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The Printer Working Group
Standard for IPPFAX/1.0 Protocol

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Proposed Standard - Working Draft
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The Printer Working Group Standard for IPPFAX/1.0 Protocol
Proposed Standard - Working Draft 510n.y-P0.13

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35 **Abstract:** This document specifies the IPPFAX/1.0 protocol. The IPPFAX requirements [ifx-req] are
36 derived from the requirements for Internet Fax [RFC2542].
37 In summary, IPPFAX is used to provide a synchronous, reliable exchange of image Documents between
38 clients and servers. The primary use envisaged of this protocol is to provide a synchronous image
39 transmission service for the Internet. Contrast this with the Internet FAX protocol specified in [RFC2305]
40 and [RFC2532] that uses the SMTP mail protocol as a transport.
41 The IPPFAX/1.0 protocol is a specialization of the IPP/1.1 [RFC2911], [RFC2910] protocol supporting a
42 subset of the IPP operations with increased conformance requirements in some cases, some restrictions in
43 other cases, and some additional REQUIRED attributes. The IPPFAX Protocol uses the 'ippfax' URL
44 scheme (instead of the 'ipp' URL scheme) in all its operations. Most of the new attributes defined in this
45 document MAY be supported by IPP Printers as OPTIONAL extensions to IPP as well. In addition,
46 IPPFAX/1.0 REQUIRES the support of the IPP Event Notification mechanism [ipp-ntfy] using the 'ippget'
47 Pull Delivery Method [ipp-get-method].
48 An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least the PDF/is as specified
49 in [ifx-pdfis] which is defined for the 'application/pdf' document format MIME type . A Print System MAY be
50 configured to support both the IPPFAX and IPP protocols concurrently, but each protocol requires separate
51 Printer objects with distinct URLs.
52

53 This document is available electronically at:
54
55   ftp://pwg.org/pub/pwg/QUALDOCS/pwg-ifx-ippfax-P14-030318.pdf, .doc

56 A version showing the changes from the previous version is available at:

57   ftp://pwg.org/pub/pwg/QUALDOCS/pwg-ifx-ippfax-P14-030318-rev.pdf

58 The latest version of this specification is available at:

59   ftp://pwg.org/pub/pwg/QUALDOCS/pwg-ifx-ippfax-latest.pdf, .doc

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Contact information:

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    1) send it to majordomo@pwg.org
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    3) put the following two lines in the message body:
        subscribe ifx
        end

Implementers of this specification are encouraged to join the IFX Mailing List in order to participate in any discussions of clarifications or review of registration proposals for additional names.

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228

Introduction

230 This document specifies the IPPFAX/1.0 protocol. The IPPFAX requirements [ifx-req] are derived from
231 the requirements for Internet Fax [RFC2542].

232 In summary IPPFAX is used to provide a synchronous, reliable exchange of image documents between
233 clients and servers. The primary use envisaged of this protocol is to provide a synchronous image
234 transmission service for the Internet. Contrast this with the Internet FAX protocol specified in [RFC2305]
235 and [RFC2532] that uses the SMTP mail protocol as a transport.

236 IPPFAX is primarily intended as a method of supporting a synchronous, secure, high quality document
237 distribution protocol over the Internet. It therefore discusses paper, pages, scanning and printing, etc.
238 There is, however, no requirement that the input documents comes from actual paper nor is there a
239 requirement that the output of the process be printed paper. The only conformance requirements are those
240 associated with the exchange of data over the network.

241 The IPPFAX/1.0 protocol is a specialization of the IPP/1.1 [RFC2911], [RFC2910] protocol supporting a
242 subset of the IPP operations with increased conformance requirements in some cases, some restrictions in
243 other cases, and some additional REQUIRED attributes. The IPPFAX Protocol uses the 'ippfax' URL
244 scheme (instead of the 'ipp' URL scheme) for all operations. Most of the new attributes defined in this
245 document MAY be supported by IPP Printers as OPTIONAL extensions to IPP as well. Only the attributes
246 defined in this document that start with the "ippfax-" prefix MUST NOT be used in the IPP Protocol (see
247 section 1.3). In addition, IPPFAX/1.0 REQUIRES the support of the IPP Event Notification mechanism
248 [ipp-ntfy] using the 'ippget' Pull Delivery Method [ipp-get-method]. See section 20 for a comparison of
249 IPP and IPPFAX.

250 An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least PDF/is [ifx-pdfis]
251 which is defined for the 'application/pdf' document format MIME type. A Print System MAY be
252 configured to support both the IPPFAX and IPP protocols concurrently for a single output device (or
253 multiple output devices), but each protocol requires separate Printer objects with distinct URLs. Note - It
254 is assumed that the reader is familiar with IPP/1.1 [RFC2911], [RFC2910], [RFC3196], and [ipp-iig-bis].
255 See section 23.

256 An IPPFAX client is called a Sender. The user of the Sender is called the Sending User. The Sending
257 User either (1a) loads the Document into the Sender or (1b) causes the Sender to generate the
258 Document data by means outside the scope of this standard, (2) indicates the Receiver's network
259 location, and (3) starts the exchange.

260 The target market for an IPPFAX receiver is a mid range imagining device that can support the minimum
261 memory requirements that are required by the data format, PDF/is, but the image format is structured in
262 such a way that the Receiver is not required to include a disk or other permanent storage.

1.1 Operations used

For each IPPFAX Job, the Sender sends at least the following operations to the Receiver in the following order:

1. Get-Printer-Attributes - Sender MUST verify that the Printer object is an (IPPFAX) Receiver and MUST determine the Receiver's basic capabilities.

2. Validate-Job - Sender MUST verify that the Receiver can support the Job attributes that the Sender will send in the IPPFAX Job.

3. Print-Job - Sender MUST submit the IPPFAX job with a single document (or MAY send Create-Job & one or more Send-Document operations if the Receiver also supports these operations)

4. Get-Notifications - The Sender MUST support and MUST use this operation to check for successful job completion unless the Sending User wishes otherwise.

1.2 Typical exchange

This section lists a typical exchange of information between a Sender and a Receiver using the four operations listed in section 1.1.

1. The Sending User determines the network location of the Receiver (value of the "printer-uri" operation attribute) – see section 4.1. This document does not specify how the Sending User does this. Possible methods include directory lookup, search engines, business cards, network enumeration protocols such as SLP, etc. See section 22 for the Generic Directory Schema for IPPFAX.

2. The Sending User either (1) loads the Document into the Sender or (2) causes the Sender to generate the Document data by means outside the scope of this document, indicates the Receiver's network location and starts the exchange.

3. The Sender MUST validate whether or not the Receiver is an IPPFAX-capable Printer and SHOULD determine the basic capabilities of the Receiver, including document format – see section 7.1.

4. The Sender decides on the most appropriate data format depending on the Receiver's basic capabilities. The PDF/is data format is described in detail in the "PDF Image-Streamable (PDF/is)" specification [ifx-pdfis].

292   5. The Sender MUST validate whether or not the Receiver will accept all of the attributes of the
293   IPPFAX Job from this Sending User using the Validate-Job operation. See section 7.2. If the
294   Receiver rejects the Validate-Job operation, the Sender can avoid sending the data.

295   6. The Sender either (1) scans the Document and converts it into an acceptable data format or (2)
296   generates or forwards the Document representation in an acceptable data format – see section 6.6.

297   7. As part of the Validation and Job Creation, the following identities are determined and exchanged:
298   Sender, Sending User, Receiver, and Receiving User – see section 8.

299   8. The Sender transmits the Document data to the Receiver – see section 9.

300   9. The Sending User receives a confirmation that the Receiver received the Document data – see
301   section 9.4.

302   10. In addition the Sender MUST support and the Sending User MAY choose to receive an Event
303   Notification that the Document has been successfully Delivered – see sections 9.3 and 9.6

304 If the Sender is unable to initiate or complete the exchange then it is assumed that the Sender will perform
305 some form of retry. The mechanisms used and the user-visible behavior in this case is an implementer's
306 choice and beyond the scope of this document.

