



A Project of the PWG IPPFAX Working Group

# Universal Image Format (UIF)

IEEE-ISTO Printer Working Group  
Draft Standard 5102.2-D0.8

January 29, 2002

<ftp://ftp.pwg.org/pub/pwg/QUALDOCS/uif-spec-09.pdf>, .doc

## Abstract

This standard specifies 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 [uif-req] are derived from the requirements for IPPFAX [ifx-req] and Internet Fax [RFC2542].

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 makes reference to the TIFF-FX specification [RFC2301], 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 (see [T.4], [T.6], [T.43], [T.44], [T.81], [T.82], and [T.85]). UIF also requires the use of certain TIFF-FX extensions described in Appendix B of this document. UIF does not specify any new TIFF tags or field values.

This document is a draft of an IEEE-ISTO PWG Proposed Standard and is in full conformance with all provisions of the PWG Process (see: <ftp://ftp.pwg.org/pub/pwg/general/pwg-process.pdf>). PWG Proposed Standards are working documents of the IEEE-ISTO PWG and its working groups. The list of current PWG projects and drafts can be obtained at <http://www.pwg.org>.

When approved as a PWG standard, this document will be available from:

<ftp://ftp.pwg.org/pub/pwg/standards/pwg5102.2.pdf>, .doc, .rtf

1

1 Copyright (C) 2001, IEEE Industry Standards and Technology Organization. All rights reserved.

2 This document may be copied and furnished to others, and derivative works that comment on, or  
3 otherwise explain it or assist in its implementation may be prepared, copied, published and distributed,  
4 in whole or in part, without restriction of any kind, provided that the above copyright notice, this  
5 paragraph and the title of the Document as referenced below are included on all such copies and  
6 derivative works. However, this document itself may not be modified in any way, such as by  
7 removing the copyright notice or references to the IEEE-ISTO and the Printer Working Group, a  
8 program of the IEEE-ISTO.

9 Title: Universal Image Format

10 The IEEE-ISTO and the Printer Working Group DISCLAIM ANY AND ALL WARRANTIES,  
11 WHETHER EXPRESS OR IMPLIED INCLUDING (WITHOUT LIMITATION) ANY IMPLIED  
12 WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

13 The Printer Working Group, a program of the IEEE-ISTO, reserves the right to make changes to the  
14 document without further notice. The document may be updated, replaced or made obsolete by other  
15 documents at any time.

16 The IEEE-ISTO takes no position regarding the validity or scope of any intellectual property or other  
17 rights that might be claimed to pertain to the implementation or use of the technology described in this  
18 document or the extent to which any license under such rights might or might not be available; neither  
19 does it represent that it has made any effort to identify any such rights.

20 The IEEE-ISTO invites any interested party to bring to its attention any copyrights, patents, or patent  
21 applications, or other proprietary rights which may cover technology that may be required to  
22 implement the contents of this document. The IEEE-ISTO and its programs shall not be responsible for  
23 identifying patents for which a license may be required by a document and/or IEEE-ISTO Industry  
24 Group Standard or for conducting inquiries into the legal validity or scope of those patents that are  
25 brought to its attention. Inquiries may be submitted to the IEEE-ISTO by e-mail at:

26 [ieee-isto@ieee.org](mailto:ieee-isto@ieee.org).

27 The Printer Working Group acknowledges that the IEEE-ISTO (acting itself or through its designees)  
28 is, and shall at all times, be the sole entity that may authorize the use of certification marks,  
29 trademarks, or other special designations to indicate compliance with these materials.

30 Use of this document is wholly voluntary. The existence of this document does not imply that there  
31 are no other ways to produce, test, measure, purchase, market, or provide other goods and services  
32 related to its scope.  
33

**Table of Contents**

1

2

3 1 Introduction..... 6

4 2 Terminology ..... 6

5 2.1 Conformance Terminology..... 6

6 2.2 Model..... 6

7 3 TIFF-FX support..... 7

8 3.1 The ‘TIFF-FXExtensions’ Field ..... 7

9 3.2 Relationships among UIF Profiles ..... 8

10 3.3 Summary of UIF Profiles..... 9

11 3.3.1 UIF Profile F ..... 9

12 3.3.2 UIF Profile J ..... 11

13 3.3.3 UIF Profile C ..... 13

14 3.3.4 UIF Profile L..... 15

15 3.3.5 UIF Profile M ..... 17

16 3.4 Potential UIF Profiles ..... 20

17 4 Sender/Receiver protocol requirements..... 20

18 4.1 Indicating Document format using MIME..... 20

19 4.2 Image-Reduction..... 21

20 4.3 Intra-Document media selection..... 21

21 5 References..... 21

22 6 Outstanding Issues ..... 22

23 7 Revision History (to be removed when standard is approved)..... 24

24

25 Appendix A. Capabilities communication (Informative) ..... 25

26 A.1 Receiver capabilities string..... 25

27 A.1.1 Minimum Receiver capabilities ..... 25

28 A.1.1.1 Minimum capabilities for TIFF-FX Profile S ..... 25

29 A.1.1.2 Minimum capabilities for UIF Profile F ..... 26

30 A.1.1.3 Minimum capabilities for UIF Profile J..... 26

31 A.1.1.4 Minimum capabilities for UIF Profile C..... 26

32 A.1.1.4.1 Minimum grayscale capabilities for UIF Profile C ..... 26

33 A.1.1.4.2 Minimum full color capabilities for UIF Profile C..... 27

34 A.1.1.5 Minimum capabilities for UIF Profile L..... 28

35 A.1.1.5.1 Minimum grayscale capabilities for UIF Profile L..... 28

36 A.1.1.5.2 Minimum full color capabilities for UIF Profile L ..... 28

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

38 A.1.2 New CONNEG tags and values ..... 30

39 A.1.2.1 Definition of profile-related auxiliary predicates ..... 30

40 A.1.2.2 Application of ‘profile’ tag and tag values ..... 32

41 A.2 UIF Profiles supported ..... 33

42 A.3 Media supported ..... 33

43 A.4 Media ready ..... 33

44 A.5 Image reduction supported..... 33

45 A.6 Conformance Requirements Summary..... 33

1  
2 Appendix B. UIF-related Extensions to TIFF-FX..... 35  
3 B.1 TIFF-FX Extension 20: Relaxed Image Widths and Resolutions ..... 35  
4 B.2 TIFF-FX Extensions 21 – Required Resolution ..... 35  
5 B.3 TIFF-FX Extensions 22 – Required Resolution ..... 35  
6 B.4 TIFF-FX Extensions 23 – Required Resolution ..... 35  
7 B.5 TIFF-FX Extensions 24 – Required Resolution ..... 35  
8 B.6 TIFF-FX Extensions 25 – Required Field ..... 36  
9 B.7 TIFF-FX Extension 26 – Required Compression..... 36  
10  
11

