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The Printer Working Group PDF Image-Streamable Format – “PDF/is”

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(Formerly “PDFax”)

Working Draft for Proposed Standard

510n.y-0.6

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19 February 2003

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The Printer Working Group PDF Image-Streamable Format (PDF/is) Working Draft for Proposed Standard 510n.y-0.6

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Abstract: This standard specifies a subset of PDF (Portable Document Format) 1.4 known as the PDF Image-Streamable Format (PDF/is) by formally defining a series of PDF/is "profiles" distinguished primarily by the method of image compression employed and color space used.
In summary PDF/is is an image document 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. PDF/is makes reference to the PDF 1.4 Reference [pdf], which describes the PDF representation of image data specified by the ITU-T Recommendations for black-and-white facsimile (see [t.4], [t.6]), the ISO/IEC Specifications for Digital Compression and Coding of Continuous-Tone Still Images (see [jpeg]), and Lossy/Lossless Coding of Bi-Level Images (see [jbig2]), and the general purpose Flate compression methods (see [rfc1950] and [rfc1951]).

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110 connectivity vendors, and print management application developers. The group is chartered to
111 make printers and the applications and operating systems supporting them work together better.
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113 Program of the IEEE ISTO." In order to meet this objective, the PWG will document the results of
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119 operational experience, and enjoys significant public support.

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133 participate in any discussions of clarifications or review of registration proposals for additional
134 names. Requests for additional media names, for inclusion in this specification, should be sent to
135 the IFX Mailing list for consideration.

136

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214 1 Introduction

215 In summary, PDF/Is is a raster image data format intended for use by, but not limited to, the
216 IPPFAX protocol. IPPFAX is used to provide a synchronous, reliable exchange of image
217 Documents between Senders and Receivers. PDF/Is makes reference to the PDF 1.4
218 specification [pdf], which describes the PDF (Portable Document Format) representation of image
219 data specified by the ITU-T Recommendations for black-and-white facsimile (see [t.4], [t.6]), the
220 ISO/IEC Specifications for Digital Compression and Coding of Continuous-Tone Still Images (see
221 [jpeg]), and Lossy/Lossless Coding of Bi-Level Images (see [big2]), and the general purpose
222 Flate compression methods (see [rfc1950] and [rfc1951]). As an image-only format, text objects,
223 line art, smooth shades, and the like are prohibited.
224

225 PDF/Is is an image-only, streamable, subset specification of PDF 1.4 [pdf] and, as such, follows
226 all of the specification requirements of PDF.
227

228 As a streamable version of PDF, it is not required that a Consumer of a PDF/Is document be able
229 to randomly access the PDF. The format has been adopted in such a way as to allow a
230 Consumer the ability to read the PDF/Is document from the beginning to end without the
231 necessity to cache more data than is necessary to print the current page, or portion thereof, with
232 some exceptions, as noted.

233 2 Terminology

234 This section defines terminology used throughout this document.

235 2.1 Conformance Terminology

236 Capitalized terms, such as **MUST**, **MUST NOT**, **REQUIRED**, **SHOULD**, **SHOULD NOT**, **MAY**,
237 **NEED NOT**, **OPTIONAL**, and **PROHIBITED**, have special meaning relating to conformance as
238 defined in RFC 2119 [rfc2119] and [rfc2911] section 12.1. If an implementation supports the
239 extension defined in this document, then these terms apply; otherwise, they do not. These terms
240 define conformance to *this document (and [rfc2911]) only*; they do not affect conformance to
241 other documents, unless explicitly stated otherwise. To be more specific:

242 **REQUIRED (REQ)** - an adjective used to indicate that a conforming PDF/Is Producer or
243 Consumer's implementation **MUST** support the indicated operation, object, attribute, or attribute
244 value. See [rfc2911] "Appendix A - Terminology for a definition of "support".

245 **RECOMMENDED (REC)** - an adjective used to indicate that a conforming PDF/Is Producer or
246 Consumer's implementation **SHOULD** support the indicated operation, object, attribute, or
247 attribute value.

248 **OPTIONAL (OPT)** - an adjective used to indicate that a conforming PDF/Is Producer or
249 Consumer's implementation **MAY** support the indicated operation, object, attribute, or attribute
250 value.

251 **PROHIBITED (PROH)** - an adjective used to indicate that a conforming PDF/Is Producer or
252 Consumer's implementation **MUST NOT** support the indicated operation, object, attribute, or
253 attribute value.

254 **IGNORED** – an adjective used to indicate that a conforming PDF/Is Producer or Consumer
255 implementation NEED NOT support the indicated operation, object, attribute, or attribute value;
256 but this feature MAY be added to a future version of this specification.

257 **AS SPECIFIED** – is used to indicate that a conforming PDF/Is Producer or Render
258 implementation MUST, MAY, or MUST NOT support the indicated operation, object, attribute, or
259 attribute value as is defined in the indicated specification.

260 **OR** – a conjunction that specifies a logical ‘or’, implying that a choice of one or more of the
261 choices specified.

262 **XOR** – a conjunction that specifies a logical ‘exclusive or’, implying that a choice of one and only
263 one of the choices specified.

264 2.2 Other Terminology

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

266

267 **Implement** – The specified feature is present in the Document.

268

269 **Support** – A Producer has the capability of Implementing the feature specified, or the Consumer
270 has the capability of understanding and acting on the Implementation.

271

272 **Document** – The PDF/Is-formatted electronic representation of a set of one or more pages that
273 the Sender sends to the Receiver.

274

275 **Consumer** – This is the agent (software, hardware or some combination) that converts the
276 Document into a displayed or printed form.

277 **Producer** – This is the agent (software, hardware or some combination) that creates the
278 Document.

279 **Interpolation** – See ‘Interpolation’ in [pdf] pg. 273.

280 **Forward-Reference** – In indirect object reference (See [pdf] Section 3.2.9) to an object that
281 appears later in the Document.

282 **Cache** – Consumer’s storage, either memory, disk, or the like, to hold Document data as it’s
283 received from the Producer.

284 **Page-Relative Objects** – Objects that are indirectly referenced (See [pdf] Section 3.2.9) by either
285 a ‘Page’ object or through a chain of object references that start with a reference from a ‘Page’
286 object.

287 **Discarded** – An adjective that describes a PDF object. An object is ‘Discarded’ when the
288 Consumer no longer has access to the data within the object in question.

289 **Object Size** – The number of bytes required to represent an object in the Document. The size is
290 calculated by subtracting the offset of the first byte of the line following the “endobj” of the object
291 in question, from the offset of the first byte of the object number (See [pdf] Section 3.2.9).

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292 3 PDF/is Support

293 3.1 Profiles

294 The following sections define the profile names used later in the document. Full specification of
295 each profile will occur later in the specification.

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296 3.1.1 Image Profiles

297 The following table defines the Profile names used to describe various image compression filters
298 and techniques.

299 Table 3-1: Image Profiles

Profile	Image Implementation	Reference
<MASK>	'Masked Images' and/or 'Tiling'	[pdf] Section (4.8.5) and "The Tiling Operator:" Section of this specification.
<JP2K>	JPEG2000 Filter	To be supported in a future version of PDF/is.

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... [1]

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300 ¶ For a Producer to be considered to support the <MASK> Profile, 'Masked Images' OR 'Tiling'
301 MUST be Supported. For a Consumer to be considered to support the <MASK> Profile, 'Masked
302 Images' and 'Tiling' MUST be Supported.
303
304

305 3.1.2 Security Profiles

306 There are several options that MAY be Supported by a Producer or Consumer with regard to
307 security:

308 Table 3-2: Security Profiles

Profile	Security Implementation	Reference
<STD-ENC>	'Standard' Encryption	[pdf] Section 3.5.2
<PPK-ENC>	PPK Encryption	[pdf-ppk] Section 3
<DIG-SIG>	Digital Signature	[pdf-ppk] Section 2.2

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<#>Color Profiles¶
Table 3-3: Color Profiles

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311 3.2 PDF Document Requirements

312 For the table shown below, a Consumer MUST Support all aspects of the object/filter (as
313 defined in the Field Specification, below) for the object/filter to be considered Supported. A
314 Producer NEED NOT Support more aspects of the object/filter than are Required of the
315 object/filter (as defined in the Field Specification) for the object/filter to be considered
316 Supported.
317

Deleted: For the table shown below,
if an Object/Filter is not Implemented
then its associated Profile is not
Implemented.¶

318 Key:

319 **Producer:** Producer Requirement.

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320 Consumer: Consumer Requirement.

