IPP Fax Project

TIFF-FX Use by IPP

aka UIF (Universal Image Format)

Revision	Date	Author	Notes
1	1/16/01	Paul Moore, Netreon	Initial version
2	1/28/01	Gail Songer, Netreon	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.

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This document specifies how an IPP[1,2,3] printer supports the TIFF-FX[4] Internet Fax image format. The complete support for TIFF-FX in this way is called Universal Image Format (UIF). There are several pieces to this support:

- A specification of precisely what parts of the TIFF-FX specification is to be supported
- How the printer allows clients to discover its UIF characteristics (resolution, drawing surface, etc.)
- How the client specifies options for the transmission (scaling for example).

The term 'printer' is used in the IPP sense as meaning something that executes IPP operations as specified in the IPP protocol. It does not necessarily mean that this is a device that is actually capable of placing ink on paper.

1 Indicating support

In order to indicate that it supports UIF a printer will include a new MIME type in its set of supported document formats.

The MIME type is "application/vnd.pwg-UIF" (ISSUE: use "image/tiff; application=uif" instead?).

By including this MIME type in its "document-format-supported" attribute the printer commits itself to supporting all features described in this specification.

2 TIFF-FX support

A profile is based on a collection of ITU-T facsimile coding methods. The profiles listed below have been derived from TIFF-FX [5]. The reader is referred to this document for a complete description of each profile, as the subsections below briefly summarize each profile and list only the differences between the UIF version of the profile and TIFF-FX profile on which it is based.

A printer that supports UIF must support at least Profile U.

2.1 Profile U

Profile U is modeled after Profile S of TIFF-FX[5], which describes the minimal black-and-white subset of TIFF for facsimile. Profile U uses 1-dimensional Modified Huffman (MH) compression and shall adopt the same requirements and restrictions for baseline TIFF fields, extension TIFF fields, byte order, bit order, and image file directory (IFD) placement as stated in Section 3 of TIFF-FX[4] with the exception of the following:

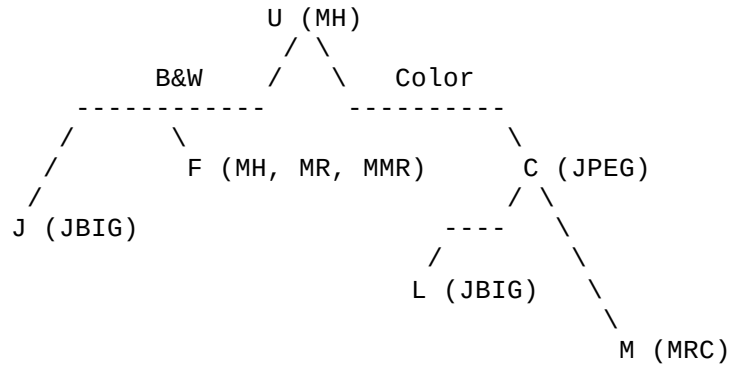
- There shall be no enumeration restrictions on the 'XResolution', 'YResolution', and 'ImageWidth' TIFF fields.
- Support for 'XResolution' = 600 and 'YResolution' = 600 is required. Support for all other resolutions is optional. Note that 'XResolution' and 'YResolution' values refer to the image format and not necessarily the engine delivery.

2.2 Other UIF Profiles

Support for other profiles described in TIFF-FX[4], namely Profiles F, J, C, L, and M, is optional. Implementations that choose to support these optional profiles shall adopt the same requirements and restrictions used in Profiles F, J, C, L, and M, respectively, with the exception of the following:

- There shall be no enumeration restrictions on the 'XResolution', 'YResolution', and 'ImageWidth' TIFF fields.
- For the bi-level profiles (Profiles F, C, and the Mask layer of Profile M), support for XResolution = 600 and YResolution = 600 is required. For the color profiles (Profiles C, L, and the foreground / background layers of Profile M), support for XResolution = 300 and YResolution = 300 is required. Support for all other resolutions is optional. Note that 'XResolution' and 'YResolution' values refer to the image format and not necessarily the engine delivery.

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



All implementations of UIF MUST implement Profile U, which is the root node of the tree. All color implementations of UIF MUST implement Profile C. The implementation of 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, an implementation of Profile M must also implement Profiles C and U, and may optionally implement Profile F, J or L. For another example, an implementation of Profile C must also implement Profile U, and may optionally implement Profile F or J.

3 Capabilities communication

A client needs to discover what the printer supports in terms of resolution, encoding, drawing surface etc. To do this the printer will use CONNEG[5]. The CONNEG data will be read from the device using the new printer attribute 'uif-conneg', which is a text attribute of up to 32,768 bytes.

Section 3.7 of CONNEG[5] describes the feature tag names that have to do with image coding. The "image-file-structure" Conneg tag describes how the coded image data is wrapped and formatted. In addition to the legal values for the "image-file-structure" tag presented in CONNEG[5], UIF formatted data may also use "tiff-limited-uif". The "tiff-limited-uif" tag SHALL be interpreted as "tiff-limited", except the requirement for one TIFF strip per page is relaxed.

The capabilities announced by the printer should indicate those things that it can do without operator intervention. ISSUE: Add description of new Conneg tag used to indicate capabilities that are available with user intervention??

Examples:

- It should indicate the drawing surface(s) available on the media for which it is currently configured.
- If it has interchangeable color and mono print cartridges it should only indicate the one that it currently has loaded (or automatically loaded without operator intervention).