**Table of Tables**

1

2 Table 1. ‘TIFF-FXExtension’ Field Bit Description..... 7

3 Table 2. UIF Profile F Baseline Fields ..... 9

4 Table 3. UIF Profile F Extension Fields ..... 10

5 Table 4. UIF Profile F New Fields ..... 11

6 Table 5. UIF Profile J Baseline Fields ..... 11

7 Table 6. UIF Profile J Extension Fields..... 12

8 Table 7. UIF Profile J New Fields ..... 13

9 Table 8. UIF Profile C Baseline Fields..... 13

10 Table 9. UIF Profile C Extension Fields ..... 14

11 Table 10. UIF Profile C New Fields ..... 14

12 Table 11. UIF Profile L Baseline Fields ..... 15

13 Table 12. UIF Profile L Extension Fields..... 16

14 Table 13. UIF Profile L New Fields ..... 16

15 Table 14. UIF Profile M Baseline Fields ..... 17

16 Table 15. UIF Profile M Extension Fields..... 18

17 Table 16. UIF Profile M New Fields ..... 19

18 Table 17. Underlying Protocol Conformance..... 33

19

1

## 2 **1 Introduction**

3 In summary UIF is a raster image data format intended for use by, but not limited to, the IPPFAX  
4 protocol, which is used to provide a synchronous, reliable exchange of image Documents between  
5 Senders and Receivers. UIF makes reference to the TIFF-FX specification [RFC2301], which  
6 describes the TIFF (Tag Image File Format) representation of image data specified by the ITU-T  
7 Recommendations for black-and-white and color facsimile (see [T.4], [T.6], [T.43], [T.44], [T.81],  
8 [T.82], and [T.85]). UIF is different from TIFF-FX in that UIF requires the use of certain TIFF-FX  
9 extensions summarized in Appendix B of this document.

10 This document specifies a set of extensions to the TIFF-FX profiles defined in [RFC2301] that are  
11 especially suited for use with synchronous protocols (e.g., IPPFAX[ifx]). The increased conformance  
12 requirements found in this UIF specification reflect the need for a data format where quality document  
13 transmission is the primary concern. When the profiles described in [RFC2301] are used with the  
14 extensions summarized in Appendix B of this document, the data format is known as Universal Image  
15 Format (UIF). UIF does not specify any new TIFF tags or field values.

16

## 17 **2 Terminology**

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

### 19 **2.1 Conformance Terminology**

20 The key words **MUST**, **MUST NOT**, **REQUIRED**, **SHOULD**, **SHOULD NOT**,  
21 **RECOMMENDED**, **MAY**, and **OPTIONAL** in this document are to be interpreted as described in  
22 [RFC2119].

### 23 **2.2 Model**

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

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

26 **Implementation** – A Sender or Receiver

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

29 **Extension Field** – One of the TIFF extension fields introduced by the current TIFF specification  
30 [TIFF], the set of PageMaker TIFF Technical Notes [TTN1], or TIFF Technical Note 2 [TTN2].

31 **New Field** – One of the new TIFF fields introduced by [RFC2301]. Note that the UIF specification  
32 does not introduce any new TIFF tags or field values.

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

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

1 **TIFF-FX Extension** – one of the extensions to [RFC2301] specified in [tiff-fx-ext1] or Appendix B of  
2 this document.

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.

5

6

### 7 **3 TIFF-FX support**

8 A UIF Document is a TIFF-FX file that adheres to the requirements of [RFC2301] and specific TIFF-  
9 FX extensions as described in Appendix B. A UIF Profile uses a collection of ITU-T facsimile coding  
10 methods. The UIF Profiles listed in this section have been derived from [RFC2301]. The reader is  
11 referred to Appendix B of this document and [RFC2301] for a complete description of each profile, as  
12 the subsections below briefly summarize each UIF Profile and list only the additional TIFF-FX  
13 extensions that **MUST** be used. Pages within a single UIF Document **MAY** be encoded using different  
14 UIF Profiles.

15 An Implementation that supports UIF **MUST** support at least TIFF-FX Profile S (see [RFC2301] for a  
16 complete description of TIFF-FX Profile S). Note that for the TIFF fields “ImageDescription”,  
17 “DocumentName”, “Software”, and “DateTime”, [TIFF] specifies only ASCII and does not provide a  
18 language tag or alternate character set facility.

19

20

#### 21 **3.1 The ‘TIFF-FXExtensions’ Field**

22 [tiff-fx-ext1] defines a new TIFF field called ‘TIFF-FXExtensions’ which is used to identify all TIFF-  
23 FX extensions. This field **MUST** be present when extensions are used. TIFF-FX Extensions are  
24 identified by bit value assignment. Table 1 summarizes the TIFF-FX Extensions that directly pertain to  
25 UIF and indicates which Extensions the Receiver **MUST** support for each profile. Bit 0 corresponds to  
26 the least significant bit of the 32-bit ‘TIFF-FXExtensions’ field value. The ‘UIF-Profiles’ column  
27 indicates those UIF profiles for which a Receiver **MUST** implement a given extension number.

28 A new TIFF-FX extensions document will be separately published to describe the new TIFF-FX  
29 Extensions 20 through 26. Until this document is published, a description of TIFF-FX Extensions 20  
30 through 26 appears in Appendix B.