321

Table 3-3: PDF Object Requirements

PDF Object/Filter	Producer	Consumer	Reference
'ASCIIHexDecode' Filter	PROH	PROH	[pdf] Section (3.3.1)
'ASCII85Decode' Filter	PROH	PROH	[pdf] Section (3.3.2)
'LZWDecode' Filter	PROH	PROH	[pdf] Section (3.3.3)
'RunLengthDecode' Filter	PROH	PROH	[pdf] Section (3.3.4)
Incremental Updates	PROH	PROH	[pdf] Section (3.4.5)
Functions	PROH	PROH	[pdf] Section (3.9)
Files	PROH	PROH	[pdf] Section (3.10)
Graphics State Parameter Dictionaries	PROH	PROH	[pdf] Section (4.3.4)
Path objects	PROH	PROH	[pdf] Section (4.4)
'DeviceGray' Color Space	PROH	PROH	[pdf] Section (4.5.3)
'DeviceRGB' Color Space	PROH	PROH	[pdf] Section (4.5.3)
'DeviceCMYK' Color Space	PROH	PROH	[pdf] Section (4.5.3)
Pattern Color Space	PROH	PROH	[pdf] Section (4.5.5)
Separation Color Space	PROH	PROH	[pdf] Section (4.5.5)
DeviceN Color Space	PROH	PROH	[pdf] Section (4.5.5)
Pattern Objects	PROH	PROH	[pdf] Section (4.6)
Inline Image Objects	PROH	PROH	[pdf] Section (4.8.6)
Form Xobjects	PROH	PROH	[pdf] Section (4.9)
Postscript Xobjects	PROH	PROH	[pdf] Section (4.10)
Text Objects	PROH	PROH	[pdf] Section (5)
Transparency	PROH	PROH	[pdf] Section (7)
'CCITTFaxDecode' Filter	REQ	REQ	[pdf] Section (3.3.5)
File Header	REQ	REQ	[pdf] Section (3.4.1)
Cross-Reference Table	REQ	REQ	[pdf] Section (3.4.3)
File Trailer	REQ	REQ	[pdf] Section (3.4.4)
Document Catalog	REQ	REQ	[pdf] Section (3.6.1)
Page Tree Nodes	REQ	REQ	[pdf] Section (3.6.2)
Page Objects	REQ	REQ	[pdf] Section (3.6.2)
Content Streams	REQ	REQ	[pdf] Section (3.7.1)
Resource Dictionaries	REQ	REQ	[pdf] Section (3.7.2)
Image XObjects	REQ	REQ	[pdf] Section (4.8)
'FlateDecode' Filter	OPT	REQ	[pdf] Section (3.3.3)
'JBIG2Decode' Filter	OPT	REQ	[pdf] Section (3.3.6)
'DCTDecode' Filter	OPT	REQ	[pdf] Section (3.3.7)
Encryption Dictionary 'Standard' Encryption (Security Profile <STD-ENC>)	OPT	OPT	[pdf] Section (3.5)
Encryption Dictionary PPK Encryption (Security Profile <PPK-ENC>)	OPT	OPT	[pdf-ppk] Section (3)
'DeviceGray' Color Space	PROH	PROH	[pdf] pg. 182. See "ICCBased Color Space" section of this specification.
'DeviceRGB' Color Space	PROH	PROH	[pdf] pg. 184. See "ICCBased Color Space" section of this specification.
'Lab' Color Space	PROH	PROH	[pdf] pg. 187
'ICCBased' Color Space	REQ	REC	[pdf] pg. 189

Deleted: Profile: If the indicated 'PDF Object/Filter' is Implemented then the Document Implements the indicated Profile.¶
Dependencies: In order to Implement the 'PDF Object/Filter' the Profiles indicated in the Dependencies column MUST also be implemented. Note that a comma ',' in this column indicates an 'and'.¶

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Deleted: (Image Profile <G4>)

Deleted: (Image Profile <FLATE>)

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Deleted: (Image Profile <JBIG2>)

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Deleted: (Image Profile <JPEG>)

Deleted: (Color Profile <GRAY>)

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Deleted: (Color Profile <RGB>)

Deleted: OPT

Deleted: REQ

Deleted: (Color Profile <LAB>)

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'Indexed' Color Space	PROH	PROH	[pdf] pg. 199
Masked Images (Image Profile <MASK>)	OPT	OPT	[pdf] Section (4.8.5)
Interactive Form Dictionary and Annotation Field Dictionary and Signature Dictionary (Security Profile <DIG-SIG>)	OPT	OPT	[pdf] Section (8.6.1-3) [pdf-ppk] Section (2)
Cached Objects	REQ	REQ	Section 3.4
Tiling (Image Profile <MASK>)	OPT	OPT	Section 3.3.11.3

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NOTE: JBIG2Decode Filter may be made Optional for the Consumer in a later revision of this specification if it is determined that decoding JBIG2 images is burdened by Intellectual Property.

3.3 PDF Object Requirements

The following sub-sections describe the object field values of the REQUIRED and OPTIONAL PDF objects in PDF/is. The numbers in '()'s refer to section numbers in the PDF Specifications [pdf], unless otherwise noted. 'AS SPECIFIED' refers to the PDF Specification [pdf] unless otherwise noted.

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All 'Required' and 'Optional' fields of a Document object (either specified here or referred to as 'Required' or 'Optional' in [pdf] or [pdf-ppk]) MUST be Supported if the object in question is to be considered 'Supported by the Consumer'. This rule does not apply if the definition of an object specifically states the requirement for the Consumer.

All 'Required' fields of a Document object (either specified here or referred to as 'Required' in [pdf] or [pdf-ppk]) MUST be Supported if the object in question is to be considered 'Supported by the Producer'. All object referred to as 'Optional' are Optional for the Producer. This rule does not apply if the definition of an object specifically states the requirements for the Producer.

3.3.1 'PDF/is' object

A new 'PDF Name Registry' (See [pdf] – Appendix E) object that is REQUIRED for a PDF/is document. The existence of this dictionary object is the one and only way to determine if the PDF in question is a PDF/is. The references in this object to items referred to in the Document Trailer are necessary to satisfy 'Producer Requirement' #6, see Section 4.1.

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Table 3-4: PDF/is Object

Field	Type	Specification
'Type'	Name	MUST have a value of '/Fis PDFis'.
'Fis_Profiles'	Array of Numeric Objects	REQUIRED: An array consisting of [MAJ_VER MIN_VER IMAGES SECURITY MEMORY]
'Encrypt'	Dictionary	MUST have same value as 'Encrypt' field in the 'Document Trailer'. See [pdf] table 3.12 for specification.
'Root'	Dictionary	MUST have same value as 'Root' field in the 'Document Trailer'. See [pdf] Table 3.12 for specification.
'Info'	Dictionary	MUST have same value as 'Info' field in the 'Document Trailer'. See [pdf] Table 3.12 for specification.
'ID'	Array	MUST have same value as 'ID' field in the 'Document Trailer'. See [pdf] Table 3.12 for specification.
'Fis_NextPage'	Dictionary	REQUIRED: An Indirect Object Reference to the first 'Page' object.

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351 See [pdf] Section 3.2.5 for definition of an 'Array Object'. See [pdf] Section 3.2.2 for definition
352 of a 'Numeric Object'.

353 **3.3.1.1 Fis_Profiles Key**

354 **3.3.1.1.1 MAJ_VER:**

355 The 'major' version number of this PDF/is specification to which the Producer conforms to
356 at the time the Document was created. The 'major' version of this specification is
357 currently '0'.

358 **3.3.1.1.2 MIN_VER:**

359 The 'minor' version number of this PDF/is specification to which the Producer conforms to
360 at the time the Document was created. The 'minor' version of this specification is
361 currently '6'.

362 **3.3.1.1.3 IMAGES, SECURITY:**

363 Each value in the array MUST be a 'Numeric Integer Object' (See [pdf] Section 3.2.2) that
364 is the sum of all of the Integer equivalents of the binary 'Bit Positions' for the Profiles that
365 are Implemented in the Document, as indicated under the appropriate section below.
366 The 'Bit Positions' are numbered from 1 (low-order) to 32 (high-order). A '1' in a 'Bit
367 Position' indicates the Profile in indicated. All other Bit Positions for each element MUST
368 be 0.

370 For example, to indicate that the SECURITY Profiles, <STD-ENC> (bit position 1 or the
371 value 1) and <DIG-SIG> (bit position 3 or 100 binary), the value of '5' (101 binary) should
372 be used as the value for the 'SECURITY' field.

374 The Producer of the Document MUST NOT Implement a Profile that is not indicated in
375 this field. The Producer of the Document MAY Implement all Profiles indicated in this
376 field, but is NOT REQUIRED.