307 1.3 Namespace used for attributes

308 Most of the new attributes defined in this document are intended to be used by both the IPP and IPPFAX
309 protocols. As such, these attributes have neither the "ipp-" nor the "ippfax-" prefix in their names. The
310 few attributes that are intended only for use in the IPPFAX protocol start with the "ippfax-" prefix in order
311 to indicate their limited scope of usage. Such attributes (e.g., "ippfax-versions-supported") MUST NOT be
312 supported by the IPP Protocol, i.e., MUST NOT be supported by IPP Printer objects.

313
314 On the other hand, unless explicitly specified otherwise, all existing IPP attributes, including future IPP
315 extensions, apply to the IPPFAX Protocol as well, including attributes which have an "ipp-" prefix. For
316 example, the IPP/1.1 "ipp-attribute-fidelity" operation attribute (see [RFC2911] section 3.2.1.1 and 3.2.1.2)
317 and the IPP/1.1 "ipp-versions-supported" Printer Description attribute (see [RFC2911] section 4.4.14) are
318 also used in the IPPFAX protocol, even though they have the "ipp-" prefix.

319 2 Terminology

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

321 **2.1 Conformance Terminology**

322 Capitalized terms, such as **MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY,**
323 **NEED NOT,** and **OPTIONAL**, have special meaning relating to conformance to this specification. These
324 terms are defined in [RFC2911] section 13.1 on conformance terminology, most of which is taken from
325 RFC 2119 [RFC2119]. In order to help the reader compare and contrast the IPP and IPPFAX protocols,
326 this document uses lower case "must", "may" etc., to reproduce IPP Protocol conformance requirements
327 for IPP clients and IPP Printer objects as stated in other documents. If such reproduction in this document
328 contradicts an IPP document, it is a mistake, and that IPP document prevails.

329 **2.2 Other Terminology**

330 This standard defines a logical model of an IPPFAX interchange. The following terms are introduced and
331 capitalized in order to indicate their specific meaning:

332 **IPP Protocol** The protocol defined in [RFC2911] and [RFC2910] and any IPP Protocol Extension
333 document (see section 18). For the IPP/1.1 Protocol each operation request must use the 'ipp' URL
334 scheme.

335 **IPPFAX Protocol** The protocol defined in this or a future revision document and any future extension
336 document. For the IPPFAX Protocol each operation request MUST use the 'ippfax' URL scheme (see
337 section 4.1 and 16). Unless a specific version number is appended to "IPPFAX", such as "IPPFAX/1.0",
338 the term IPPFAX applies to all versions.

339 **Printer object (or Printer)** A hardware or software entity that accepts protocol operation requests and
340 returns protocol responses. A Printer object MAY be: (1) an IPP Printer object or (2) an IPPFAX Printer
341 object, DEPENDING ON IMPLEMENTATION (see section 3.3), but MUST NOT be both (since they
342 support some different operations and attributes and are really two different kinds of Print Services). A
343 Printer object MAY support multiple URLs with different security, authentication, and/or access control
344 (see [RFC2911] sections 4.4.1, 4.4.2, 4.4.3, and 8). However, each URL for a Printer object MUST
345 support the same operations and attributes with the same values, except as restricted depending on the
346 security, authentication, and/or access control implied by the URL. In other words, each URL for a given
347 Printer object is offering the same Print Service.

348   Note: For brevity, this document uses the term "Receiver" instead of "IPPFAX Printer object".
349   This document uses the term "Printer object" (and "Printer") when the statement is intended to
350   apply to a Printer object that MAY support the IPP Protocol or the IPPFAX protocol (but not both).

351 **Print Service** The print functionality offered by a Printer object. Several different Printer objects MAY
352 offer the same Print Service.

353 **IPP Printer object** A Printer object that supports the IPP Protocol and offers the IPP Print Service (by
354 definition).

355 **Receiver** The Printer object that accepts IPPFAX protocol operations and receives the Document sent by
356 the Sender. A Receiver offers the IPPFAX Print Service (by definition).

357 **Print System** All of the Printer objects on a single managed host network node. A Print System MAY
358 support IPP and IPPFAX protocols concurrently (see section 3.3) for a single output device (or multiple
359 output devices), but each protocol requires separate Printer objects with distinct URLs.

360 **client** A hardware and/or software entity that initiates protocol operation requests and accepts responses.
361 A client MAY be: (1) an IPP client, (2) an IPPFAX client, or (3) both. However, this document uses the
362 term "Sender", instead of "IPPFAX client". This document uses the term "client" when the statement is
363 intended to apply to a client that MAY support the IPP Protocol, the IPPFAX protocol, or both protocols.

364 **IPP client** A client that uses the IPP Protocol to interact with an IPP Printer object.

365 **Sender** A client that uses the IPPFAX Protocol to query a Receiver and transmit a Document to that
366 Receiver.

367 **Document** The electronic representation of a set of one or more pages that the Sender sends to the
368 Receiver.

369 **Sending User** The person interacting with the Sender.

370 **Receiving User** The intended human recipient of the Document being sent by the Sender to the Receiver.

371 **Attribute Coloring** The changing of attributes and/or values returned by a single Printer object in a Get-
372 Printer-Attributes response depending on operation attributes supplied in the request, specifically the
373 "document-format" (see section 5.1 and [RFC2911] section 3.2.5.1)" operation attribute.

374 **Job Creation Operation** The IPP or IPPFAX operations that creates IPP or IPPFAX Jobs, respectively,
375 i.e., the Print-Job, Print-URI, and Create-Job operations (see [RFC2911]).

376 **IPP Job** A job submitted by an IPP client to an IPP Printer object using the IPP Protocol.

377 **IPPFAX Job** A job submitted by a Sender to a Receiver using the IPPFAX Protocol.

378 **PDF/is** The file format defined by [ifx-pdfis].

379 **Delivered** The Receiver has either printed the Document and delivered the last sheet to the output bin or
380 has forwarded the Document to some other system.

381 The terminology defined in [RFC2911], such as **attribute**, **operation**, **request**, **response**, **operation**
382 **attribute**, **Printer Description attribute**, **Job Description attribute, integrity, and privacy** is also used
383 in this document with the same capitalization conventions and semantics.

384 The terminology defined in the IPP "Event Notifications and Subscriptions" specification [ipp-ntfy] and
385 "The 'ippget' Delivery Method for Event Notifications" specification [ipp-get-method], such as **Event**
386 **Notification**, **Event**, **Subscription Object**, **Per-Job Subscription**, **Per-Printer Subscription**, **Push**
387 **Delivery Method**, and **Pull Delivery Method** is also used in this document with the same capitalization
388 conventions and semantics.

389 3 IPPFAX Model

390 This sub-section defines the IPPFAX Model and its relationship to the IPP Protocol and Model.

391 3.1 Printer Object Relationships

392 A Print System MAY support one or more Printer objects on a single network host. RFC 2911 [RFC2911]
393 defines the relationship between Printer objects and output devices to be many to many (see [RFC2911]
394 section 2.1). So one Printer object can represent one or more output devices and an output device can be
395 represented by one or more Printer objects. The same relationships hold for the IPPFAX Protocol so that
396 the relationship between Receivers and output devices is many to many.

397 3.2 A Printer object with multiple URLs

398 For a Printer object that has multiple URLs, the multiple URLs MUST only be aliases for the Printer
399 object, not connections to different Print Services. In other words, the semantics of operations and
400 attributes accessed by the different URLs for a given Printer object MUST differ only in the security,
401 authentication, and/or access control depending on the URL used.