31

32

Table 1. ‘TIFF-FXExtension’ Field Bit Description

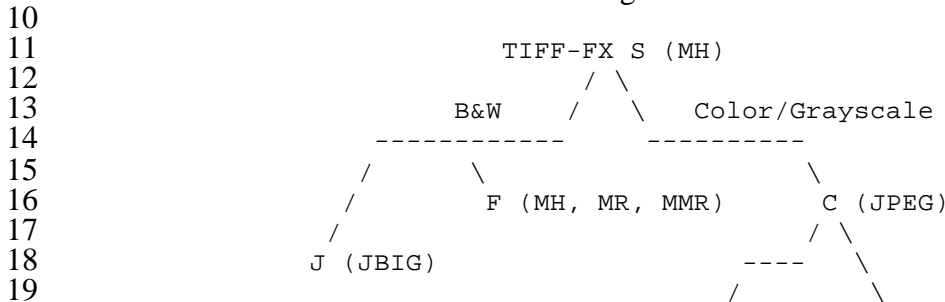
Bit Number	Extension Number	Description	UIF Profiles
19	20	Relaxed Image Width & Resolutions. If Bit 19 is 1, then the ImageWidth, XResolution, and YResolution fields are not constrained; however, the Receiver <b>MUST</b> support the image width & length that	F, J, C, L, M

		are determined by media size and resolutions supported.	
20	21	Required Resolution: 200dpi. If Bit 20 is 1, then Receivers MUST support XResolution=YResolution=200 and ResolutionUnit=2 (inches)	F, J, C, L, M
21	22	Required Resolution: 300dpi. If Bit 21 is 1, then Receivers MUST support XResolution=YResolution=300 and ResolutionUnit=2 (inches)	F, J, C, L, M
22	23	Required Resolution: 400dpi. If Bit 22 is 1, then Receivers MUST support XResolution=YResolution=400 and ResolutionUnit=2 (inches)	M
23	24	Required Resolution: 600dpi. If Bit 23 is 1, then Receivers MUST support XResolution=YResolution=600 and ResolutionUnit=2 (inches)	F, J
24	25	Required Field: 'JPEGTables' If Bit 24 is 1, then Receivers MUST support the use the 'JPEGTables' Extension Field	C, M
25	26	Required Compression: MMR If Bit 25 is 1, then Receivers MUST support Resolution=4 and T6Options=0.	F, M

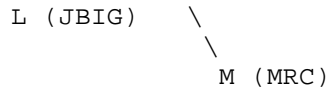
1  
2  
3  
4  
5  
6

7 **3.2 Relationships among UIF Profiles**

8 The following tree diagram, which is adapted from [RFC2301], shows the relationship among UIF  
9 Profiles and between UIF Profiles and coding methods.







1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13

All UIF Senders and/or Receivers **MUST** implement TIFF-FX 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 TIFF-FX Profile S, and **MAY** optionally implement UIF Profile F or J.

### 14 **3.3 Summary of UIF Profiles**

15 The following subsections summarize Implementation requirements and list the TIFF-FX extensions  
16 that **MUST** be supported for each of the UIF Profiles. Each subsection contains one or more tables that  
17 show the TIFF fields and field values that are **REQUIRED**, **RECOMMENDED**, or **OPTIONAL** for  
18 UIF Implementations. For all UIF Profiles, single asterisks (\*) and double asterisks (\*\*) indicate the  
19 level of Receiver conformance (see the legend below each table). Also, the rightmost column is used to  
20 indicate Sender conformance, i.e., those fields that a user **MUST**, **SHOULD**, or **MAY** include in the  
21 Image File Directory (IFD) of a UIF Document. For fields that a Receiver **MUST** support, note that a  
22 Sender **MUST** support at least one of the **REQUIRED** field values that the Receiver **MUST** support.  
23 See [RFC2301] for TIFF-FX Profile S requirements.

24 If there is a default value associated with a TIFF field, and the default value is a legal value for the  
25 given UIF Profile, then the Sender **MAY** choose to physically omit this field from the UIF file, as the  
26 presence of the TIFF field and its value are implied. The tables in the following subsections show  
27 default values for TIFF fields only when the default values are permitted.

28

#### 29 **3.3.1 UIF Profile F**

30 This section defines UIF Profile F, which uses Modified Read and Modified Modified Read (MMR)  
31 compression (described in [T.4] and [T.6]) in addition to the Modified Huffman compression used for  
32 TIFF-FX Profile S. When TIFF-FX Extensions 20, 21, 22, 24, and 26 are applied to TIFF-FX Profile F  
33 in [RFC2301], the result is UIF Profile F. Tables 2, 3, and 4 summarize the fields and field values that  
34 are **REQUIRED** / **RECOMMENDED** / **OPTIONAL** for UIF Profile F. Asterisks are used to denote  
35 levels of Receiver conformance, while the rightmost column indicates Sender conformance, i.e., those  
36 fields that a Sender **MUST**, **SHOULD**, or **MAY** include in an image file directory (IFD) of a UIF  
37 Document. For a complete description of the Baseline, Extension, and New Fields shown below, see  
38 [RFC2301] and [tiff-fx-ext1]. A Sender/Receiver implementing this profile is **REQUIRED** to also  
39 implement TIFF-FX Profile S.

40

41

**Table 2. 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 3. 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)	MUST if Compression=3

	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	
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

- 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
- 7

**Table 4. UIF Profile F New Fields**

New Fields	Values	Sender Conformance
GlobalParametersIFD**	IFD: global parameters IFD	MUST
TIFF-FXExtensions	0x2B80000** (Bits indicating use of TIFF-FX Extensions 20,21,22, 24, and 26)	MUST
FaxProfile*	n: ITU-compatible FAX profile	SHOULD
MultiProfiles*	n: profiles or profile(s) plus extension(s) applied within this file	SHOULD
CodingMethods*	n: compression algorithms used in file	SHOULD

- 8 \* Receiver SHOULD support this field.
- 9 \*\* (If double asterisk is in 'New Fields' column) Receiver MUST support the given field and all values shown in 'Values'
- 10 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

### 3.3.2 UIF Profile J

15 This section defines Profile J for UIF, which uses lossless JBIG compression as it is defined in [T.82]  
 16 subject to the application rules given in [T.85]. When TIFF-FX Extensions 20, 21, 22, and 24 are  
 17 applied to TIFF-FX Profile J in [RFC2301], the result is UIF Profile J. Tables 5, 6, and 7 summarize  
 18 fields and field values that are REQUIRED / RECOMMENDED / OPTIONAL. Asterisks are used to  
 19 denote levels of Receiver conformance, while the rightmost column indicates levels of Sender  
 20 Conformance, i.e., those fields that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF  
 21 Document. For a complete description of the Baseline, Extension, and New Fields shown below, see  
 22 the TIFF-FX specification [RFC2301] and [tiff-fx-ext1]. A Sender/Receiver implementing this profile  
 23 is REQUIRED to also implement TIFF-FX Profile S.