377 Rationale: Since this object must be located at the beginning of the Document, it
378 may not be known for certain which Profiles will be Implemented. This field is an
379 advisory indicator to a Consumer as to which features MAY be present in the
380 Document. If all Profiles indicated are not Supported, the Document may still be
381 rendered if a non-Supported Profile is indicated but is not actually Implemented
382 in the Document.

383 **Table 3-5: PDF/is Object 'IMAGES' Element**

Profile	Bit Position
<MASK>	1
<JP2K>	2

384 **Table 3-6: PDF/is Object 'SECURITY' Element**

Profile	Bit Position
<STD-ENC>	1
<PPK-ENC>	2
<DIG-SIG>	3

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Deleted: Note that PDF Numeric Integer Objects in fact are represented in signed twos-complement form.

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Deleted: Profiles they MUST Support in order to be able to render the Document for certain

Deleted: Note that even though a Profile is higher in the Image Profile tree it SHOULD NOT be indicated in this object unless that feature is Implemented in the document. For example, if the document contained 'FLATE' (FlateDecode) images but no 'JPEG' (DCTDecode) images, only Profile 'FLATE' should be indicated.¶¶

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386 3.3.1.1.4 MEMORY:

387 A 'Numeric Object' that is the decimal value of the minimum amount of cache memory
 388 the Consumer will need to cache all objects necessary to render any particular page or
 389 Tile (See "Tiling"). This memory MUST be available for PDF/is data file caching and
 390 MUST not be part of any image processing or page buffer memory.

391 The value specified for 'MEMORY' is in Kilobytes (1,024 bytes) and is in addition to a
 392 base memory requirement of 2 Megabytes (2,097,152 bytes).

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393 The value used should specify the minimum cache memory that is available to either the
 394 Producer or Consumer, i.e. if the Consumer has 3 Megabytes of cache memory and the
 395 Producer has only 2 Megabytes, 2 Megabytes is the value that should be specified.

396 At the end of generation of each Indirect Object (See [pdf] Section 3.2.9), the Producer
 397 MUST ensure that this cache memory limit has not been exceeded. If the limit has been
 398 exceeded, the Producer MUST either reorganize the current page by using "Tiling",
 399 freeing up some "cached" objects, or by using some other process, in order to avoid
 400 breaking the cache buffer limit.

401 Calculation of the current cache buffer size MUST follow the following formula:

- 402 1) The current total Document size (in bytes) that has been created up to the
 403 point at which this calculation is being made.
- 404 2) Minus the 'Object Size' of all released 'Cached' objects (See "Cached
 405 Objects" Section of this specification), up to that point.
- 406 3) Minus the 'Object Size' of all non-cached 'Page-Relative Objects' for previous
 407 pages, not already accounted for by #2.
- 408 4) Minus the 'Object Size' of all non-cached 'Image XObjects' or 'Color Space'
 409 data for any previous 'Tiles' on the current page; if the page is "Tiled".
- 410 5) Minus the 'Object Size' of the last 'Image XObject' in the current 'Tile', if the
 411 page is "Tiled".
- 412 6) Minus the 'Object Size' of the 'Image XObject' for the current page, if the page
 413 is not "Tiled".

Deleted: The value of the memory requirement MUST be agreed upon between the Producer and the Consumer before the Document is generated. This value is usually the minimum of the cache memory available to either the Producer or the Consumer. The usage of this memory is to cache objects as specified in the "Object Lifetime" section of this specification. It should be noted that an 'Image XObjects' data stream typically won't be 'cached' into this memory since these streams can often be rendered into a page buffer as they are received, even if masked.

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414 Rationale: The last two items assume that the Consumer will process image data
 415 as it is received and will not need to cache these objects before rendering.

Deleted: This is true since all image masks and color profile data MUST occur in the Document before the 'Image XObject's that reference them.