402 The three parallel "printer-uri-supported" (1setOf uri), "uri-authentication-supported" (1setOf type2
403 keyword), and "uri-security-supported" (1setOf type2 keyword) Printer Description attributes (see
404 [RFC2911] sections 4.4.1, 4.4.2, and 4.4.3, respectively) MUST contain the URLs, authentication, and
405 security, respectively, supported by the Printer object. See also the OPTIONAL "printer-xri-supported"
406 (collection) Printer Description attribute [ipp-set-ops], which, if supported, MUST be used to set these
407 three parallel attributes using the protocol.

408 Note: For a Printer object that supports multiple URLs, neither the IPP/1.1 protocol nor the IPPFAX/1.0
409 protocol provides a way for the administrator to Set or Get the values of Printer attributes whose values
410 MAY depend on the URL used and/or MAY depend on the authenticated role of the requesting user. So,

411   for example, there is no way to set the differing values of the "operations-supported" Printer attribute (see
412   section 6.5) that depend on the URL using the IPP or IPPFAX protocol. Providing such means is left for
413   future work as a single specification for use by both IPP and IPPFAX.

414 3.3 A Print System supporting both IPP and IPPFAX protocols

415   From section 3.2, if a Print System supports both IPP and IPPFAX, it MUST do so with separate Printer
416   objects, not with a single Printer object with IPP and IPPFAX URLs. Each such Printer object MUST
417   support either IPP or IPPFAX, but not both. In other words, each URL for a Printer object MUST have the
418   same scheme, namely, 'ipp' or 'ippfax', i.e., MUST NOT have some URLs with the 'ipp' scheme and other
419   URLs with the 'ippfax' scheme. The reason for this requirement for separate Printer objects for IPP and
420   IPPFAX is because a URL and its Printer object is intended to represent a network resource offering a
421   particular type of service, not several different types of services.

422   Note: it is possible to support IPP and IPPFAX Printer objects with a single piece of code in a Print
423   System with conditional branching to handle the differences in conformance requirements between IPP and
424   IPPFAX. For example, such conditional branching could depend on the "printer-uri" operation attribute
425   supplied by the client in each request to the Print System. See section 20 for a comparison of IPP/1.1 and
426   IPPFAX/1.0.

427 4 Common IPPFAX Operation Attribute Semantics

428   This section describes the IPPFAX/1.0 operation attribute semantics that are common to all operations.
429   IPPFAX/1.0 does not define any new operations. Instead, IPPFAX/1.0 semantics are provided using
430   existing IPP operations [RFC2911], [ipp-ntfy], [ipp-get-method], [ipp-set-ops], etc. with increased
431   conformance requirements as specified in this document.

432 4.1 printer-uri (uri) operation attribute ([RFC2911] section 3.1.5)

433   This operation attribute specifies the transfer path to the Receiver for the operation. As in IPP/1.1, the
434   client MUST supply the "printer-uri" operation attribute in every IPPFAX request (see [RFC2911] section
435   3.1.5). For IPPFAX, the attribute value MUST be a URL using the 'ippfax' scheme (see section 16)
436   specifying the Receiver's network location.

437   The following is an example value of the target "printer-uri" operation attribute and "printer-uri-supported"
438   Printer Description attribute:

439   ippfax://www.acme.com/ippfax-printers/printer5

440   As in all URLs, the scheme identifies the protocol. For example, if a client supports both the IPP and
441   IPPFAX protocols, then the URL scheme in the "printer-uri" operation attribute that the client supplies
442   indicates the protocol and determines whether the client intends the Print System to use IPP or IPPFAX
443   semantics. Similarly, if a Print System supports both the IPP and IPPFAX protocols, then the URL scheme
444   in the target "printer-uri" operation attribute that the client supplies MUST determine the protocol, the
445   Printer object, and the semantics that the Print System performs.

446   As in IPP/1.1 [RFC2911] for each operation, the Receiver NEED NOT validate that the "printer-uri"
447   operation attribute is present and that the value supplied by the Sender matches one of the Receiver's
448   "printer-uri-supported" Printer Description attribute (see section 6.1). For URI matching rules see section
449   16.7. If the Receiver does validate the "printer-uri" operation attribute and the URI value supplied does not
450   match any value of the Receiver's "printer-uri-supported" Printer Description attribute, the Receiver
451   MUST reject the request, return the 'client-error-attributes-or-values-not-supported' status code, and return
452   the attribute and value in the Unsupported Attributes Group.

453   **4.2 version-number parameter ([RFC2911] section 3.1.8)**

454   This IPP/1.1 operation parameter ([RFC2911] section 3.1.8) specifies the major and minor version number
455   of the IPP Protocol being used *as part of the IPPFAX Protocol*. As in IPP/1.1, the Sender MUST supply
456   this parameter in every request and the Receiver MUST return this parameter in every response.

457   For IPPFAX version 1.0 as specified in this document, the value of the IPP "version-number" parameter
458   MUST be '1.1' or a higher minor version number. The value is represented as 0x0101 (see [RFC2910])
459   where the major version number comes first (so-called "network byte order").

460   If the Receiver does not support the supplied IPP major version *as part of the IPPFAX protocol*, the
461   Receiver MUST respond as specified in [RFC2911] section 3.1.8 with the 'server-error-version-not-
462   supported' status code. As in IPP/1.1, if the major version number is supported, but the minor version
463   number is not, the Receiver SHOULD accept and attempt to perform the request (or reject the request if the
464   operation is not supported), else the Receiver MUST reject the request and returns the 'server-error-
465   version-not-supported' status code. In all cases as in IPP/1.1, the Receiver MUST return the "version-
466   number" parameter with the value that it supports that is closest to the version number supplied by the
467   client in the "version-number" parameter in the request.

468   **4.3 ippfax-version-number (type2 keyword) operation attribute**

469   The value of this operation attribute indicates the version of the IPPFAX Protocol and encoding that the
470   Sender is requesting and the Receiver is returning. The Sender MUST supply this operation attribute in
471   every request and the Receiver MUST return this operation attribute in every response. This operation
472   attribute MUST be placed in the Operation Attributes Group *immediately* after the operation attributes

473 whose order is specified in IPP/1.1 [RFC2911]. The semantics of the "ippfax-version-number" operation
474 attribute serves the same purpose for the IPPFAX Protocol as the IPP/1.1 "version-number" parameter
475 serves for the IPP Protocol (see [RFC2911] section 3.1.8).

476 If the Sender does not supply this attribute, the Receiver MUST reject the operation, MUST return the
477 'client-error-bad-request' status code, and SHOULD return the 'ippfax-version-number' attribute name
478 keyword in the Unsupported Attributes Group (see section 14.1).

479 For IPPFAX version 1.0 as specified in this document, the value of the "ippfax-version-number" operation
480 attribute MUST be '1.0' keyword value. By including an IPPFAX version number in the client request, it
481 allows the Sender to identify which version of IPPFAX the Sender is requesting to be used, i.e., the version
482 whose conformance requirements the Sender may be depending upon the Receiver to meet.

483 The Receiver MUST indicate the IPPFAX versions supported using the "ippfax-versions-supported"
484 (1setOf type2 keyword) Printer Description attribute (see section 6.3).

485 As in IPP/1.1, if the Receiver does not support the major version number supplied by the Sender, i.e., the
486 major version field of the "ippfax-version-number" operation attribute does not match any of the values of
487 the Printer's "ippfax-versions-supported" (see section 6.3), the Receiver MUST respond with a status code
488 of 'server-error-version-not-supported' along with the closest version number that is supported (see
489 [RFC2911] section 13.1.5.4). If the major version number is supported, but the minor version number is
490 not, the Receiver SHOULD accept and attempt to perform the request (or reject the request if the operation
491 is not supported), else it rejects the request and returns the 'server-error-version-not-supported' status code.
492 In all cases, the Receiver MUST return the "ippfax-version-number" operation attribute in the response
493 with the value that it supports that is closest to the version number supplied by the Sender in the request.

