 (color-space=CIELAB)
 41 (color-illuminant=D50)
 42 (CIELAB-L-min>=0)
 43 (CIELAB-L-max<=100)
 44 (CIELAB-a-min>=-85)
 45 (CIELAB-a-max<=85)
 46 (CIELAB-b-min>=-75)
 47 (CIELAB-b-max<=125)
 48 (dpi=[200,300])
 49 (dpi-xyratio=1))

50

1 The CONNEG string “profile=uif-ig” is defined to expand as

2 (& (image-file-structure=TIFF-limited)
 3 (MRC-mode=0)
 4 (color=grey)
 5 (image-coding=JBIG)
 6 (image-coding-constraint=JBIG-T43)
 7 (JBIG-stripe-size=128)
 8 (image-interleave=stripe)
 9 (color-space=CIELAB)
 10 (color-levels<=256)
 11 (color-illuminant=D50)
 12 (CIELAB-L-min>=0)
 13 (CIELAB-L-max<=100)
 14 (dpi=[200, 300])
 15 (dpi-xyratio=1))

16

17 The CONNEG string “profile=uif-l” is defined to expand as

18 (& (image-file-structure=TIFF-limited)
 19 (MRC-mode=0)
 20 (color=full)
 21 (image-coding=JBIG)
 22 (image-coding-constraint=JBIG-T43)
 23 (JBIG-stripe-size=128)
 24 (image-interleave=stripe)
 25 (color-levels<=16777216)
 26 (color-space=CIELAB)
 27 (color-illuminant=D50)
 28 (CIELAB-L-min>=0)
 29 (CIELAB-L-max<=100)
 30 (CIELAB-a-min>=-85)
 31 (CIELAB-a-max<=85)
 32 (CIELAB-b-min>=-75)
 33 (CIELAB-b-max<=125)
 34 (dpi=[100, 200, 300])
 35 (dpi-xyratio=1))

36

37 **A.1.2.2 Application of ‘profile’ tag and tag values**

38 The ‘profile’ tag definition and its associated tag values allow the composite UIF Profile M to take the
 39 form shown below

40

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, 400])))

47

1 As another example, if a Receiver would like to advertise that it can support UIF Profiles S and F with
2 the optional resolution of 1200 dpi and can support UIF Profile C with the optional resolution of
3 600dpi, then the Receiver can return the following if a Sender queries its capabilities string:

```
4 ( | ( & ( profile=[uif-s,uif-f] )  
5 ( dpi=[200,300,600,1200] ) ) )  
6 ( & ( profile=uif-c )  
7 ( dpi=[200,300,600] ) ) )
```

9 **A.2 UIF Profiles supported**

10 A UIF Sender MUST query the potential UIF Receiver for the UIF **pP**rofiles supported by the
11 Receiver. A UIF Receiver MUST respond with the UIF **pP**rofiles that it supports. When a Receiver
12 indicates the document formats / profiles that are supported, the list MUST include all the UIF
13 **pP**rofiles described in this document that are supported and, if UIF Profile M is supported, all of the
14 combinations with UIF-Profile M that are supported. The Sender MUST interpret a missing or
15 otherwise invalid response as an indication that the Receiver does not support UIF. The method of
16 transport and the actual data values used to indicate supported UIF **pP**rofiles are protocol-specific and
17 beyond the scope of this document.

18 **A.3 Media supported**

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

24 **A.4 Media ready**

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

30 **A.5 Image reduction supported**

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

35 **A.6 Conformance Requirements Summary**

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

1 **Table 1819. Underlying Protocol Conformance.**

Operation	UIF-capable Sender	UIF-capable Receiver	Section
Receiver capabilities string	MAY	MUST	A.1
UIF p Profiles supported	MUST	MUST	A.2
Media supported	MUST	MUST	A.3
Media ready	MUST	MUST	A.4
Image reduction supported	MAY	MUST	A.5

2