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416 3.3.1.1.5 Example

417 An example of the PDF/is object for a Document containing a JCCBased color JPEG image
 418 that's Standard encrypted (Profile <STD-ENC>) and needs a 4 Megabyte cache would look
 419 like this:

```
420         1 0 obj
421         <<
422             /Fis_Profiles [0 6,0,1 2048]
423             /Encrypt 2 0 R
424             /Root 3 0 R
425             /Info 4 0 R
426             /Fis_NextPage 5 0 R
427         >>
428         endobj
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```

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430 **3.3.2 'FlateDecode' Filter**

431 See [pdf] Section 3.3.3, [rfc1950], and [rfc1951].

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432 **Table 3-7: FlateDecode Filter**

Field	Specification
<All Fields>	AS SPECIFIED

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434 **3.3.3 'CCITTFaxDecode' Filter**435 See [pdf] Section 3.3.5, [t.4], and [t.6]. Note that only Group 4 images are Supported by PDF/is,
436 see 'K', below.

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437 **Table 3-8: CCITTFaxDecode Filter**

Field	Specification
'K'	MUST have a value of -1.
'EndOfLine'	AS SPECIFIED
'EncodedByteAlign'	AS SPECIFIED
'Columns'	AS SPECIFIED
'Rows'	AS SPECIFIED
'EndOfBlock'	AS SPECIFIED
'BlackIs1'	AS SPECIFIED
'DamagedRowsBeforeError'	AS SPECIFIED

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439 **3.3.4 'JBIG2Decode' Filter**

440 See [pdf] Section 3.3.6, [jbig2], and [t.89].

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441 **Table 3-9: JBIG2Decode Filter**

Field	Specification
<All Details>	AS SPECIFIED, except as noted below.

442

- 443 • The Producer MUST Implement only **JBIG2 Profile 1** (0x00000101 BASE) OR **Profile 4**
444 (0x00000104 Medium lossy/lossless arithmetic) of [t.89]. Consumers MUST support both
445 **Profile 1 and Profile 4.**
- 446 • All Consumers MUST support at least "Level 2" Memory (See [t.89], Table 1, Item 18).
- 447 • The Producer MUST adhere to the Function and Memory constraints as specified in
448 [t.89].

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450 **3.3.5 'DCTDecode' Filter**451 See <http://partners.adobe.com/asn/developer/acrosdk/docs/filefmtspecs/PDFReference.pdf>[pdf]
452 Section 3.3.7, [ps-jpeg], [ps], and [jpeg]. PDF/is supports both the JPEG Baseline DCT and
453 Extended sequential DCT compressed image formats.

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Table 3-10: DCTDecode Filter

Field	Specification
<All Details>	AS SPECIFIED, except as noted below:

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- Images MUST NOT be encoded using 'Progressive JPEG'.
- Images MUST have either 1 or 3 color components.
- All 3 component images (RGB, or YUV) MUST be 'interleaved'. See [jpeg] Section 4.8.1.
- The Consumer MUST adhere to the Memory requirements specified in Section 11 "RAM Requirements" of [ps-jpeg] for the Consumers Supported image resolution(s).

Deleted: <#>Images MUST NOT have interleaved scans.

3.3.6 File Trailer

See [pdf] Table 3.12.

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Table 3-11: File Trailer

Field	Specification
'Size'	AS SPECIFIED
'Prev'	PROHIBITED
'Root'	AS SPECIFIED
'Encrypt'	AS SPECIFIED
'Info'	REQUIRED.
'ID'	REQUIRED. MUST use a pseudo-random number in place of 'File Size' when generating this value. See [pdf] Section 9.3 for guidelines on how to generate this value. Rationale: Using a random number in place of file size is due to the requirements of using this field in generating the encryption key for the 'standard encryption' algorithm ([pdf] Step 5 of Algorithm 3.2, pg. 78): file size will not be known at the time this field is needed.

Deleted: 'Fis_header' ... [4]

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3.3.7 Encryption Dictionary

See [pdf] Table 3.13 and [pdf-ppk] Table 3.

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Note that if a Document is Standard encrypted (Profile <STD-ENC>), the 'ID' field of the [File Trailer](#) MUST be calculated before the Encryption Dictionary is written. The 'ID' MUST then be cached until the 'File Trailer' is written.

The specification of the Encryption object depends on which type of encryption is Implemented in the Document. See the appropriate table, below.

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Table 3-12: Standard Encryption Dictionary <STD-ENC>

Field	Specification
'Filter'	MUST have a value of 'Standard'.
'V'	MUST have a value of '2'.
'Length'	REQUIRED
'R'	AS SPECIFIED

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Deleted: if <STD-ENC> is Implemented, otherwise AS SPECIFIED.

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'O'	AS SPECIFIED
'U'	AS SPECIFIED
'P'	AS SPECIFIED
'SubFilter'	PROHIBITED
'Recipients'	PROHIBITED

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Table 3-13: PPK Encryption Dictionary <PPK-ENC>

Field	Specification
'Filter'	AS SPECIFIED.
'V'	MUST have a value of '2'.
'Length'	REQUIRED
'R'	AS SPECIFIED
'O'	PROHIBITED
'U'	PROHIBITED
'P'	PROHIBITED
'SubFilter'	MUST be 'adbe.pkcs7.s4'
'Recipients'	AS SPECIFIED

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3.3.8 Document Catalog

See [pdf] Table 3.16.

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It should be noted that Page Attributes MUST NOT be Inherited (See [pdf] pg. 91) due to the nature of the ordering of the objects in this format. Rationale: Since the parent object of a Page object will not appear in the format until after the page, streaming of the data for a page that has an inherited attribute would not be possible.

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Table 3-14: Document Catalog

Field	Specification
'Type'	AS SPECIFIED
'Version'	AS SPECIFIED
'Pages'	AS SPECIFIED
'PageLabels'	IGNORED
'Names'	IGNORED.
'Dests'	IGNORED.
'ViewerPreferences'	IGNORED.
'PageLayout'	IGNORED.
'PageMode'	IGNORED.
'Outlines'	IGNORED.
'Threads'	IGNORED.
'OpenAction'	IGNORED.
'AA'	IGNORED.
'URI'	IGNORED.
'AcroForm'	REQ if <DIG-SIG>, PROH otherwise
'Metadata'	IGNORED.
'StructTreeRoot'	IGNORED.
'MarkInfo'	AS SPECIFIED., See below.

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'Lang'	IGNORED.
'SpiderInfo'	IGNORED.
'OutputIntents'	PROHIBITED.
'Fis_header'	MUST be an indirect object reference to the 'PDF/is object'.

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489 **3.3.9 Page Tree Nodes**

490 See [pdf] Table 3.17.

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Table 3-15: Page Tree Nodes

Field	Specification
'Type'	AS SPECIFIED
'Parent'	AS SPECIFIED
'Kids'	AS SPECIFIED
'Count'	AS SPECIFIED
<All 'Page Object' Fields, see [pdf] Table 3.18>	PROHIBITED

Deleted: 'Tagged PDF' ([pdf] Section 9.7) MAY be used to enter searchable text in a Document. A Producer MAY apply Optical Character Recognition (OCR) on the images of each page in a Document to generate searchable text. Since 'Tagged PDF' information can be used for Document searching and does not affect printed output, its usage is OPTIONAL for the Producer and MAY be IGNORED by a conforming Consumer.

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493 If the Producer of a Document knows that the Document is being generated in reverse order (e.g. the scanner is scanning the last page, first), this fact SHOULD be conveyed by reversing the order of the 'Kids' objects from the order in which they appear in the Document. Rationale: This would allow a Consumer that has random access to the Document (i.e. does not need to stream the data) the ability to display the pages in the proper order.

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3.3.10 Page Objects

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See [pdf] Table 3.18.

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Table 3-16: Page Objects

Field	Specification
'Type'	AS SPECIFIED
'Parent'	AS SPECIFIED
'LastModified'	AS SPECIFIED
'Resources'	MUST NOT be inherited
'MediaBox'	MUST NOT be inherited
'CropBox'	MUST NOT be inherited. If Present, the TrimBox MUST NOT extend beyond the boundaries of the CropBox.
'BleedBox'	AS SPECIFIED. If Present, the TrimBox MUST NOT extend beyond the boundaries of the BleedBox.
'TrimBox'	REQUIRED.
'ArtBox'	PROHIBITED.
'BoxColorInfo'	PROHIBITED.
'Contents'	AS SPECIFIED.
'Rotate'	MUST NOT be inherited
'Group'	PROHIBITED.
'Thumb'	IGNORED.
'B'	IGNORED.
'Dur'	IGNORED.
'Trans'	IGNORED.

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'Annots'	IGNORED.
'AA'	IGNORED.
'Metadata'	IGNORED.
'PeeceInfo'	IGNORED.
'StructParents'	IGNORED.
'ID'	IGNORED.
'PZ'	IGNORED.
'SeparationInfo'	PROHIBITED.
'Fis_NextPage'	REQUIRED: An Indirect Object Reference to the next 'Page' object or a 'Page Tree Node' if this is the last page.

502

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504 The size of the current page can be determined by the value of the 'MediaBox'. The value
505 associated with 'MediaBox' is an array of the coordinates of the page rectangle in default user
506 space units (1/72 of an inch). An 8.5 X 11 inch page, oriented Portrait, would be:

507 /MediaBox [0 0 612 792]

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3.3.11 Content Streams

509 See [pdf] Table 4.1. A conforming Consumer MUST be able to parse the Content Stream
510 operators listed below, but only must be able to act upon the operators that are not listed as
511 IGNORED.

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513 All objects referenced from a Content Stream MUST appear in the Document in the same order
514 they appear in the Content Stream.

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Table 3-17: Content Stream Operators

Operators	Specification	Reference
'q'	AS SPECIFIED	[pdf] Table 4.7
'Q'	AS SPECIFIED	[pdf] Table 4.7
'cm'	MUST be [Sx 0 0 Sy Tx Ty], See Below	[pdf] Table 4.7
'Do'	AS SPECIFIED	[pdf] Table 4.34
'MP'	IGNORED	[pdf] Table 9.8
'DP'	IGNORED except for 'Tiling operator' and 'Cache operator', see below	[pdf] Table 9.8
'BMC'	IGNORED	[pdf] Table 9.8
'BDC'	IGNORED	[pdf] Table 9.8
'EMC'	IGNORED	[pdf] Table 9.8
'BX'	AS SPECIFIED	[pdf] Table 3.20
'EX'	AS SPECIFIED	[pdf] Table 3.20
<All elements between a 'BMC' or	IGNORED	[pdf] Table

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'BDC' and an 'EMC'>		9.8
<All other Operators>	PROHIBITED	

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517 **3.3.11.1 'cm' Operator:**

518 See [pdf] Table 4.7 for definition of 'cm' operator.

519 Given:

520 Wi = Width (X-direction) of the Image in inches.

521 Hi = Height (Y-direction) of the Image in inches.

522 Xi = Horizontal translation, in inches, from the left edge of the page to the left edge of the
523 image.

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524 Yi = Vertical translation, in inches, from the bottom edge of the page to the bottom of the
525 image.

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526 The edges of the page are defined by the Page Object's 'Media Box'.

527

528 The Producer MUST ensure that the following is true:

529 **Sx** = Wi * 72530 **Sy** = Hi * 72531 **Tx** = Xi * 72532 **Ty** = Yi * 72

533

534 **3.3.11.2 'Do' Operator:**

535 See [pdf] Table 4.34 for definition of 'Do' operator.

536 If the <MASK> profile is not Implemented, there MUST only be one image (one 'Do'
537 operator) per page.

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538 **Image Resolution Calculations**

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539 Given:

540 Img = The 'ImageXObject' associated with the 'Do' operator.

541 Cm = The current 'cm' operation in effect for 'Img'.

542 Wp = 'Width' field of 'Img'.

543 Hp = 'Height' field of 'Img'.

544 Sx = 'Sx' value of 'Cm'.

545 Sy = 'Sy' value of 'Cm'.

546

547 The following MAY be assumed by either the Producer or the Consumer:

548 $\sqrt{(Wp * 72 / Sx)}$ = The resolution, in the X-direction, of 'Img', in dots per inch.

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549 $\sqrt{(Hp * 72 / Sy)}$ = The resolution, in the Y-direction, of 'Img', in dots per inch.

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3.3.11.3 'DP' Operators:

See [pdf] Table 9.8 for a definition of the 'DP' Operator.

The only 'Marked Content' flags that are not ignored in a PDF/is Document are the 'Tiling Operator' and the 'Cache operator'.

3.3.11.3.1 'Tiling' Operator:

Tiling facilitates the creation of a complex series of images on a PDF/is page to a Consumer that may be memory constrained and unable to otherwise display the page. If the Producer of the Document is able to determine that the current page's image layering (or "masking") will violate the cache memory constraints of the Consumer; the Consumer MUST break up the current page into non-overlapping regions to be displayed ('Tiling') or free up resources using the 'Cache Operator' (see below). Tiling is specified in the content stream of the page.

Tiles have the following properties:

- All images or masks in the content stream in a particular 'Tile' do not overlay, and are not overlaid by, any images or masks in any other 'Tile'.
- An object that is referenced in the Content Stream of a particular 'Tile' MUST not be used in any other 'Tile' unless that object is 'cached'.

To indicate that a new 'Tile' is beginning, the content stream MUST contain the following operator syntax, exactly as shown:

/Fis_tile <</Fis_tile [X Y]>> DP

Where:

X: A 'Real Numeric Object' (See [pdf] Section 3.2.2) of the maximum X coordinate value that this tile will contain.

Y: A 'Real Numeric Object' of the minimum Y coordinate value that this tile will contain.

And:

All coordinate values are in the user space coordinate system (0,0 is lower left), at 72 units per inch, relative to the Page Objects 'Media Box'.

- Use of this feature implies that the <MASK> Image Profile is Implemented.
- All Tiles in the same "row" MUST have the same Y value.
- All Tiles in the same "column" MUST have the same X value.
- A value of '0' for either X or Y implies that this Tile covers the remainder of this row or column, respectively.
- Tiles may only progress from left to right, top to bottom: the first tile is in the upper left corner (lowest X coordinate, highest Y coordinate), the last tile will be in the lower right corner.
- The last Tile operator (having a value of [0,0]) MUST not be present, as the close of the Content Stream will indicate that the last tile is to be rendered.
- The extent of an image within a particular Tile MUST meet the following requirements:
 - Its left edge MUST have an x-coordinate value greater than or equal to the X value of the Tile to the left of the current Tile, or '0' if this is the first Tile in a row.
 - Its right edge MUST have an x-coordinate less than the X value of the current Tile.
 - Its top edge MUST have a y-coordinate value less than or equal to the Y value of the Tile above the current Tile, or '0' if this is the first Tile in a column.

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o Its bottom edge MUST have a y-coordinate greater than the Y value of the current Tile.

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Deleted: X and Y MUST only have values of '-1', '0', or '1'.

See the following examples to help illustrate this feature.

Deleted: A value of '0' indicates that the entire width of this axis will not be overlapped by images and masks to follow in the content stream. This value would be used if each 'Tile' were a full width 'band' of the page or it was the last tile on a row or column. For example, if a band spanned the width (the X axis) of the page, the 'X' value should be '0'.¶

For the examples, below:

N: [X, Y]

Where 'N' is the order in which the tile appears in the Content Stream.

'X' is the 'X' value of the Tile operator.

'Y' is the 'Y' value of the Tile operator.

¶ A value of '-1' indicates that all remaining images and masks in the content stream have lesser values of this axis. For example, for a band that spanned the top of a page, the 'Y' value would be '-1' (since Y values decrease as you move down the page).¶

Example #1: an 8.5" X 11" page (612x792 units), divided into 9 equal sized Tiles.

1: [204, 528]	2: [408, 528]	3: [0, 528]
4: [204, 264]	5: [408, 264]	6: [0, 264]
7: [204, 0]	8: [408, 0]	9: (No operator)

¶ ... [6]

615
616
617

Example #2: and 11" X 17" page (792x1224 units), divided into 4 "bands".

1: [0, 918]
2: [0, 612]
3: [0, 306]
4: (No operator)

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A 'Tile Operator' MUST only occur between displayed images on a page, and MUST NOT occur at the beginning and/or end of the content stream.

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Deleted: 7: [0, 1]

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To illustrate what a 'Tiled' content stream might look like, here is the content stream for Example #2, above:

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```

stream
q
792 0 0 306 0 1224 cm % region of first 'tile'. 792 units wide, 306 units high,
/lm1 Do % Display image in first band.
/Fis_tile <</Fis_tile [0 918]>> DP % 'Tile Operator'
Q
q
792 0 0 306 0 918 cm
/lm2 Do % Display image in second band.
/Fis_tile <</Fis_tile [0 612]>> DP
Q
q
792 0 0 306 0 612 cm
/lm3 Do % Display image in third band.
/Fis_tile <</Fis_tile [0 306]>> DP
Q
q