494 There is no version negotiation per se. However, if after receiving a 'server-error-version-not-supported'
495 status code from a Receiver, a Sender SHOULD try again with a different version number. A Sender MAY
496 also determine the versions supported either from a directory (see section 22) or by querying the Printer
497 object's "ipp-versions-supported" (see section 6.2) and "ippfax-versions-supported" attributes (see section
498 6.3) to determine which IPP and IPPFAX versions are supported, respectively, as part of IPPFAX.

499 The Sender MUST send and the Receiver MUST check both the IPP (see section 4.2) and IPPFAX version
500 numbers supplied by the Sender in each request, not just the IPPFAX version number.

501 # 5 Get-Printer-Attributes operation semantics

502 The Receiver MUST support the Get-Printer-Attributes operation as defined in [RFC2911] as extended by
503 the semantics defined in this section.

5.1 document-format (mimeMediaType) operation attribute ([RFC2911] section 3.2.5.1)

This operation attribute identifies the document-format for which the Receiver MUST return the supported values of the requested attributes. The semantics of this Get-Printer-Attributes operation attribute is the same as for IPP ([RFC2911] section 3.2.5), with the following conformance requirement changes:

1. The Sender SHOULD supply the "document-format" operation attribute (IPP client may).

2. The Receiver MUST perform Attribute Coloring for the requested (or defaulted) document format (IPP Printer may).

3. Standard mimeMediaType values are defined in section 6.6.

Standard keyword values are defined in section 1.1.

6 IPPFAX Printer Description Attributes

This section defines the IPPFAX Printer Description attributes and the IPP Printer Description attributes whose semantics are augmented for IPPFAX.

Table 1 lists all the IPPFAX conformance requirements for IPP and IPPFAX Printer Description attributes whose semantics are defined in this document. The Receiver conformance requirements for Attribute Coloring in the Get-Printer-Attributes response that depends on the "document-format" operation attribute value supplied by the client is indicated in the column labeled "Attribute Coloring".

Table 2 lists the other Printer Description attributes defined in IPP/1.1 [RFC2911] or IPP Notifications [ipp-ntfy] that are not in Table 1. The Printer Description attributes in Table 2 have the same conformance requirements as in [RFC2911] and [ipp-ntfy], as shown in Table 2. Any other Printer Description attributes defined in other documents are OPTIONAL for IPPFAX.

See section 9.2 for the Receiver conformance requirements for the "xxx-supported", "xxx-default", and "xxx-ready" Job Template Printer attributes.

526   **Table 1 - Printer Description attributes conformance requirements**

Attribute Name (attribute syntax)	IPP Printer support	Receiver support	Receiver Attribute Coloring	Section
printer-uri-supported (1setOf uri) *	must	MUST	MUST NOT	6.1, 8.4
ipp-versions-supported (1setOf type2 keyword) *	must	MUST**	MUST NOT	6.2
ippfax-versions-supported (1setOf type2 keyword)	MUST NOT	MUST**	MUST NOT	6.3
printer-is-accepting-jobs (boolean) *	must	MUST	MUST NOT	6.4
operations-supported (1setOf type2 enum) *	must	MUST	MUST NOT	6.5
document-format-supported (1setOf mimeMediaType) *	must	MUST	MUST NOT	6.6
pdfis-data-encryption-supported (1setOf type2 keyword)	may	MUST	MUST NOT	6.7

527   * These IPP/1.1 attributes are defined in [RFC2911], but have enhanced semantics defined in this
528   document.
529   ** A Printer object that supports IPPFAX MUST NOT support IPP as well, but MUST support the "ipp-
530   versions-supported" attribute to indicate the version(s) of IPP that are supported *as part of IPPFAX*
531   *operations*. A Print System that supports both IPP and IPPFAX MUST support them as separate
532   Printer objects (see section 3.3).
533   .

534 **Table 2 - Additional Printer Description attributes conformance requirements**

Attribute Name (attribute syntax)	IPP Printer support	Receiver support	Receiver Attribute Coloring	Spec
uri-authentication-supported (1setOf type2 keyword)	must	MUST	MUST NOT	[RFC2911]
uri-security-supported (1setOf type2 keyword)	must	MUST	MUST NOT	[RFC2911]
printer-name (name(127))	must	MUST	MUST NOT	[RFC2911]
printer-location (text(127))	may	MAY	MUST NOT	[RFC2911]
printer-info (text(127))	may	MAY	MUST NOT	[RFC2911]
printer-more-info (uri)	may	MAY	MUST NOT	[RFC2911]
printer-driver-installer (uri)	may	MAY	MAY	[RFC2911]
printer-make-and-model (text(127))	may	MAY	MUST NOT	[RFC2911]
printer-more-info-manufacturer (uri)	may	MAY	MUST NOT	[RFC2911]
printer-state (type1 enum)	must	MUST	MUST NOT	[RFC2911]
printer-state-reasons (1setOf type2 keyword)	must	MUST	MUST NOT	[RFC2911]
printer-state-message (text(MAX))	may	MAY	MUST NOT	[RFC2911]
multiple-document-jobs-supported (boolean)	may	MAY	MUST NOT	[RFC2911]
charset-configured (charset)	must	MUST	MUST NOT	[RFC2911]
charset-supported (1setOf charset)	must	MUST	MUST NOT	[RFC2911]
natural-language-configured (naturalLanguage)	must	MUST	MUST NOT	[RFC2911]
generated-natural-language-supported (1setOf naturalLanguage)	must	MUST	MUST NOT	[RFC2911]
document-format-default (mimeMediaType)	must	MUST	MUST NOT	[RFC2911]
queued-job-count (integer(0:MAX))	must	MUST	MUST NOT	[RFC2911]
printer-message-from-operator (text(127))	may	MAY	MUST NOT	[RFC2911]
color-supported (boolean)	may	MAY	MAY	[RFC2911]
reference-uri-schemes-supported (1setOf uriScheme)	may	MAY	MAY	[RFC2911]
pdl-override-supported (type2 keyword)	must	MUST	MAY	[RFC2911]
printer-up-time (integer(1:MAX))	must	MUST	MUST NOT	[RFC2911]
printer-current-time (dateTime)	may	MAY	MUST NOT	[RFC2911]
multiple-operation-time-out (integer(1:MAX))	may	MAY	MUST NOT	[RFC2911]
compression-supported (1setOf type3 keyword)	must	MUST	MAY	[RFC2911]
job-k-octets-supported (rangeOfInteger(0:MAX))	may	MAY	MAY	[RFC2911]
job-impressions-supported (rangeOfInteger(0:MAX))	may	MAY	MAY	[RFC2911]
job-media-sheets-supported (rangeOfInteger(0:MAX))	may	MAY	MAY	[RFC2911]
pages-per-minute (integer(0:MAX))	may	MAY	MUST NOT	[RFC2911]

pages-per-minute-color (integer(0:MAX))	may	MAY	MUST NOT	[RFC2911]
printer-state-change-time (integer(1:MAX))	may	MAY	MUST NOT	[ipp-ntfy]
printer-state-change-date-time (dateTime)	may	MAY	MUST NOT	[ipp-ntfy]

535

6.1 printer-uri-supported (1setOf uri) ([RFC 2911] section 4.4.1)

537 This attribute contains the set of target URIs that the Receiver supports, i.e., the URI values that a client
538 can supply as values of the "printer-uri" target operation attribute in requests. As in IPP/1.1, the Receiver
539 MUST support this Printer Description attribute (see [RFC2911] section 4.4.1). However, a single Printer
540 object MUST NOT support both 'ipp' and 'ippfax' schemed URIs. Therefore, the schemes MUST all be
541 'ipp' or all 'ippfax'. In order for a Print System to support both IPP and IPPFAX, it MUST use separate
542 Printer objects (see section 3.3).

543 If a Print System supports both the IPP and IPPFAX protocols, it is RECOMMENDED that the Print
544 System support Printer objects whose target URIs differ only in the scheme. Then a client that queries the
545 "printer-uri-supported" attribute of one of the Printer objects with one of these two protocols, can query the
546 same Print System with the other protocol just by changing the scheme to see if the other protocol is
547 supported (as a separate Printer object).