4 Client requirements

4.1 Scaling

It is possible that a client might send an image that does not match the announced drawing surface of the printer (for example it may have an image that it cannot change). In this case the client needs to indicate to the printer what should happen. For this purpose a new optional IPP job template attribute is added: uif-scale.

This is a boolean attribute. If not specified then the value is taken to be 'false'.

If scaling is used (uif-scale = true) then the printer must shrink or expand the image so as to fit it to the page. If scaling is used, the printer must calculate discrete aspect ratios for each page.

If scaling is not used (uif-scale = false) then the printer must flow extra data to the next page (in the case of an oversize image) or leave white space below or to the right of the image (in the case of an undersize image).

The scaling applies to all pages of the job (unless the client and device supports page level overrides[6]).

The scaling is calculated separately for each page. (ISSUE: What should be done concerning media selection when the TIFF image sizes are different on a page by page

basis? Either determine media size by media size attribute or let the receiver determine for itself the media to be used on each page.)

5 Attribute Syntax

5.1 'octetString32k'

The 'octetString32k' attribute syntax is a sequence of octets encoded in a maximum of 32,767 octets which is indicated in sub-section headers using the notation: octetString32k(MAX). This syntax type is used for opaque data. (This is also defined in ifx protocol specification)

6 Formal Attribute Definition

6.1 'uif-conneg'

Format: octetString32k(MAX)

Type: Printer description attribute

Description: This conneg string describes what the printer supports in terms of resolution, encoding, drawing surface etc.

Conformance: A receiver MUST support this attribute. A sender MAY request this attribute

6.2 'uif-scale'

Format: boolean

Type: Job template attribute

Description: If (uif-scale = true) then the printer must shrink or expand the image so as to fit it to the page. The aspect ratio must be maintained.

If (uif-scale = false) then the printer must truncate (in the case of an oversize image) or leave white space below or to the right of the image (in the case of an undersize image). This is the default behavior.

Conformance: A receiver MUST support this attribute. A sender MAY send this attribute

6.3 'uif-scale-supported'

Format: boolean

Type: Printer description attribute

Description: True means that both values are supported.

Conformance: A receiver MUST support this attribute. A sender MAY send this attribute

7 CONNEG example

This is taken directly from [5].

```
(& (image-file-structure=TIFF)
   (MRC-mode=0)
   (| (& (color=Binary)
         (| (image-coding=[MH,MR,MMR])
            (& (image-coding=JBIG)
               (image-coding-constraint=JBIG-T85)
               (JBIG-stripe-size=128) ) )
         (| (& (dpi=204) (dpi-xyratio=[204/98,204/196]) )
            (& (dpi=200) (dpi-xyratio=[200/100,1]) )
            (& (dpi=300) (dpi-xyratio=1) ) )
      (& (color=Grey)
         (color-levels<=256)
         (color-space-CIELAB)
         (color-illuminant=D50)
         (CIELAB-L-min>=0)
         (CIELAB-L-max<=100)
         (| (& (image-coding=JPEG)
               (image-coding-constraint=JPEG-T4E) )
            (& (image-coding=JBIG)
               (image-coding-constraint=JBIG-T43)
               (JBIG-stripe-size=128)
               (image-interleave=stripe) ) )
         (dpi=[100,200,300]) (dpi-xyratio=1) ) )
   (size-x<=2150/254)
   (paper-size=[letter,A4,B4]) )
   (ua-media=stationery) )
```

8 References

[1] deBry, Hastings, Herriot, Isaacson, Powell, "Internet Printing Protocol/1.1: Model and Semantics", RFC 2911

[2] Herriot, Butler , Moore, Turner, Wenn. "Internet Printing Protocol/1.1: Encoding and Transport", RFC 2910

[3] Hastings, Manros, ,Kugler, Holst, "Internet Printing Protocol/1.1: Implementer's Guide", draft-ietf-ipp-implementers-guide-v11-00.txt

[4] McIntyre, Zilles, Buckley, Venable, Parsons, Rafferty "File Format for Internet Fax", RFC2301

[5] Klyne, McIntyre. "Content Feature Schema for Internet Fax (V2)", RFC2879.

[6] ftp://ftp.pwg.org/pub/pwg/ipp/new_EXC/pwg-ipp-override-attributes-000915.pdf

9 Issues

1. It is not clear to me whether or not variable drawing surfaces are supported by TIFF-FX. For example can I say that I support 2000x3000 pixels? We have

definitely agreed that we need to be able to do this as well as to include the TIFF-FX defined, named set of drawing surfaces. It is not supported by TIFF-FX and we need to create a profile that does support it. Profile U was added to this document, but we need to confirm with Lloyd if this is the best way to proceed.

2. Should the MIME type be “image/tiff; application=uif” instead of “application/vnd.pwg-UIF”? Using the former would allow existing TIFF readers to do something with UIF data.

3. Add description of new Conneg tag used to indicate capabilities that are available *with* user intervention?

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

10 Actions

1. Teleconference scheduled on May 30, 2001 for 10:00am – 12:00pm (Pacific Time) to resolve some of the above issues.

2. John will come up with a list of default fields for each IPP-Fax profile in an attempt to reduce the number of parameters that need to be negotiated using Conneg.

3. PM does XML version of conneg.

Next meeting: Toronto. Date and time yet to be decided.