```

Deleted: . A 'Tile Operator' ... [12]

Deleted: this feature...: ... [13]

Deleted: A page with two tile ... [14]

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Deleted: % 25 units from top ... [16]

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642 792 0 0 306 0 306 cm
 643 /Im4 Do % Display image in last band.
 644 endstream
 645

646 3.3.11.3.2 'Cache' Operator:

647 The 'Cache Operator' allows the Producer of the Document to specify that certain
 648 'cached' objects (See 'Cached Objects' section in this specification) may be released
 649 from the cache at a certain point in the content stream. See 'Cache Release' section in
 650 this document for use of this operation. This operation would allow a Consumer to
 651 Discard specified objects to free resources for image operations. This operator has the
 652 following syntax:

653 `/Fis_cache <</Fis_cache [OBJECTS]>> DP`
 654

655 3.3.12 Resource Dictionaries

656 See [pdf] Table 3.21.

657

658 The Resource Dictionary MUST reference all Image XObjects and ColorSpaces that are used on
 659 the current page. The position of the image objects, their masks, and color spaces with respect
 660 to each other is defined in the Image XObject section of this specification.

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Table 3-18: Resource Dictionaries

Field	Specification
'ExtGState'	PROHIBITED.
'ColorSpace'	AS SPECIFIED.
'Pattern'	PROHIBITED.
'Shading'	PROHIBITED.
'XObject'	AS SPECIFIED.
'Font'	PROHIBITED.
'ProcSet'	<u>IGNORED.</u>
'Properties'	IGNORED.

Deleted: 'Text' Proc Sets PROHIBITED, all others AS SPECIFIED**Deleted:** <#>Color Spaces¶

See [pdf] Section 4.5.¶

Table 3-19: Color Spaces¶

Field ... [18]

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662

663

664 3.3.13 ICCBased Color Space

665 See [pdf] Table 4.16.

666

Table 3-19: ICCBased Color Space

Field	Specification
'N'	<u>MUST have a value of either '1' or '3'.</u>
'Alternate'	<u>PROHIBITED, Implies '/DeviceGray' if 'N' is '1' or '/DeviceRGB' if 'N' is '3'.</u>
'Range'	AS SPECIFIED.
'Metadata'	AS SPECIFIED.

Deleted: ¶Note that to minimize ICC profile data size, **FlateDecode** Filter compression MAY be used.¶

It should also be noted that a Document with an ICCBased color space can be decoded by a Consumer that does not support ICCBased color spaces. In this case, the Consumer should use the 'Alternate' color space as defined by the Field of the same name.¶

Deleted: 20**Deleted:** MUST be either '1' or '3'.**Deleted:** MUST be either '/DeviceGray', '/DeviceRGB'**Deleted:** , or '/Lab'**Formatted:** Bullets and Numbering**Deleted:** Standard

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668 The following rules MUST be adhered to:

- 669 • All ICC profiles MUST adhere to ICC specification ICC.1:1998-09 [icc] and it's addendum
- 670 ICC.1A:1999-04 [icc-a].
- 671 • The **Device Class** MUST have the Signature of 'scrm'. See [icc] Section 6.1.4, Table 11.

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- The **Color Space** MUST have a Signature of either 'RGB', or 'GRAY'. See [icc] Section 6.1.5, Table 13.
- The **Profile Connection Color Space** MUST have a Signature of 'XYZData'. See [icc] Section 6.1.6, Table 14. Rationale: The **XYZData** Profile Connection Space does not require an **AToB0Tag** which would increase the size and complexity of the profile, dramatically.
- The **Flags** at Bit Positions 0 and 1 MUST both be set to TRUE. See [icc] Section 6.1.8, Table 16.
- **Rendering Intent** MUST be IGNORED by the Consumer in favor of the 'Intent' field in the Image XObject. See [pdf] pg. 192 and [icc] Section 6.1.11, Table 18.
- **N-Component LUT-Based Input Profiles** are PROHIBITED. See [icc] Section 6.3.1.3.
- **FlateDecode** Filter compression MUST NOT be used on the profile data. Rationale: since the profile data must be cached on the target system in uncompressed form, so that it may be accessed during image processing; compression of this data will only affect data transmission. In addition, compression of this data may lead to an incorrect calculation of the cache memory required on the Consuming device.

Consuming devices that do not wish to support ICC color profiles MAY use the 'Alternate' color space as specified in [pdf] Table 4.16. It is strongly recommended that only devices with limited, or no color capability, or limited resolution (hand-held devices and the like) should consider not supporting ICC color profiles. Consuming devices that choose not to support ICC color profiles MUST support '/DeviceGray' and '/DeviceRGB' color spaces (See [pdf] pg. 179) instead and MUST interpret image color values using ICCBased color space's 'Alternate' color space definition.