548 The Receiver MUST support the 'ippfax' URL scheme (see section 16) and only the 'ippfax' URL scheme
549 for this attribute (see section 3.3).

6.2 ipp-versions-supported (1setOf type2 keyword) ([RFC2911] section 4.4.14)

551 This attribute identifies the version or versions of the IPP Protocol that this Receiver supports as part of the
552 IPPFAX Protocol (rather than indicating that the Receiver supports the IPP Protocol), including major and
553 minor versions, i.e., the version numbers for which this Receiver meets the conformance requirements.
554 The Receiver MUST support this Printer Description attribute. The Receiver MUST compare the "version-
555 number" parameter (see section 4.2), with the values of this attribute in order to determine whether the
556 Printer supports the IPP version requested by the Sender *as part of the IPPFAX Protocol*.

557 Standard keyword values are (from [RFC2911]:

558 '1.1': The "IPP part" of the IPPFAX operations meets the protocol and encoding conformance
559   requirements of IPP version 1.1 as specified in [RFC2911], [RFC2910], and IPP extensions.
560
561   Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for
562   keywords, by starting with an ASCII digit, instead of an ASCII lower case letter.

6.3 ippfax-versions-supported (1setOf type2 keyword)

This attribute identifies the version or versions of the IPPFAX Protocol that this Receiver supports, including major and minor versions, i.e., the version numbers for which this Receiver meets the conformance requirements. The support of this attribute indicates that this Printer object is a Receiver as opposed to an IPP Printer object. The Receiver MUST support this Printer Description attribute. An IPP Printer object MUST NOT support this attribute, since a Printer object MUST NOT support both IPP and IPPFAX (see section 3.3).

The Receiver MUST compare the "ippfax-version-number" operation attribute (see section 4.3) supplied by the Sender in each request, with the values of this attribute in order to determine whether the Receiver supports the IPPFAX version requested by the Sender.

Since a Printer object MUST NOT support both the IPP and IPPFAX protocols, there is no ambiguity with requiring a Receiver to support both the "ipp-versions-supported" and "ippfax-versions-supported" Printer Description attributes (see sections 6.2 and 6.3). If a Printer object supports the "ipp-versions-supported" attribute, but not the "ippfax-versions-supported" attribute, then by definition that Printer object supports the IPP Protocol. If a Printer object supports the "ippfax-versions-supported" Printer Description attribute, then by definition that Printer object is a Receiver and supports the IPPFAX Protocol and not the IPP Protocol. For such a Printer object, the "ipp-versions-supported" attribute indicates the versions of IPP that it supports *as part of IPPFAX operations*, rather than indicating that it supports the IPP Protocol (by itself).

Standard keyword values are:

'1.0': Meets the conformance requirements of IPPFAX version 1.0 as specified in this document.

> Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for keywords, by starting with an ASCII digit, instead of an ASCII lower case letter. However, for consistency with IPP, these IPPFAX version keyword values are defined compatibly with the IPP version keyword values.

6.4 printer-is-accepting-jobs (boolean) ([RFC 2911] section 4.4.23)

This attribute indicates whether or not the Receiver is currently accepting (IPPFAX) Job Creation requests. As in IPP/1.1, the Receiver MUST support this Printer Description attribute (see [RFC2911] section 4.4.23).

See section 10.4 for a discussion of how the Enable-Printer and Disable-Printer administrative operations, if implemented, affect the value of this attribute.

6.5 operations-supported (1setOf type2 enum) ([RFC 2911] section 4.4.15)

This attribute identifies the set of supported operations for this Receiver and contained Job objects. As in IPP/1.1, the Receiver MUST support this Printer Description attribute (see [RFC2911] section 4.4.15).

The values of this attribute MAY depend on the URL supplied in the "printer-uri" operation attribute and/or MAY depend on the authority of the authenticated requesting user. For example, a Receiver the supports administrative operations MUST NOT support administrative operations for use by end users, but such a Receiver MAY return the administrative operation enums to end users. For example, if an end user queries a Printer that supports the Disable-Printer administrative operation, it MAY either (1) return the Disable-Printer enum or (2) use Attribute Coloring and not return the Disable-Printer enum to the end user. In either case, if an administrator queries the same Printer, it MUST return the Disable-Printer enum.

6.6 document-format-supported (1setOf mimeMediaType) ([RFC 2911] section 4.4.22)

This attribute identifies which document formats the Receiver supports. As in IPP/1.1, the Receiver MUST support this Printer Description attribute (see [RFC2911] section 4.4.22).

Since most document formats don't give the "blind interchange" guarantee of document presentation fidelity for all implementations and configurations, the IPPFAX document formats supported MUST be a subset of the IPP document formats supported.

Both the Sender and Receiver MUST support MUST support application/pdf.

ISSUE: Should be get a new mime type?

6.7 pdfis-data-encryption-supported (1setOf type2 keyword)

This attribute identifies which data encryption methods are supported by the Receiver. A Receiver MUST support this Printer Description attribute.

See [ifx-pdfis] for the definition of each of these methods. The values of this attribute MUST conform to the requirements in [ifx-pdfis].

619 **Table 3 – Data Encryption keywords**

Keyword	Security Profile (See [ifx-pdfis]
"standard"	<STD-ENC>
"ppk-lite"	<PPK-ENC>
"digital-signature"	<DIG-SIG>

620

621

7 Sender Validation of the Receiver's Capabilities

623 This section describes how a Sender MUST first validate the target Printer as a Receiver and determines its
624 basic capabilities (section 7.1) and then validate the IPPFAX Job (section 7.2).

625 A Sender MUST NOT use any feature that is prohibited in the PDF/is [ifx-pdfis] specification.

7.1 Sender Validates the target Printer as a Receiver and determines its basic capabilities

627 The Sender MUST validate that the target Printer is a valid Receiver using the Get-Printer-Attributes
628 operation as indicated in Table 4. The Sender SHOULD determine the Receiver's basic capabilities before
629 generating the document data in order to ensure the best rendering the document as intended by the Sender
630 before submitting an IPPFAX job as indicated in Table 4. The Sender MUST NOT rely solely on the
631 IPPFAX Validate-Job operation followed by the IPPFAX Job Creation operation, since an IPP/1.1 (or
632 IPP/1.0) Printer MAY accept both IPPFAX operations (but not perform IPPFAX semantics).

633 If the Sender requests these attributes using Get-Printer-Attributes and some of them are not returned, then
634 the Sender MUST query the Sending User to inform that person that the Printer does not accept IPPFAX
635 Jobs, so that the Sender has the opportunity to choose to abandon the exchange or to try an IPP URL (see
636 section 6.1) and then query the Sending User if it OK to use the IPP Protocol.

637 The order of presentation in Table 4 is the likely order that a Sender would check the values, though the
638 Sender can request all of the attributes in a single Get-Printer-Attributes operation (and the Receiver MAY
639 return them in any order as specified in [RFC2911]).

640 **Table 4 - Receiver Attributes that the Sender validates with Get-Printer-Attributes**

Attribute	Ref.	Sender action
Operation attributes:		
printer-uri	4.1	Sender MUST validate whether or not the Get-Printer-Attributes operation with a "printer-uri" target URL using the 'ippfax' scheme locates a valid Receiver destination.
Printer Description attributes:		
ippfax-versions-supported	6.3	Sender MUST check whether the Printer supports the IPPFAX Protocol on the target URL by checking whether or not the Printer supports this attribute, i.e., validate that the Printer is a Receiver.
operations-supported	6.5	If the Sender is going to use any operations that are OPTIONAL for a Receiver to support (such as Create-Job, Send-Document), the Sender SHOULD validate that the Receiver supports such operations (though the Printer MUST return an error if the client attempts to use an operation that the Printer doesn't support).
document-format-supported	6.6	Sender SHOULD** check which document formats the Receiver supports.
Job Template Printer attributes:		
media-supported	9.2.1.1	Sender SHOULD** check which media is supported, if the Sender specifies a particular media.
media-ready	9.2.1.1	Sender SHOULD check which media is ready (loaded, i.e., needs no human intervention to use).
printer-resolutions-supported	9.2.2.1	Sender SHOULD** check which resolutions are supported, so that it can use the highest resolution supported by the Receiver.