**Table 5. 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

- 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 6. 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.

1  
2

**Table 7. UIF Profile J New Fields**

New Fields	Values	Sender Conformance
GlobalParametersIFD**	IFD: global parameters IFD	MUST
TIFF-FXExtensions	0xB80000** (Bits indicating use of TIFF-FX Extensions 20,21,22 and 24)	MUST
FaxProfile*	n: ITU-compatible FAX profile	SHOULD
MultiProfiles*	n: profiles or profile(s) plus extension(s) applied within this file	SHOULD
T82Options**	0: T.85 profile of T.82	MUST
CodingMethods*	n: compression algorithms used in file	SHOULD

3 \* Receiver SHOULD support this field.  
4 \*\* Receiver MUST support the given field and all values shown in 'Values' column.

5

6 **3.3.3 UIF Profile C**

7 This section defines Profile C for UIF, which uses lossy JPEG compression as it is defined in [T.81].  
8 When TIFF-FX Extensions 20, 21, 22, and 25 are applied to TIFF-FX Profile C in [RFC2301], the  
9 result is UIF Profile C. Tables 8, 9, and 10 summarize fields and field values that are REQUIRED /  
10 RECOMMENDED / OPTIONAL. Asterisks are used to denote levels of Receiver conformance, while  
11 the rightmost column indicates levels of Sender Conformance, i.e., those fields that a Sender MUST,  
12 SHOULD, or MAY include in an IFD of a UIF Document. For a complete description of the Baseline,  
13 Extension, and New Fields shown below, see [RFC2301] and [tiff-fx-ext1]. A Sender/Receiver that  
14 implements this profile is REQUIRED to also implement TIFF-FX Profile S.

15

16

17

**Table 8. 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	MUST

	Document	
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 9. 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 (see [TTN2])	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 10. UIF Profile C New Fields**

New Fields	Values	Sender Conformance
Decode**	minL, maxL, mina, maxa, minb, maxb: minimum	MUST

	and maximum values for L*a*b*	
GlobalParametersIFD**	IFD: global parameters IFD	MUST
TIFF-FXExtensions	0x1380000** (Bits indicating use of TIFF-FX Extensions 20,21,22 and 25)	MUST
FaxProfile*	n: ITU-compatible FAX profile	SHOULD
MultiProfiles*	n: profiles or profile(s) plus extension(s) applied within this file	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 3.3.4 UIF Profile L

8 When TIFF-FX Extensions 20, 21, and 22 are applied to TIFF-FX Profile L in [RFC2301], the result is  
9 UIF Profile L. This profile uses JBIG compression (see [T.82]), subject to the application rules  
10 specified in [T.43] to losslessly code three types of color and grayscale images: one bit per color CMY,  
11 CMYK and RGB images; a palletized (i.e. mapped) color image; and continuous tone color and  
12 grayscale images.

13 Tables 11, 12, and 13 summarize fields and field values that are REQUIRED / RECOMMENDED /  
14 OPTIONAL for Implementations of UIF Profile L. Asterisks are used to denote levels of Receiver  
15 conformance, while the rightmost column indicates levels of Sender Conformance, i.e., those fields  
16 that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF Document. For a complete  
17 description of the Baseline, Extension, and New Fields shown below, see [RFC2301] and [tiff-fx-  
18 ext1]. A Sender / Receiver that chooses to implement this profile is REQUIRED to also implement  
19 TIFF-FX Profile S, and UIF Profile C.

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

22

23

Table 11. 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

- 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 12. 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

- 8 \* Receiver SHOULD support this field.
- 9 \*\* Receiver MUST support the given field and all values shown in 'Values' column.
- 10 Note: Fields that the Receiver MAY support have no asterisks in either the field name or the values column
- 11
- 12
- 13

**Table 13. 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
TIFF-FXExtensions	0x380000** (Bits indicating use of TIFF-FX Extensions 20, 21, and 22)	MUST
FaxProfile*	n: ITU-compatible FAX profile	SHOULD
MultiProfiles*	n: profiles or profile(s) plus extension(s) applied within this file	SHOULD
CodingMethods*	n: compression algorithms used in file	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

### 4 3.3.5 UIF Profile M

5 When TIFF-FX Extensions 20, 21, 22, 23, 25, and 26 are applied to TIFF-FX Profile M in [RFC2301],  
 6 the result is UIF Profile M. This profile is modeled after TIFF-FX Profile M, which uses Mixed Raster  
 7 Content (MRC), defined in [T.44]. MRC enables different coding methods and resolutions within a  
 8 single page. For a more detailed description of MRC and the Baseline, Extension, and New Fields  
 9 shown below, see [RFC2301], [T.44], and [tiff-fx-ext1].

10 Tables 14, 15, and 16 summarize fields and field values that are REQUIRED / RECOMMENDED /  
 11 OPTIONAL for Implementations of UIF Profile M.. Asterisks are used to denote levels of Receiver  
 12 conformance, while the rightmost column indicates levels of Sender Conformance, i.e., those fields  
 13 that a Sender MUST, SHOULD, or MAY include in an IFD of a UIF Document. A Sender/Receiver  
 14 that chooses to implement this profile is REQUIRED to also implement TIFF-FX Profile S and UIF  
 15 Profile C.

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

18

19

**Table 14. 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	MUST

	7**: JPEG 9: JBIG, per [T.82] 10: JBIG, per [T.43]	
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**: binary mask, background & foreground layers;  other resolutions are OPTIONAL	MUST
YResolution	200**, 300**, 400**: binary mask, 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 15. 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 16. 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
TIFF-FXExtensions	0x3780000** (Bits indicating use of TIFF-FX Extensions 20, 21, 22, 23, 25, and 26)	MUST
FaxProfile*	n: ITU-compatible FAX profile	SHOULD
MultiProfiles*	n: profiles or profile(s) plus extension(s) applied within this file	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 **3.4 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.