697 3.3.14 Image XObjects

698 See [pdf] Table 4.35 for description of the following table.
699

Deleted: ¶
<#>Indexed Color Space¶
An Index may be applied to any other supported color space, although it has limited value when applied to 'DeviceGray'. The Producer of a Document that used an Indexed color space MAY apply the **FlateDecode** filter to the color space data to minimize data size.¶

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Table 3-20: Image XObjects

Field	Specification
'Type'	MUST be 'XObject'
'Subtype'	MUST be 'Image'
'Width'	AS SPECIFIED
'Height'	AS SPECIFIED
'ColorSpace'	AS SPECIFIED, and see below.
'BitsPerComponent'	AS SPECIFIED
'Intent'	REQUIRED. The default SHOULD be 'Perceptual'
'ImageMask'	AS SPECIFIED.
'Mask'	AS SPECIFIED, see below.
'SMask'	PROHIBITED.
'Decode'	AS SPECIFIED.
'Interpolate'	MUST be 'true'
'Alternates'	IGNORED
'Name'	IGNORED.
'StructParent'	IGNORED.
'ID'	IGNORED.
'OPI'	PROHIBITED.
'Metadata'	IGNORED.

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- 702 • An 'ImageMask', if indicated in an Image XObject, MUST appear in the Document before
703 the Image XObject that references it. Implementing an 'ImageMask' implies
704 Implementation of the <MASK> Image Profile.
- 705 • The 'ICCBased' color space profile for an Image XObject MUST appear in the Document
706 before the Image XObject that references it.
- 707 • All image data, no matter which image compression method is used, MUST be ordered
708 as specified in Section 4.8.3 and in Figure 4.26 of [pdf], contrary to the 'Note' at the
709 bottom of page 265 of [pdf].

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Deleted: or 'Indexed' c
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Deleted: , the data for the color space
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710 **3.3.15 Masked Images**

711 See [pdf] Section 4.8.5.

712 **Table 3-21: Masked Images**

Field	Specification
<All Fields>	AS SPECIFIED

714 **3.3.16 Interactive Form Dictionary**

715 See [pdf] Table 8.47.

716 **Table 3-22: Interactive Form Dictionary**

Field	Specification
'Fields'	MUST be an <u>Array of one</u> indirect object <u>reference to an</u> Annotation Field Dictionary.
'NeedAppearances'	PROHIBITED
'SigFlags'	MUST be '3'
'CO'	PROHIBITED
'DR'	PROHIBITED
'DA'	PROHIBITED
'Q'	PROHIBITED

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718 **3.3.17 Annotation Field Dictionary**

719 See [pdf] Tables 8.10 & 8.49. This dictionary consists of entries from both a 'Annotation
720 Dictionary (Table 8.10) and a 'Field Dictionary' (Table 8.49).

721 **Table 3-23: Annotation Field Dictionary**

Field	Specification
'Type'	MUST be 'Annot'
'Subtype'	MUST be 'Widget'
'Contents'	IGNORED
'P'	IGNORED
'Rect'	MUST be '[0 0 0 0]'
'NM'	IGNORED
'F'	IGNORED

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'BS'	IGNORED
'Border'	IGNORED
'AP'	IGNORED
'AS'	IGNORED
'C'	IGNORED
'CA'	IGNORED
'T'	IGNORED
'Popup'	IGNORED
'A'	IGNORED
'AA'	IGNORED
'StructParent'	IGNORED
'FT'	MUST be 'Sig'
'Parent'	PROHIBITED.
'Kids'	PROHIBITED.
'T'	AS SPECIFIED.
'TU'	AS SPECIFIED.
'TM'	IGNORED.
'FP'	MUST be '1'.
'V'	MUST be an indirect reference to a 'Signature Dictionary'.
'DV'	IGNORED.
'AA'	IGNORED.

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722
723724 **3.3.18 Signature Dictionary**

725 See [pdf] Table 8.60 and [pdf-ppk] Table 2.

726 The Digital Signature format MUST only be in the 'Raw Format', see [pdf-ppk] Section 2.2.

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Table 3-24: Signature Dictionary

Field	Specification
'Type'	MUST be 'Sig'
'Filter'	AS SPECIFIED.
'SubFilter'	MUST be 'adbe.x509.rsa_sha1'
'Name'	AS SPECIFIED.
'Reason'	AS SPECIFIED.
'Location'	AS SPECIFIED.
'M'	AS SPECIFIED.
'ByteRange'	PROHIBITED (Implies all bytes in the Document with the exclusion of the bytes represented by the value of the 'Cert' field. See [pdf] for this field)
'Contents'	AS SPECIFIED.
'Cert'	AS SPECIFIED.
'R'	AS SPECIFIED.
'V'	AS SPECIFIED.
'ADBE_Build'	AS SPECIFIED.
'ADBE_AuthType'	AS SPECIFIED.
'ADBE_PwdTime'	AS SPECIFIED.

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728

729 **3.3.19 Document Information Dictionary**

730 See [pdf] Table 9.2.

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731

Table 3-25: Document Information Dictionary

Field	Specification
<All Fields>	AS SPECIFIED

732

733 **3.4 Object Lifetime**

734 Some Consumer's may be limited in the amount of storage they may have to cache the
735 Document as it's received from the Producer. This storage limitation may prohibit the Consumer
736 from holding the entire Document before beginning to render the first page. To facilitate this
737 storage constraint, PDF/IS has a mechanism of "object lifetime". This mechanism defines how
738 long an object must be held in storage before it is no longer needed.

739

740 If a Document can be fully maintained in the Consumer's storage, i.e. the Consumer is a PC or
741 some other device with large quantities of storage; the Document's Cross-Reference table
742 should be used to access objects as they are needed. In this case, the Consumer should follow
743 the parsing model as spelled out in the PDF Reference [pdf].

744

745 If a Document cannot be fully maintained within the Consumers storage or if it is uncertain if it will
746 be able to do so, the Document MUST be linearly parsed and the following parsing rules MUST
747 be adhered to:

748

749 1) Documents MUST be parsed in order, from beginning to end.

750 2) All non-IGNORED object data in the Document MUST be maintained in the Consumers
751 cache unless it falls into one of the following categories:

752

753 a. The object was a cached object and has been released from the cache.

754

755 b. The object was a non-cached 'Page-Relative Object' for a previous page.

756

757 c. The object was a non-cached object that was referenced by a previous "Tile".

758

759 d. The object is the last 'ImageXObject' for the current "Tile".

760

761 e. The object is an 'ImageXObject' for the current page, and the page is not "Tiled".

762

763 If a 'Page-Relative' object MAY be used on more than one page or in more than one 'Tile', it will
764 be necessary to specify the object as 'Cached'. This will allow an object to be used throughout
765 the Document that otherwise would be discarded. This caching mechanism only applies to
766 'Page-Relative' 'Dictionary Objects'; see [pdf] Section 3.2.6.

767

768 An object that is held in the Consumers cache by the 'Cache Hold' mechanism MUST be
769 maintained in the cache until one of the following conditions is met:

770

771 • The 'Cache Release' mechanism is invoked for this object.

772

773 • The 'Cache Operator' is invoked for this object.

774

775 • The 'Document Catalog' is reached.

776

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Deleted: <#>The first object, the "PDF/IS" object MUST never be Discarded.¶
<#>All non-IGNORED objects that are referenced from other Cached objects MUST not be Discarded.¶
<#>All Cached non-Page-Relative Objects (See Terminology) MUST be not be Discarded until the Document rendering is complete.¶
<#>All 'Page-Relative' Objects MUST NOT be Discarded until the next 'Page' object or the 'Document Catalog' is reached; unless the object is held in the 'Cache Hold' (See next section). This also implies that all rendering of the current page MUST be complete before "reaching" the next 'Page' object or the 'Document Catalog'.¶
<#>If rendering of a "Band" (See Section 3.3.11.3) is complete, objects that are referenced in the 'content stream' of the completed 'band' may be Discarded, if the object is not referenced in the remainder of the 'content stream' and is not 'Cached' (See next section).¶

Deleted: Once an object is cached, it no longer has to abide by 'Object Lifetime' requirements 5 and 6.

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Deleted: DRAFT**Deleted:** Standard**768 3.5.1 Cache Hold**

769 To specify that an object should not be discarded once the current page is rendered, the
 770 Dictionary Object to be 'cached' should have the following array object added:

Deleted: o**Deleted:** 'Dictionary Object' (See [pdf] Section 3.2.6):771 /Fis_Cache **[]****Deleted:** []**772 3.5.2 Cache Release**

773 To release an object from the Consumer's memory; the following array object MUST be placed in
 774 the 'Page Object' of the first page in which the object is no longer needed. For example, if the
 775 object is question was first found on page 1 and was last used on page 3, the 'Cache Release'
 776 should occur in the 'Page Object' for page 4.