641 ** SHOULD** indicates that the Sender SHOULD check, but that if the Sender doesn't, then the Validate-
642 Job operation will catch any unsupported attributes or values and reject the operation.

643 **7.2 Validating the Printer's IPPFAX capabilities using the Validate-Job operation**

644 After validating that the Printer is a Receiver (section 7.1), the Sender MUST validate the job attributes
645 using the Validate-Job operation (that doesn't include any Document data) before sending the IPPFAX Job
646 with the same attributes using an IPPFAX Job Creation operation that includes the Document data. The
647 Sender MUST supply all the same operation and Job Template attributes in the Validate-Job request as it
648 will supply in the subsequent Job Creation request (see section 9).

649 The Sender MUST supply the "ipp-attribute-fidelity" operation attribute with a 'true' value (see
650 [RFC2911] section 3.2.1.1 and 15.1) in both the Validate-Job and the Job Creation operations. Then the

651 Receiver will reject the request if any of the Job Template attributes and values are not supported, thereby
652 ensuring that the document is printed as intended. If the Validate-Job is rejected because of the lack of
653 support of one or more Job Template attributes, the Sender MUST query the user in order to proceed
654 without these attributes. If the Validate-Job fails for more serious reasons, such as 'server-error-not-
655 accepting-jobs ([RFC2911] section 13.1.5.7), the Sender MUST inform the Sending User so that person has
656 the opportunity to choose to abandon the exchange or to try an IPP URL (see section 6.1) and then query
657 the Sending User if it is OK to use the IPP Protocol. The main IPPFAX features that MAY be missing in
658 the IPP Protocol are:

659   -   Guaranteed exchange: Since IPP does not mandate any data formats it is possible that the
660   Sender MAY not be able to discover a common data format that both it and the printer support.

661   -   Identity exchange (section 8): IPP need not provide the definitive identity exchange that
662   IPPFAX does. In many cases this is acceptable.

8 Identity exchange

664 This section defines the attributes that the Sender and the Receiver use to identify each to the other and to
665 identify the Sending User and the Receiver User. Table 5 lists these attributes and shows the Sender and
666 Receiver conformance requirements.

667   **Table 5 - Summary of Identify Exchange attributes**

Attribute	Sender supplies	Receiver supports
sending-user-vcard (text(MAX))	MAY *	MUST
receiving-user-vcard (text(MAX))	SHOULD *	MUST
sender-uri (uri)	MUST *	MUST
printer-uri-supported	MUST **	MUST

668   * Sender supplies in a Validate-Job and Job Creation operations.
669   ** Sender supplies in a Get-Printer-Attributes request.

8.1 sending-user-vcard (text(MAX)) operation/Job Description attribute

671 This operation attribute identifies the Sending User in MIME vCard v3.0 [RFC2426, RFC2425] format.
672 The Sender MAY send this operation attribute in an IPPFAX Job Creation operation. The Receiver MUST
673 support this Job Creation and Validate-Job operation attribute according to the vCard v3.0 specification
674 and MUST populate the job's corresponding Job Description attribute. The Receiver MUST support MAX
675 (1023) octets of text. However, the Receiver MAY ignore any image, logo, and sound parts, in which case
676 it MUST still accept the Job Creation request and return the 'successful-ok-ignored-or-substituted-

677 attributes' status code (see [RFC2911] section 13.1.2.2), but NEED NOT return the attribute and its
678 ignored values in the Unsupported Attributes Group.

679 For a sample vCard see section 20. If the Sender supplies the attribute, then the Receiver MUST use its
680 value to populate the Job object's corresponding Job Description attribute of the same name.

681 The Receiver MAY choose to use this information on a job start and end sheet (banner page) for the job.
682 As in IPP/1.1, whether or not the Receiver prints a separate job start sheet depends on the "job-sheets" Job
683 Template attribute, if supported. The Sender can request the Receiver to print a separate start sheet if the
684 Receiver's "job-sheets-supported" Printer attribute (see [RFC2911] section 4.2.3) contains a value other
685 than 'none'. The Sender can suppress the Receiver's separate start sheet if the Receiver's "job-sheets-
686 supported" Printer attribute contains the 'none' value. If the Sender omits the "job-sheets" Job Template
687 attribute, the Receiver's "job-sheets-default" value will be used.

8.2 receiving-user-vcard (text(MAX)) operation/Job Description attribute

689 This operation attribute identifies the intended Receiving User in MIME vCard format[RFC2426,
690 RFC2425]. The Sender SHOULD send this operation attribute in an IPPFAX Job Creation or Validate-Job
691 operation. The Receiver MUST support this Job Creation operation attribute and MUST populate the job's
692 corresponding Job Description attribute. The Receiver MUST support MAX (1023) octets of text.
693 However, the Receiver MAY ignore any image, logo, and sound parts, in which case it MUST still accept
694 the Job Creation request and return the 'successful-ok-ignored-or-substituted-attributes' status code (see
695 [RFC2911] section 13.1.2.2), but NEED NOT return the attribute and its ignored values in the Unsupported
696 Attributes Group.

697 For a sample vCard see section 20. If the Sender supplies the attribute, then the Receiver MUST use its
698 value to populate the Job object's corresponding Job Description attribute of the same name.

699 The Receiver MAY choose to use this information on a job start and end sheet (banner page) for the job.
700 See discussion under section 8.1.

8.3 sender-uri (uri) operation/Job Description attribute

702 This operation attribute identifies the Sender in a similar manner to the way a Sending Station ID is used in
703 a GSTN fax device. The value of this identity is not specified in this document but MUST uniquely
704 identify the Sender device and be traceable to the Sender. The manufacturer of the Sender MUST ensure
705 that the customer configures the Sender with a value for this attribute that is a syntactically valid URI
706 before first attempt to send an IPPFAX Job.

707   The Sender MUST send this operation attribute with the configured value in an IPPFAX Job Creation
708   operation. The Receiver MUST support this Job Creation operation attribute and MUST populate the job's
709   corresponding Job Description attribute.

710   The Receiver MUST use its value to populate the Job object's corresponding Job Description attribute of
711   the same name. This value is only a comment (since it can be spoofed) and is used for logging purposes
712   and has nothing to do with authentication (for which see section 11). This attribute is more akin to an
713   email 'Reply-To' field.

8.4 printer-uri-supported (1setOf uri) Printer Description attribute ([RFC2911] section 4.4.1)

714

715   This IPP/1.1 Printer Description attribute (see [RFC2911] section 4.4.1) identifies the Receiving device, so
716   that no new IPPFAX Printer Description attribute is needed. See section 6.1 for additional IPPFAX
717   semantics for this attribute. The Sender MUST query this attribute using the Get-Printer-Attributes
718   operation as specified in section 7.1 while supplying a target "printer-uri" operation attribute with the
719   'ippfax' scheme.

9 Transmission using the Print-Job or Create-Job/Send-Document operations

720

721   The Sender and Receiver MUST support creating IPPFAX Jobs using the Print-Job operation and MAY
722   support creating IPPFAX Jobs using Create-Job and Send-Document, as well. The Sender and Receiver
723   MUST NOT support print by reference, i.e., MUST NOT support the Print-URI and Send-URI operations,
724   since they do not provide the same security and assurance of accessibility as pushing the document data
725   does.

9.1 IPP/1.1 Validate-Job and Job Creation operation attributes

726

727   Table 6 lists the operation attributes for Validate-Job and Job Creation operations for Senders, IPP/1.1
728   Printers, and Receivers. Differences in Sender conformance from IPP/1.1 clients are indicated with
729   footnotes. Any other IPP operation attributes defined in other documents are OPTIONAL for IPPFAX.