9

## 10 **4 Sender/Receiver protocol requirements**

### 11 **4.1 Indicating Document format using MIME**

12 If the underlying transport protocol uses MIME as defined by [RFC2046], 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 TIFF-FX Profile S and/or UIF  
 15 Profile F, then the UIF data content MUST be described by the 'image/tiff' content type/subtype.  
 16 Registration of the MIME type/sub-type 'image/tiff' is described in the TIFF MIME Sub-type  
 17 Registration document [TIFF-REG]\*. If the Document contains any UIF Profiles besides TIFF-FX  
 18 Profile S and/or UIF Profile F, then the Sender MUST describe the UIF data using the 'image/tiffx'  
 19 content type/subtype\*.

20 \* Note: The IETF[RFC2301] will be registering a new MIME media type to accommodate  
 21 profiles/codings that are not compatible with TIFF 6. TIFF-FX profiles that are not compatible with  
 22 TIFF 6, namely profiles J, C, L, and M, will use the new MIME type. For the purposes of this draft, the  
 23 'image/tiffx' MIME type is shown as a working name, since it has been suggested through email by  
 24 the Internet FAX Working Group. When the proper MIME type is agreed by the Internet FAX WG,  
 25 this document will be updated.

26

## 1 **4.2 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 and the received image dimensions are larger than  
7 what is allowed by the supported media, then the Receiver MUST flow extra data to the next page. If  
8 the Receiver does support image reduction, then the Sender MAY request in a protocol-specific  
9 manner that the Receiver use image-reduction if necessary. If the Receiver receives such a request, and  
10 the received image dimensions are larger than what is allowed by the supported media, then the  
11 Receiver MUST reduce the image so as to fit it to the page while maintaining the aspect ratio. If the  
12 Receiver uses image reduction, the Receiver MUST determine if reduction is necessary for each page  
13 and if so, apply reduction. The scaling is calculated separately for each page. The scaling applies to all  
14 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[ipp-override]).

## 17 **4.3 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

22

## 23 **5 References**

24 [RFC2301] McIntyre, Zilles, Buckley, Venable, Parsons, Rafferty "File Format for Internet Fax",  
25 RFC2301, March 1998.

26 [RFC2879] Klyne, McIntyre. "Content Feature Schema for Internet Fax (V2)", RFC2879, August  
27 2000.

28 [ipp-override] PWG Standard 5100.4-2001 "Internet Printing Protocol (IPP): Override Attributes for  
29 Documents and Pages". <ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.4.pdf>, February 7, 2001.

30 [uif-req] Moore, P., "Universal Image Format requirements", October 16, 2000,  
31 <ftp://ftp.pwg.org/pub/pwg/QUALDOCS/requirements/uif-requirements-01.pdf>

32 [ifx-req] Moore, P., "IPP Fax transport requirements", October 16, 2000,  
33 <ftp://ftp.pwg.org/pub/pwg/QUALDOCS/requirements/ifx-transport-requirements-01.pdf>

34 [RFC2542] Masinter, "Terminology and Goals for Internet Fax", RFC2542, March 1999.

35 [ifx] Moore, Songer, Hastings, "IPP Fax Protocol" PWG Draft Standard D0.8, October 15, 2001.

36 [T.4] ITU-T Recommendation T.4, Standardization of group 3 facsimile apparatus for document  
37 transmission, October 1997

- 1 [T.6] ITU-T Recommendation T.6, Facsimile coding schemes and coding control functions for group  
2 4 facsimile apparatus, November 1988
- 3 [T.43] ITU-T Recommendation T.43, Colour and gray-scale image representations using lossless  
4 coding scheme for facsimile, February 1997
- 5 [T.44] ITU-T Recommendation T.44, Mixed Raster Content (MRC), April 1999.
- 6 [T.81] ITU-T Recommendation T.81, Information technology - Digital compression and coding of  
7 continuous-tone still images - Requirements and guidelines, September 1992
- 8 [T.82] ITU-T Recommendation T.82, Information technology - Coded representation of picture and  
9 audio information - Progressive bi-level image compression, March 1995
- 10 [T.85] ITU-T Recommendation T.85, Application profile for Recommendation T.82 - Progressive bi-  
11 level image compression (JBIG coding scheme) for facsimile apparatus, August 1995
- 12 [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14,  
13 RFC 2119, March 1997.
- 14 [TIFF] Tag Image File Format, Revision 6.0, Adobe Developers Association, June 3, 1992,  
15 <http://partners.adobe.com/asn/developer/pdfs/tn/TIFF6.pdf>  
16 The TIFF 6.0 specification dated June 3, 1992 specification (c) 1986-1988, 1992 Adobe  
17 Systems Incorporated. All Rights Reserved.
- 18 [TTN1] Adobe PageMaker 6.0 TIFF Technical Notes, Sept. 14, 1995,  
19 <http://partners.adobe.com/asn/developer/pdfs/tn/TIFFPM6.pdf>
- 20 [TTN2] Draft TIFF Technical Note 2, Replacement TIFF/JPEG specification, March 17, 1995,  
21 <ftp://ftp.sgi.com/graphics/tiff/TTN2.draft.txt>
- 22 [TIFF-REG] Parsons, G., Rafferty J. and S. Zilles, "Tag Image File Format (TIFF) - image/tiff  
23 MIME Sub-type Registration", work in progress, draft-ietf-fax-tiff-regbis-???.txt
- 24 Note: [22] is being progressed as BCP and is expected to be issued prior to the issuing of TIFF-  
25 FX as a Draft Standard.
- 26 [RFC2046] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part Two:  
27 Media Types", RFC 2046, November 1996.
- 28 [tiff-fx-ext1] McIntyre, Abercrobie, Rucklidge, Buckley, "TIFF-FX Extension Set 1", July 20, 2001.
- 29 [RFC2533] Klyne, G., "A Syntax for Describing Media Feature Sets", RFC 2533, March 1999.