Deleted: 'Dictionary Object'

777 /Fis_Cache [OBJECTS]

778 Where:

780 OBJECTS: is an array (contained in '[]'s) of indirect object references to the objects that were
 781 previously cached and are no longer needed. Indication of an object number that was never
 782 cached MUST be ignored.

Deleted: of

783 Example:

784 3 0 obj

785 <<

786 /Fis_Cache **[]** %First object to be cached.**Deleted:** []

787 ...

788 >>

789 endobj

790 ...

791 7 0 obj

%Second object to be cached.

792 <<

793 /Fis_Cache **[]****Deleted:** []

794 ...

795 >>

796 endobj

797 ...

%One or more Page objects in between.

798 45 0 obj

799 <<

800 /Type /Page %Page object

801 /Fis_Cache [3 0 R 7 0 R] %Objects 3 and 7 are no longer needed.

802 ...

803 >>

804 endobj

805

806 4 Conformance Requirements

807 This section specifies the conformance requirements for Consumers and Producers.

808 4.1 Producer conformance requirements

809 In order to conform to this specification, a Document Producer:

810 1. MUST specify the version of PDF (See [pdf] Section 3.4.1) as being 'PDF 1.4'.

811 2. MUST place the 'PDF/is' object as the first object in the PDF.

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- 812 3. MUST place any 'Encryption Dictionary' object as the second object in the PDF/is
813 Document, if the Document is encrypted.
- 814 4. MUST NOT include any private 'PDF Name Registry' values/objects (See [pdf] –
815 Appendix E) that affect printed output.
- 816 5. MUST place the objects: 'Interactive Form Dictionary', 'Field Dictionary' and 'Digital
817 Signature' object as the last three objects (in that order) in the Document, if the
818 Document is Digitally Signed. Note that in a situation where the Consumer cannot cache
819 the entire document before rendering, the detection of a valid or invalid Digital Signature
820 will only occur after rendering of the entire Document.
- 821 6. MUST ensure that there is at least one Forward-Reference to each object. The only
822 object that does not have to follow this rule is the '[PDF/is Object](#)'. Rationale: This will aid
823 the Consumer with knowing which objects will need to be cached and which can be
824 ignored.
- 825 7. MUST ensure that all objects appear in the PDF AFTER the object in which they are first
826 referenced (Satisfied by Requirement 6) and BEFORE the next 'Page Object' unless the
827 object is a Cached Object (See Section 3.4).
- 828 8. MUST ensure that all object identifiers ([pdf] Section 3.2.9) start at the beginning of a line.
- 829 9. MUST ensure that all 'endobj' keywords ([pdf] Section 3.2.9) start at the beginning of a
830 line.
- 831 10. MUST ensure that all 'stream' data ([pdf] Section 3.2.7) does not contain a line beginning
832 with the word "endstream", aside from the required "endstream" that delimits the end of
833 the stream.

834 11. MUST NOT Linearize the Document. See [pdf] Appendix F.

835 12. MUST NOT Incrementally Update the Document. See [pdf] Section 3.4.5.

836 4.2 Consumer conformance requirements

837 In order to conform to this specification, a Document Consumer:

- 838 1. MUST Support all of the REQUIRED PDF/is objects.
- 839 2. MUST Interpolate images up or down in resolution, as required, to properly match the
840 Documents image resolution(s) to the Consumer's device capabilities.
- 841 3. MAY ignore all IGNORED objects that the Producer added to the PDF/is Document.
- 842 4. MUST abide by the "Object Lifetime" rules in Section 3.4 if unable to Cache the entire
843 Document.
- 844 5. MUST terminate processing of the Document if it is detected that the Document has been
845 incrementally updated (See [pdf] Section 3.4.5) as these Documents are PROHIBITED.

Deleted: DRAFT**Deleted:** Standard846 **4.3 File Layout**

847 Given that a Document is fully compliant with this specification, a PDF/is Document will,
848 nominally, take on the following format:

849 **Table 4-1: File Layout**

	Object
A	'PDF/is' object.
B	Encryption Object (if Profile <STD-ENC> XOR <PPK-ENC>)
C	Document Information Dictionary
D	Page object for page 1
E	Resources for page 1
F	Content object for page 1
G	Color Space(s) for page 1
H	Image Mask(s) for page 1
I	Image XObject(s) for page 1
J	[Repeat D – I for all remaining pages, in order]
K	Document Catalog
L	Page Node(s)
M	Interactive Form Dictionary (if Profile <DIG-SIG>)
N	Annotation Field Dictionary (if Profile <SIG-SIG>)
O	Signature Dictionary (if Profile <DIG-SIG>)
P	File Trailer
Q	Cross-Reference Table (See [pdf] Section 3.4.3)

Formatted: Body Text, Bulleted + Level: 1 + Aligned at: 18 pt + Tab after: 36 pt + Indent at: 36 pt**Deleted:** 1) In the interest of blind-interchange, should JBIG2 rendering support be required of all consumers?¶ The only other 'Optional' features in the spec, as it now stands are:¶
A) Standard Encryption.¶
B) PPK Encryption.¶
C) Digital Signaturing.¶
Here are my feelings on each of these:¶

A - May require licensing of RC4 encryption software. Standard encryption requires a target device that can query and take a password as input: this may not be practical for all types of devices. This should remain an option.¶

B - May require licensing of encryption software. PPK encryption requires that the consumer have a public key that the producer can retrieve via IPP. A 'profile' isn't necessary for this feature: if the producer is unable to get the consumer's public key, the producer will not be able to use this feature.¶

C - A Digital Signature may be applied to any document. The consumer doesn't have to validate the signature if they don't wish to, or are not able to do so.¶

¶
2) Should we "hard code" a b (... [19])**Formatted:** Bullets and Numbering**Deleted:** of all**Deleted:** s**Deleted:** All of the samples are different versions of the same document.¶ (... [20])**Deleted:** , single page,**Deleted:** ICCBased color space**Deleted:** Indexed ICCBased color space**Deleted:** . The images use 'FlateDecode' compression on the 'ICCBased' and 'Indexed' Col (... [21])**Field Code Changed****Deleted:** 2**Deleted:** 2: The next sample has been encrypted with 'Standard' encryption. The 'user' passw (... [22])**Formatted:** Bullets and Numbering**Deleted:** Standard

850

851 **5 Issues**

- 852 • None currently.

853 **6 Sample PDF/is PDFs**

854 The 'source' of the sample document in this section can be viewed with any text editor but should
855 only be modified with a binary editor, as the stream data contained therein is not compatible with
856 text editors. Comments on the format of the documents are contained within the documents
857 themselves.

858
859 This sample is an unencrypted, unsigned, one page document. The page contains a
860 'CCITTFaxDecode' masked, 'DCTDecode' color, foreground image with a 'FlateDecode' gray
861 scale, background image.
862 <ftp://pwg.org/pub/pwg/QUALDOCS/SamplePDFFax/base-03.pdf>
863

Field Code Changed**Deleted:** 2**Deleted:** 2: The next sample has been encrypted with 'Standard' encryption. The 'user' passw (... [22])**Formatted:** Bullets and Numbering**Deleted:** Standard864 **7 Normative References**

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928 9 Revision History (to be removed when standard is approved)

Revision	Date	Author	Notes
1	10/9/02	Rick Seeler, Adobe Systems	Initial version
2	10/23/02	Rick Seeler, Adobe Systems	
3	11/19/02	Rick Seeler, Adobe Systems	
4	11/22/02	Rick Seeler, Adobe Systems	
5	12/19/02	Rick Seeler, Adobe Systems	
6	2/19/03	Rick Seeler, Adobe Systems	

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937 11 Acknowledgments

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950 13 Appendix A

951 13.1 Intellectual Property Statement – Adobe Systems Incorporated

952 The following statement is in addition to the Intellectual Property Statement in the PDF Reference (See
953 [pdf] Section 1.4).

954 Patent Clarification Notice Specific to Use of PDF for IPP FAX Protocol

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956 Adobe has a number of patents covering technology that is disclosed in the Portable Document Format
 957 (PDF) Specification, version 1.4 and later, as documented in PDF Reference and associated Technical
 958 Notes (the “PDF Specification”). Adobe desires to promote the use of PDF as the file format for a future,
 959 IPP FAX Protocol to be proposed, recommended, finalized and published by the IEEE Printer Working
 960 Group (the “IPP FAX Standard”).