730 **Table 6 - IPP/1.1 Validate-Job and Job Creation operation attributes**

Operation attribute	Section	Sender supplies	IPP/1.1 Printer supports	Receiver supports
Attributes-charset (charset)		MUST	must	MUST
Attributes-natural-language (naturalLanguage)		MUST	must	MUST
printer-uri (uri) *	4.1	MUST	must	MUST
requesting-user-name (name(MAX)) *		SHOULD	must	MUST
job-name (name(MAX))		MAY	must	MUST
ipp-attribute-fidelity (boolean) *	9.1.1	MUST with 'true' value[1]	must	MUST
document-name (name(MAX)) *		MAY	must	MUST
compression (type3 keyword) *		MAY	must	MUST
document-format (mimeMediaType) *	9.1.2	MUST[2]	must	MUST
document-natural-language (naturalLanguage) *		MAY	may	MAY
job-k-octets (integer(0:MAX))		MAY	may	MAY
job-impressions (integer(0:MAX))		MAY	may	MAY
job-media-sheets (integer(0:MAX))		MAY	may	MAY
sending-user-vcard (1setOf text(MAX))	8.1	MAY	may	MUST
receiving-user-vcard (text(MAX))	8.2	SHOULD	may	MUST
sender-uri (name(MAX))	8.3	MUST	may	MUST

731   * As in IPP/1.1, these attributes are NOT Job Description attributes, only Operation attributes for Job
732   Creation and Validate-Job operations.
733

734   **9.1.1 ipp-attribute-fidelity operation attribute ([RFC2911] section 3.2.1.1)**

735   In IPP/1.1, this operation attribute indicates whether or not the client requires the Printer to support all Job
736   Template attributes and values supplied. The Sender MUST supply this operation attribute in the Validate-
737   Job and Job Creation operations and the value MUST be 'true'. A Receiver MUST validate and support
738   this operation attribute. Note: [RFC2911] does not REQUIRE the IPP Client to supply this operation
739   attribute and allows the client to supply the 'false' value.

---

[1] [RFC2911] does not require the client to supply the "ipp-attribute-fidelity" and allows the client to supply either the 'true' or 'false' value.

[2] The [RFC2911] does not require the IPP client to supply the "document-format" operation attribute.

740 If the Sender does not supply this attribute or supplies the 'false' value, the Receiver MUST reject the
741 operation, MUST return the 'client-error-bad-request' status code, and SHOULD return the 'ipp-attribute-
742 fidelity' attribute name keyword in the Unsupported Attributes Group (see section 14.1).

743 **9.1.2 document-format (mimeMediaType) operation attribute ([RFC2911] section 3.2.1.1)**

744 This operation attribute identifies the MIME Media Type of the document that the Sender is sending. The
745 Sender MUST supply this operation attribute in the Validate-Job and Job Creation operations. A Receiver
746 MUST validate and support this operation attribute. Note: [RFC2911] does not REQUIRE the IPP Client
747 to supply this operation attribute.

748 If the Sender does not supply this attribute, the Receiver MUST reject the operation, MUST return the
749 'client-error-bad-request' status code, and SHOULD return the 'document-format' attribute name keyword
750 in the Unsupported Attributes Group (see section 14.1).

751 If the Sender supplies a value that the Receive does not support, i.e., not a value of the Receiver's
752 "document-format-supported" Printer Description attribute, the Receiver MUST reject the operation and
753 return the 'client-error-document-format-not-supported' status code (IPP conformance).

754 Standard mimeMediaType values are defined in section 6.6.

755 **9.2 Job Template Attributes (for Validate-Job and Job Creation operations)**

756 Table 7 lists all of the Job Template attributes defined in other IPP documents for use in Validate-Job and
757 Job Creation operations and shows their conformance for IPPFAX Jobs. As in [RFC2911], the term "Job
758 Template attribute" is actually up to four attributes: the "xxx" Job attribute, and the "xxx-default", "xxx-
759 supported", and possibly the "xxx-ready" Printer attributes. Any other IPP Job Template attributes defined
760 in other documents are OPTIONAL for IPPFAX.

761 As in IPP/1.1, if a Receiver supports the "xxx" Job Template attribute, then it MUST support the
762 corresponding "xxx-default" (if defined) and "xxx-supported" Printer attributes as well, and MAY support
763 the "xxx-ready" attribute (if defined).

764 In Table 7, if the "Sender supply" and "Receiver support" columns contain an explicit single value, the
765 Sender MAY send and the Receiver MAY support the Job Template attribute for an IPPFAX Job, but
766 MUST support only the indicated value. Note: Each such single value has been selected as the value for
767 the attribute that would correspond to the *expected behavior* if the attribute were not supported at all. If
768 these attributes are supplied in an IPPFAX Job with any other value, the Receiver MUST reject the Job
769 Creation operation (since the value isn't supported and "ipp-attribute-fidelity" MUST be 'true'). If the
770 Receiver supports this attribute, the Receiver MUST return only the indicated value in the Get-Printer-

771   Attributes response for the corresponding "xxx-supported", "xxx-default" Printer attributes. Note: These
772   are attributes which might degrade the appearance of the document or provide a significantly non-FAX
773   feature if the non-default value were supplied and supported, such as "number-up" = 2 or "job-priority" =
774   100, respectively.

775   In Table 7, if the "Sender supply" and "Receiver support" columns contain "MUST NOT", the Sender
776   MUST NOT supply and the Receiver MUST NOT support the Job Template attribute for an IPPFAX Job.
777   If these attributes are supplied in an IPPFAX Job, the Receiver MUST reject the Job Creation operation
778   (since the attribute isn't supported and "ipp-attribute-fidelity" MUST be 'true'). When querying the
779   Receiver with the Get-Printer-Attributes operation, the corresponding "xxx-default" and "xxx-supported"
780   MUST NOT be returned. Note: These are attributes which might degrade the appearance of the document
781   or provide a significantly non-FAX feature and do not have an obvious value which corresponds to the
782   behavior when the attribute is not supported at all, such as media-input-tray-check (type3 keyword |
783   name(MAX)) or output-bin (type2 keyword | name(MAX)).

784   In Table 7, the "Receiver Attribute Coloring" column indicates the Receiver conformance requirements for
785   Attribute Coloring in the Get-Printer-Attributes response that depends on the "document-format" operation
786   attribute value supplied by the Sender. The 'n/a' value indicates not applicable, since the attribute either
787   MUST NOT be supported or MUST have only the indicated single value.

788   **Table 7 - IPPFAX Semantics for Job Template Attributes**

Job Template attribute	Sender supply *	Receiver support *	Receiver Attribute Coloring	Reference
copies (integer(1:MAX))	MAY	MAY	MAY	[RFC2911]
cover-back (collection)	MAY	MAY	MAY	[ipp-prod-print]
cover-front (collection)	MAY	MAY	MAY	[ipp-prod-print]
document-overrides (collection)	MAY	MAY	MAY	[ipp-coll]
finishings (1setOf type2 enum)	MAY	MAY	MAY	[RFC2911]
finishings-col (collection)	MAY	MAY	MAY	[ipp-prod-print]
force-front-side (1setOf integer(1:MAX))	MAY	MAY	MAY	[ipp-prod-print]
imposition-template (type2 keyword	name(MAX))	'none'	'none'	n/a	[ipp-prod-print]
insert-sheet (1setOf collection)	'insert-count' = 0	'insert-count' = 0	n/a	[ipp-prod-print]
job-account-id (name(MAX))	MAY	MAY	MAY	[ipp-prod-print]
job-accounting-sheets (collection)	MAY	MAY	MAY	[ipp-prod-print]
job-accounting-user-id (name(MAX))	MAY	MAY	MAY	[ipp-prod-print]
job-error-sheet (collection)	MAY	MAY	MAY	[ipp-prod-print]
job-hold-until (type3 keyword	name(MAX))	'no-hold'	'no-hold'	n/a	[RFC2911]