30

## 31 **6 Outstanding Issues**

32

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

37

- 1 Resolution: IPPFAX Group decided it would be a good idea to revert to TIFF-FX Profile S as it is  
2 defined in [RFC2301], as all TIFF-FX Receivers MUST support this profile. Also, all TIFF readers  
3 are supposed to ignore unknown TIFF tags; therefore, use of the “image/tiff” MIME type is  
4 acceptable for use with both TIFF-FX Profile S and UIF Profile F.  
5
- 6 2. Use of the ‘profile’ CONNEG tag is not syntactically valid in section A.1.2.2. Graham Kline,  
7 author of the CONNEG specification, recommended that we use the hash-based approach  
8 described in RFC2938 if the goal is a shorter CONNEG expression—there is a free Java  
9 implementation available from the IMC website ( <http://www.imc.org/ietf-medfree/Fsm110a.zip> ).  
10  
11

1  
2  
3**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.
D0.6	7/25/01	John Pulera, Minolta	Expanded Sender conformance requirements for UIF profiles and MIME; other modifications per June teleconference.
D0.7	10/16/01	John Pulera, Minolta	Redefined UIF Profiles to be TIFF-FX profiles using TIFF-FX extensions; moved capabilities communication to an informative appendix.
D0.8	10/30/01	John Pulera, Minolta Tom Hastings, Xerox	Clarified terminology to make clear that UIF is TIFF-FX plus specific TIFF-FX extensions; other editorial changes.
D0.9	01/29/02	John Pulera, Minolta	Moved definition of new TIFF-FX extensions to Appendix B; removed definition of UIF Profile S; changes to Appendix A CONNEG strings.

4  
5



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 capabilities, a UIF Sender **MUST** query in a protocol-specific  
10 manner either the UIF Profiles supported (see section A.2) or the Receiver capabilities string (see  
11 section A.1). If the Sender wants to send a UIF file using any **OPTIONAL** features outside the profile-  
12 specific baseline level (see baseline levels shown in section A.1.1), then the Sender **MUST** query the  
13 Receiver for the capabilities string. The Sender **MUST** also query the Receiver to determine the media  
14 that is supported, and the media that is not only supported but ready. The UIF Profiles supported,  
15 media supported, and media ready are excluded from the Receiver capabilities string so that a full  
16 Sender-side implementation of CONNEG is unnecessary if a UIF Sender decides to support only the  
17 minimum capabilities for a given profile (see Section 4.1.2).

### 18 **A.1 Receiver capabilities string**

19 A valid Receiver capabilities string **MUST** be any well-formed CONNEG string obeying the syntax  
20 specified in [RFC2533] and using the feature tag and tag values described in [RFC2879]. A UIF  
21 Sender **MAY** request the Receiver capabilities string. A UIF Receiver **MUST** return a Receiver  
22 capabilities string if a Sender requests it. The Receiver capabilities string is not expected to be more  
23 than 32Kb in length. The capabilities announced by the Receiver **SHOULD** indicate those things that it  
24 can do without operator intervention. For example if the Receiver has a manually interchangeable print  
25 cartridge with only the black cartridge loaded, it **SHOULD** only indicate support for "color=binary".  
26 The method of transport is protocol-dependent and beyond the scope of this document.

27

#### 28 **A.1.1 Minimum Receiver capabilities**

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

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

##### 36 **A.1.1.1 Minimum capabilities for TIFF-FX Profile S**

```
37 (& (image-file-structure=TIFF-minimal)  
38 (MRC-mode=0)  
39 (image-coding=MH)
```

```

1      (color=Binary)
2      ( | (& (dpi=200)
3          (dpi-xyratio=[200/100,200/200])) )
4          (& (dpi=204)
5            (dpi-xyratio=[204/98,204/196])) ) )
6

```

### 7 **A.1.1.2 Minimum capabilities for UIF Profile F**

```

8
9      ( | (& (image-file-structure=TIFF-minimal)
10         (MRC-mode=0)
11         (image-coding=MH)
12         (color=Binary)
13         ( | (& (dpi=200)
14             (dpi-xyratio=[200/100,200/200])) )
15             (& (dpi=204)
16               (dpi-xyratio=[204/98,204/196])) ) ) )
17         (& (image-file-structure=TIFF-limited)
18            (MRC-mode=0)
19            (image-coding=MMR)
20            (color=Binary)
21            (dpi=[200,300,600])
22            (dpi-xyratio=1) ) ) )
23

```

### 24 **A.1.1.3 Minimum capabilities for UIF Profile J**

```

25      ( | (& (image-file-structure=TIFF-minimal)
26         (MRC-mode=0)
27         (image-coding=MH)
28         (color=Binary)
29         ( | (& (dpi=200)
30             (dpi-xyratio=[200/100,200/200])) )
31             (& (dpi=204)
32               (dpi-xyratio=[204/98,204/196])) ) ) )
33         (& (image-file-structure=TIFF-limited)
34            (MRC-mode=0)
35            (image-coding=JBIG)
36            (image-coding-constraint=JBIG-T85)
37            (color=Binary)
38            (JBIG-stripe-size=128)
39            (dpi=[200,300,600])
40            (dpi-xyratio=1) ) ) )

```

### 41 **A.1.1.4 Minimum capabilities for UIF Profile C**

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

#### 46 **A.1.1.4.1 Minimum grayscale capabilities for UIF Profile C**

```

47      ( | (& (image-file-structure=TIFF-minimal)
48         (MRC-mode=0)

```

```

1      (image-coding=MH)
2      (color=Binary)
3      ( | (& (dpi=200)
4          (dpi-xyratio=[200/100,200/200]) )
5          (& (dpi=204)
6            (dpi-xyratio=[204/98,204/196]) ) ) )
7      (& (image-file-structure=TIFF-limited)
8          (MRC-mode=0)
9          (color=grey)
10         (image-coding=JPEG)
11         (image-coding-constraint=JPEG-T4E)
12         (color-levels<=256)
13         (color-space=CIELAB)
14         (color-illuminant=D50)
15         (CIELAB-L-min>=0)
16         (CIELAB-L-max<=100)
17         (dpi=[200,300])
18         (dpi-xyratio=1) ) )
19