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963 This Patent Clarification Notice is in addition to the permissions statement set forth in Section 1.4 of the
964 PDF Reference which shall also apply to Adobe’s contribution to the IPP FAX Standard.

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966 Accordingly, Adobe agrees to provide a Royalty Free License to all Essential Claims solely for the purpose
 967 of implementing the IPP FAX Standard. Adobe and the IEEE Printer Working Group will identify and
 968 establish, within the final, published release of the IPP FAX Standard, a process whereby implementers of
 969 the IPP FAX Standard can request and obtain the above license.

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971 No license shall be extended to those implementing only draft versions of the IPP FAX Standard.

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973 A “Royalty Free License” shall mean a license that:

- 975 i) shall be available to all implementers of the IPP FAX Standard worldwide, whether or not
976 members of the IEEE Printer Working Group;
- 977 ii) shall extend to all Essential Claims owned or controlled by Adobe and its Affiliates;
- 978 iii) shall not be conditioned on payment of royalties, fees or other consideration except as
979 described in (iv) and (v) below;
- 980 iv) may be conditioned on a grant of a reciprocal license on identical terms to all Essential
981 Claims owned or controlled by the licensee and its Affiliates; and
- 982 v) may include reasonable, customary terms relating to operation or maintenance of the license

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983 relationship including but not limited to the following: choice of law, dispute resolution, and
984 patent notices.

985
986 “Essential Claims” shall mean all claims in any patent or patent application, in any jurisdiction in the
987 world, that (A) Adobe and/or its Affiliates own and (B) that would be necessarily infringed by
988 implementation of the IPP FAX Standard. A claim is necessarily infringed hereunder only when a licensee
989 can prove that it is not possible to avoid infringing it because there is no non-infringing alternative for
990 implementing the required portions of the IPP FAX Standard. Existence of a non-infringing alternative
991 shall be judged based on the state of the art at the time a licensee implements the IPP FAX Standard.

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992 The following are expressly excluded from and shall not be deemed to constitute Essential Claims:

- 993 1) any claims other than as set forth above even if contained in the same patent as Essential Claims;
- 994 and
- 995 2) claims that would be infringed only by
 - 996 a) portions of an implementation that are not required by the IPP FAX Standard
 - 997 b) enabling technologies that may be necessary to make or use any product or portion thereof
 - 1000 that complies with the IPP FAX Standard but are not themselves expressly set forth in the IPP
 - 1001 FAX Standard; or
 - 1002 c) the implementation of technology developed elsewhere and merely incorporated by reference
 - 1003 into the IPP FAX Standard.

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1004 For purposes of the Essential Claims definition, the “IPP FAX Standard” shall be deemed to include only
1005 architectural and interoperability requirements and shall not include any implementation examples or any
1006 other material that merely illustrates the requirements of the IPP FAX Standard.

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1007 An “Affiliate” of a first entity is a second entity that is controlled (greater than 50%) by, in control of, or
1008 under common control with the first entity.

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<G4>	'CCITTFaxDecode' Filter	[pdf] Section 3.3.5	
<FLATE>	'FlateDecode' Filter	[pdf] Section 3.3.3	
<JBIG2>	'JBIG2Decode' Filter	[pdf] Section 3.3.6	
<MASK>	Masked Images	[pdf] Section 4.8.5	
<JPEG>	'DCTDecode' Filter	[pdf] Section 3.3.7	

Page 10: [2] Deleted		Rick Seeler	1/9/2003 12:51 PM
Profile	Color Space Implementation	Reference	
<GRAY>	'DeviceGray'	[pdf] Page 182	
<RGB>	'DeviceRGB'	[pdf] Page 184	
<LAB>	'Lab'	[pdf] Page 187	
<ICCBased>	'ICCBased'	[pdf] Page 189	
<Indexed>	'Indexed'	[pdf] Page 199	

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<JBIG2>	1		

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'Fis_header'	MUST be an indirect object reference to the 'PDF/is object'.		

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DRAFT

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Standard

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A value of '0' indicates that the entire width of this axis will not be overlapped by images and masks to follow in the content stream. This value would be used if each 'Tile' were a full width 'band' of the page or it was the last tile on a row or column. For example, if a band spanned the width (the X axis) of the page, the 'X' value should be '0'.

A value of '-1' indicates that all remaining images and masks in the content stream have lesser values of this axis. For example, for a band that spanned the top of a page, the 'Y' value would be '-1' (since Y values decrease as you move down the page).

A value of '1' indicates that all remaining images and masks in the content stream have greater value for this axis. For example, for a band that spanned the left edge of a page, the 'X' value would '1' (X axis values increase as you move to the right).

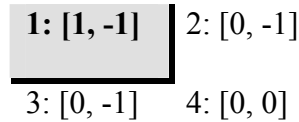
It should be noted that tiles may progress from the top to the bottom, bottom to top, left to right, or right to left as necessary. The order and progression of the Tiles SHOULD be determined by either the capabilities of the Producer or the Consumer. The specification of how this should be done is outside the scope of this specification.

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illuminate		

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. The shaded area is the area that is specified to be non-overlapping by the parameters of the /Fis_tile operator of the tile in Bold . The number before the colon is the order in which the tile appears in the content stream		

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.		

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Example #1, Tile #1 is detailed:		



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2:		

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1		

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0		

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6		

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1		

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0		

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9		

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0		

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. A 'Tile Operator' occurring immediately before any **Do** operators in the content stream MUST be IGNORED. A 'Tile Operator' that occurs after all **Do** operators MUST also be IGNORED.

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this feature

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A page with two tiles, each tile running across the page, might have a content stream that looks like this:

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500

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	% 25 units from top left corner (page is 11" tall, 792 units high).	
Page 22: [17] Deleted	Rick Seeler	2/7/2003 12:11 PM
Page 22: [17] Deleted 0 -1	Rick Seeler	2/7/2003 11:06 AM
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3.3.13 Color Spaces

See [pdf] Section 4.5.

Table 3-19: Color Spaces

Field	Specification
'Lab'	AS SPECIFIED
'DeviceGray'	AS SPECIFIED
'DeviceRGB'	AS SPECIFIED, but see below.
'DeviceCMYK'	PROHIBITED
'CalGray'	PROHIBITED
'CalRGB'	PROHIBITED
'ICCBased'	AS SPECIFIED, but see below.
'Indexed'	AS SPECIFIED, but see below.
'Pattern'	PROHIBITED
'Separation'	PROHIBITED
'DeviceN'	PROHIBITED

3.3.13.1 DeviceRGB Color Space

The Producers who uses 'DeviceRGB' color space, and Consumers that interpret them, SHOULD Implement the color values assuming 'DeviceRGB' to be the 'sRGB' standard IEC 61966-2-1 (1999-10) (See [srgb]).

1) In the interest of blind-interchange, should JBIG2 rendering support be required of all consumers?

The only other 'Optional' features in the spec, as it now stands are:

- A) Standard Encryption.
- B) PPK Encryption.
- C) Digital Signaturing.

Here are my feelings on each of these:

A - May require licensing of RC4 encryption software. Standard encryption requires a target device that can query and take a password as input: this may not be practical for all types of devices. This should remain an option.

B - May require licensing of encryption software. PPK encryption requires that the consumer have a public key that the producer can retrieve via IPP. A 'profile' isn't necessary for this feature: if the producer is unable to get the consumer's public key, the producer will not be able to use this feature.

C - A Digital Signature may be applied to any document. The consumer doesn't have to validate the signature if they don't wish to, or are not able to do so.

2) Should we "hard code" a buffer size for the memory cache value (Section 3.3.1.1.4)?

3) A proposal from Xerox that I'm not sure I can answer right now:

"General comment about DID and Annotation fields, and the possibility of using one or the other as a mechanism for including a "fax transmit header" or sender-uri value, per Sec. 9.5 in IPPFAX 1.0 Protocol Draft. Right now the recommendation is to burn it into the image data, but the DID or Annotation field could be used for this attribute value--consider text to this effect in 3.3.19 or 3.3.17."

All of the samples are different versions of the same document.

1: The first

. The images use 'FlateDecode' compression on the 'ICCBased' and 'Indexed' Color Spaces.

2: The next sample has been encrypted with 'Standard' encryption. The 'user' password is '12345'; the 'owner' password is '54321'. The document has also been Digitally Signed: the document will fail a digital signature check since it has been tampered with. To see the digital signature in Acrobat (or Acrobat Reader), select the 'Signature' tab on the left side of the screen.

<ftp://pwg.org/pub/pwg/QUALDOCS/SamplePDFax/stdEncryptSigned-02.pdf>