```

#### 20 ***A1.1.4.2 Minimum full color capabilities for UIF Profile C***

```

21      ( | (& (image-file-structure=TIFF-minimal)
22          (MRC-mode=0)
23          (image-coding=MH)
24          (color=Binary)
25          ( | (& (dpi=200)
26              (dpi-xyratio=[200/100,200/200]) )
27              (& (dpi=204)
28                (dpi-xyratio=[204/98,204/196]) ) ) ) )
29      (& (image-file-structure=TIFF-limited)
30          (MRC-mode=0)
31          (color=grey)
32          (image-coding=JPEG)
33          (image-coding-constraint=JPEG-T4E)
34          (color-levels<=256)
35          (color-space=CIELAB)
36          (color-illuminant=D50)
37          (CIELAB-L-min>=0)
38          (CIELAB-L-max<=100)
39          (dpi=[200,300])
40          (dpi-xyratio=1) )
41      (& (image-file-structure=TIFF-limited)
42          (MRC-mode=0)
43          (color=full)
44          (image-coding=JPEG)
45          (image-coding-constraint=JPEG-T4E)
46          (color-subsampling="4:1:1")
47          (color-levels<=16777216)
48          (color-space=CIELAB)
49          (color-illuminant=D50)
50          (CIELAB-L-min>=0)
51          (CIELAB-L-max<=100)
52          (CIELAB-a-min>=-85)
53          (CIELAB-a-max<=85)
54          (CIELAB-b-min>=-75)
55          (CIELAB-b-max<=125)

```

```

1      (dpi=[200,300])
2      (dpi-xyratio=1) ) )
3

```

#### 4 ***A.1.1.5 Minimum capabilities for UIF Profile L***

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

##### 10 ***A.1.1.5.1 Minimum grayscale capabilities for UIF Profile L***

```

11
12 (| (& (image-file-structure=TIFF-minimal)
13      (MRC-mode=0)
14      (image-coding=MH)
15      (color=Binary)
16      (| (& (dpi=200)
17          (dpi-xyratio=[200/100,200/200]) )
18          (& (dpi=204)
19              (dpi-xyratio=[204/98,204/196]) ) ) )
20      (& (image-file-structure=TIFF-limited)
21          (MRC-mode=0)
22          (color=grey)
23          (| (& (image-coding=JPEG)
24              (image-coding-constraint=JPEG-T4E) )
25              (& (image-coding=JBIG)
26                  (image-coding-constraint=JBIG-T43)
27                  (JBIG-stripe-size=128)
28                  (image-interleave=stripe) ) ) )
29          (color-space=CIELAB)
30          (color-levels<=256)
31          (color-illuminant=D50)
32          (CIELAB-L-min>=0)
33          (CIELAB-L-max<=100)
34          (dpi=[200,300])
35          (dpi-xyratio=1) ) )

```

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

```

37
38 (| (& (image-file-structure=TIFF-minimal)
39      (MRC-mode=0)
40      (image-coding=MH)
41      (color=Binary)
42      (| (& (dpi=200)
43          (dpi-xyratio=[200/100,200/200]) )
44          (& (dpi=204)
45              (dpi-xyratio=[204/98,204/196]) ) ) )
46      (& (image-file-structure=TIFF-limited)
47          (MRC-mode=0)
48          (color=grey)
49          (| (& (image-coding=JPEG)

```

```

1         (image-coding-constraint=JPEG-T4E) )
2     (& (image-coding=JBIG)
3         (image-coding-constraint=JBIG-T43)
4         (JBIG-stripe-size=128)
5         (image-interleave=stripe) ) )
6     (color-space=CIELAB)
7     (color-levels<=256)
8     (color-illuminant=D50)
9     (CIELAB-L-min>=0)
10    (CIELAB-L-max<=100)
11    (dpi=[200,300])
12    (dpi-xyratio=1) )
13 (& (image-file-structure=TIFF-limited)
14    (MRC-mode=0)
15    (color=full)
16    (| (& (image-coding=JPEG)
17        (image-coding-constraint=JPEG-T4E)
18        (color-subsampling=["1:1:1","4:1:1"]) )
19    (& (image-coding=JBIG)
20        (image-coding-constraint=JBIG-T43)
21        (JBIG-stripe-size=128)
22        (image-interleave=stripe) ) )
23    (color-levels<=16777216)
24    (color-space=CIELAB)
25    (color-illuminant=D50)
26    (CIELAB-L-min>=0)
27    (CIELAB-L-max<=100)
28    (CIELAB-a-min>=-85)
29    (CIELAB-a-max<=85)
30    (CIELAB-b-min>=-75)
31    (CIELAB-b-max<=125)
32    (dpi=[100,200,300])
33    (dpi-xyratio=1) ) )
34

```

### 35 **A.1.1.6 Minimum capabilities for UIF Profile M**

```

36 (| (& (image-file-structure=TIFF-minimal)
37     (MRC-mode=0)
38     (image-coding=MH)
39     (color=Binary)
40     (| (& (dpi=200)
41         (dpi-xyratio=[200/100,200/200]) )
42     (& (dpi=204)
43         (dpi-xyratio=[204/98,204/196]) ) ) )
44 (& (image-file-structure=TIFF-limited)
45    (MRC-mode=0)
46    (color=full)
47    (image-coding=JPEG)
48    (image-coding-constraint=JPEG-T4E)
49    (color-subsampling="4:1:1")
50    (color-levels<=16777216)
51    (color-space=CIELAB)
52    (color-illuminant=D50)
53    (CIELAB-L-min>=0)
54    (CIELAB-L-max<=100)
55    (CIELAB-a-min>=-85)

```

```

1      (CIELAB-a-max<=85)
2      (CIELAB-b-min>=-75)
3      (CIELAB-b-max<=125)
4      (dpi=[200,300])(dpi-xyratio=1)
5      (& (image-file-structure=TIFF-MRC-limited)
6      (MRC-mode=1)
7      (MRC-max-stripe-size<=256)
8      (| (& (image-file-structure=TIFF-minimal)
9      (color=Binary)
10     (image-coding=MH)
11     (dpi=[200,300,400])
12     (dpi-xyratio=1) )
13     (& (image-file-structure=TIFF-limited)
14     (color=full)
15     (image-coding=JPEG)
16     (image-coding-constraint=JPEG-T4E)
17     (color-subsampling="4:1:1")
18     (color-levels<=16777216)
19     (color-space=CIELAB)
20     (color-illuminant=D50)
21     (CIELAB-L-min>=0)
22     (CIELAB-L-max<=100)
23     (CIELAB-a-min>=-85)
24     (CIELAB-a-max<=85)
25     (CIELAB-b-min>=-75)
26     (CIELAB-b-max<=125)
27     (dpi=[200,300,400])
28     (dpi-xyratio=1) ) ) ) )

```

## 29 **A.1.2 New CONNEG tags and values**

30

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

### 33 ***A.1.2.1 Definition of profile-related auxiliary predicates***

34 The new CONNEG auxiliary predicate values ‘profile-uif-s’, ‘profile-uif-f’, ‘profile-uif-j’, ‘profile-uif-  
 35 cg’, ‘profile-uif-c’, ‘profile-uif-lg’, ‘profile-uif-l’, and ‘profile-uif-m’ shall be registered with the  
 36 relevant authoritative body. These new auxiliary predicates have been introduced to represent the  
 37 *incremental* differences between minimum capabilities strings listed in sections A.1.1.1 through A1.1.5  
 38 to reduce the length of the CONNEG strings.

39

40 The CONNEG string “profile-uif-s” is defined to expand as

```

41     (& (image-file-structure=TIFF-minimal)
42     (MRC-mode=0)
43     (image-coding=MH)
44     (color=Binary)
45     (| (& (dpi=200)
46     (dpi-xyratio=[200/100,200/200]) )
47     (& (dpi=204)
48     (dpi-xyratio=[204/98,204/196]) ) ) ) )

```

1

2

3 The CONNEG string "profile-uif-f" is defined to expand as

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

10

11 The CONNEG string "profile-uif-j" is defined to expand as

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

20

21 The CONNEG string "profile-uif-cg" is defined to expand as

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

34

35 The CONNEG string "profile-uif-c" is defined to expand as

```
36 (& (image-file-structure=TIFF-limited)
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)
```

1 (CIELAB-b-min>=-75)  
 2 (CIELAB-b-max<=125)  
 3 (dpi=[200,300])  
 4 (dpi-xyratio=1) )

5

6 The CONNEG string “profile-uif-lg” is defined to expand as

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

21

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

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

41

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

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

45

46 (| (profile-uif-s)  
 47 (profile-uif-c)  
 48 (& (image-file-structure=TIFF-MRC-limited)



1 (MRC-mode=1)  
 2 (MRC-max-stripe-size<=256)  
 3 (dpi=[200,300]) ) )  
 4  
 5  
 6

## 7 **A.2 UIF Profiles supported**

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

## 15 **A.3 Media supported**

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

## 21 **A.4 Media ready**

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

## 27 **A.5 Image reduction supported**

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

## 32 **A.6 Conformance Requirements Summary**

33 For the listed operations, Table 17 below shows conformance requirements that apply to the protocol  
 34 used to transport UIF data.

35 **Table 17. Underlying Protocol Conformance.**

Operation	UIF-capable Sender	UIF-capable Receiver	Section
-----------	--------------------	----------------------	---------

Receiver capabilities string	MAY	MUST	<a href="#">A.1</a>
UIF Profiles supported	MUST	MUST	<a href="#">A.2</a>
Media supported	MUST	MUST	<a href="#">A.3</a>
Media ready	MUST	MUST	<a href="#">A.4</a>
Image reduction supported	MAY	MUST	<a href="#">A.5</a>

1  
2

## 1 **Appendix B. UIF-related Extensions to TIFF-FX**

2

3 This appendix describes TIFF-FX extensions intended to complement those found in [tiff-fx-ext1] and  
4 provide the necessary level of conformance for UIF Documents. It is to be removed once the definition  
5 of TIFF-FX Extensions 20 through 26 have been formalized in a separate document.

### 6 ***B.1 TIFF-FX Extension 20: Relaxed Image Widths and Resolutions***

7 The allowances shown below supersede the TIFF-FX requirements specified in [RFC2301] concerning  
8 the ImageWidth, XResolution, and YResolution TIFF fields:

- 9 • If this TIFF-FX Extension is supported, then the ImageWidth, XResolution, and YResolution  
10 TIFF fields are not constrained to the set of resolutions specified in [RFC2301]; however, the  
11 Receiver MUST support the image width & length that are determined by the media size and  
12 resolutions supported.

### 13 ***B.2 TIFF-FX Extensions 21 – Required Resolution***

14 The requirement shown below supersedes the TIFF-FX requirements in [RFC2301] concerning the  
15 XResolution, YResolution, and ResolutionUnit TIFF fields:

- 16 • If this TIFF-FX Extension is supported, then Receivers MUST support  
17 XResolution=YResolution=200 and ResolutionUnit=2 (inches)

### 18 ***B.3 TIFF-FX Extensions 22 – Required Resolution***

19 The requirement shown below supersedes the TIFF-FX requirements in [RFC2301] concerning the  
20 XResolution, YResolution, and ResolutionUnit TIFF fields:

- 21 • If this TIFF-FX Extension is supported, then Receivers MUST support  
22 XResolution=YResolution=300 and ResolutionUnit=2 (inches)

### 23 ***B.4 TIFF-FX Extensions 23 – Required Resolution***

24 The requirement shown below supersedes the TIFF-FX requirements in [RFC2301] concerning the  
25 XResolution, YResolution, and ResolutionUnit TIFF fields:

- 26 • If this TIFF-FX Extension is supported, then Receivers MUST support  
27 XResolution=YResolution=400 and ResolutionUnit=2 (inches)

### 28 ***B.5 TIFF-FX Extensions 24 – Required Resolution***

29 The requirement shown below supersedes the TIFF-FX requirements in [RFC2301] concerning the  
30 XResolution, YResolution, and ResolutionUnit TIFF fields:

- 31 • If this TIFF-FX Extension is supported, then Receivers MUST support  
32 XResolution=YResolution=600 and ResolutionUnit=2 (inches)

1 ***B.6 TIFF-FX Extensions 25 – Required Field***

2 The requirement shown below supersedes the conformance found in [tiff-fx-ext1] concerning the  
3 JPEGTables field (see [TTN2] for a description of the JPEGTables field):

- 4 • If this TIFF-FX Extension is supported, then Receivers MUST support the use the JPEGTables  
5 Extension Field

6 ***B.7 TIFF-FX Extension 26 – Required Compression***

7 The requirement shown below supersedes TIFF-FX requirements in [RFC2301] concerning the  
8 required Compression TIFF field:

- 9 • If this TIFF-FX Extension is supported, Receivers MUST support Resolution=4 (2-dimensional  
10 MMR encoding as defined in [T.6]) and T6Options=0.

11