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Job Template attribute	Sender supply *	Receiver support *	Receiver Attribute Coloring	Reference
job-message-to-operator (text(MAX))	MAY	MAY	MAY	[ipp-prod-print]
job-priority (integer(1:100)	50	50	n/a	[RFC2911]
job-sheet-message (text(MAX))	MAY	MAY	MAY	[ipp-prod-print]
job-sheets (type3 keyword | name(MAX))	MAY	MAY	MAY	[RFC2911]
job-sheets-col (collection)	MAY	MAY	MAY	[ipp-prod-print]
media (type3 keyword | name(MAX))	MUST (see section 9.2.1)	MUST (see section 9.2.1)	MAY	[RFC2911]
media-col (collection)	MAY	MAY	MAY	[ipp-prod-print]
media-input-tray-check (type3 keyword | name(MAX))	MUST NOT	MUST NOT	n/a	[ipp-prod-print]
multiple-document-handling (type2 keyword)	MAY	MAY	MAY	[RFC2911]
number-up (integer(1:MAX)	1	1	n/a	[RFC2911]
orientation-requested (type2 enum)	'portrait'	'portrait'	n/a	[RFC2911]
output-bin (type2 keyword | name(MAX))	MUST NOT	MUST NOT	n/a	[ipp-output-bin]
page-delivery (type2 keyword)	'system-specified'	'system-specified'	n/a	[ipp-prod-print]
page-order-received (type2 keyword)	'1-to-n-order'	'1-to-n-order'	n/a	[ipp-prod-print]
page-overrides (1setOf collection)	MAY	MAY	MAY	[ipp-coll]
page-ranges (1setOf rangeOfInteger(1:MAX))	1:MAX	1:MAX	n/a	[RFC2911]
pages-per-subset (1setOf integer(1:MAX))	MUST NOT	MUST NOT	n/a	[ipp-prod-print]
presentation-direction-number-up (type2 keyword)	'toright-tobottom'	'toright-tobottom'	n/a	[ipp-prod-print]
print-quality (type2 enum)	'high'	'high'	n/a	[RFC2911]
printer-resolution (resolution)	MAY (see section 9.2.2)	MUST (see section 9.2.2)	MUST	[RFC2911]
separator-sheets (collection)	MAY	MAY	MAY	[ipp-prod-print]
sheet-collate (type2 keyword)	'collated'	'collated'	n/a	[RFC 3381]
sides (type2 keyword)	MAY	MAY	MAY	[RFC2911]
x-image-position (type2 keyword)	'none'	'none'	n/a	[ipp-prod-print]
x-image-shift (integer(MIN:MAX))	0	0	n/a	[ipp-prod-print]
x-side1-image-shift (integer(MIN:MAX))	0	0	n/a	[ipp-prod-print]
x-side2-image-shift (integer(MIN:MAX))	0	0	n/a	[ipp-prod-print]
y-image-position (type2 keyword)	'none'	'none'	n/a	[ipp-prod-print]
y-image-shift (integer(MIN:MAX))	0	0	n/a	[ipp-prod-print]

Job Template attribute	Sender supply *	Receiver support *	Receiver Attribute Coloring	Reference
y-side1-image-shift (integer(MIN:MAX))	0	0	n/a	[ipp-prod-print]
y-side2-image-shift (integer(MIN:MAX))	0	0	n/a	[ipp-prod-print]

789 * If a single value is indicated, then a Receiver MAY support the indicated Job Template attribute, but
790 MUST support only the indicated value. Note: Each such single value has been selected as the value for
791 the attribute that would correspond to the *expected behavior* if the attribute were not supported at all.

792 **9.2.1 media (type2 keyword | name(MAX)) Job Template attribute ([RFC2911] section**
793 **4.2.11)**

794 This Job Template attribute ([RFC2911] section 4.2.11) identifies the medium to be used for all sheets of
795 the job. The Sender MUST supply the "media" Job Template attribute in the Validate-Job and Job
796 Creation requests and the Receiver MUST support it, along with the "media-default", "media-ready", and
797 "media-supported" Printer attributes.

798 The keyword values MUST be Media Size Self Describing names defined in the PWG Standardized Name
799 standard [pwg-media].

800 At a minimum, an IPPFax receiver MUST be able to render and print pages of the size A4 and NA Letter.
801 The Receiver MAY scale down at most 10% (PDF/is directives may prohibit this scaling), overflow to
802 another page, or truncate. If the Receiver does truncate then it must notify the Receiving user

803 PDF Crop boxes SHOULD be used when the Sender knows that the imaginable region is less than media
804 size. If the crop box is the union of lesser size of Letter and A4 minus ¼ of inch, then the Sender can be
805 sure that the majority of Receivers can print the complete image without loss of data. However, this does
806 mean that there is the possibly that data may lost.
807

808 Standard keyword values (see [pwg-media]) include:

809 'na_letter_8.5x11in'
810 'iso_a4_210x297mm'

811 **9.2.1.1 media-supported and media-ready Job Template Printer attributes**

812 The Sender MUST query the values of the "media-supported" and "media-ready" attributes ([RFC2911]
813 section 4.2.11), since the Sender MUST supply the "media" Job Template attribute in the Job Creation

814 operation. The "media-ready" attribute indicates which media are currently loaded and will not require
815 human intervention in order to be used.

816 Standard keyword values are defined in section 9.2.1.

9.2.2 printer-resolution (resolution) Job Template attribute ([RFC2911] section 4.2.12)

818 This Job Template attribute ([RFC2911] section 4.2.12) identifies the cross-feed and feed direction
819 resolutions that Printer uses for the Job. The Sender MAY supply the "printer-resolution" Job Template
820 attribute in the Validate-Job and Job Creation requests and the Receiver MUST support it, along with the
821 "printer-resolution-default", and "printer-resolution-supported" Printer attributes.

822 For PDF/is Documents, tf the Sender supplies the "printer-resolution" (resolution) Job Template attribute,
823 the value MUST agree with the resolution of each of the pages of the PDF/is Document. If the supplied
824 value disagrees with the resolution of any of the pages of the PDF/is Document, the Receiver MUST obey
825 the resolution in the PDF/is document, on a page by page basis.

826 Note: The main purpose of requiring the Receiver to support the "printer-resolution" Job Template
827 attribute is so that the Sender can query the corresponding "printer-resolution-supported" (1setOf
828 resolution) Printer attribute to see what resolutions are. See section 9.2.2.1.

9.2.2.1 printer-resolution-supported Job Template Printer attribute

830 If the Sender is using a resolution for PDF/is that is not the REQUIRED minimum resolution for PDF/is,
831 then the Sender SHOULD query the "printer-resolution-supported" Printer attribute. Thus this attribute
832 allows the Sender to determine the resolution(s) supported in addition to the minimum resolution required.

9.3 Subscription Template Attributes Conformance Requirements

834 Table 8 lists the conformance requirements for Subscription attributes on the Job Creation and Validate-Job
835 requests. The attributes in Subscription Objects are shown immediately followed (indented) by their
836 corresponding Default and Supported Printer Attributes.

837 **Table 8 - Subscription Template attributes conformance requirements**

Attribute Name (attribute syntax) Attribute in Subscription Object Default and Supported Printer Attributes	Sender Conformance in Job Creation operations	Receiver Conformance	Reference
notify-recipient-uri (uri)	MAY *	MAY	[ipp-ntfy]
notify-schemes-supported (1setOf uriScheme)	n/a	MAY	[ipp-ntfy]
notify-pull-method (type2 keyword)	MUST **	MUST	section 9.3.1
notify-pull-method-supported (1setOf type2 keyword)	n/a	MUST	[ipp-ntfy]
notify-events (1setOf type2 keyword)	MAY	MUST	section 9.3.2

notify-events-default (1setOf type2 keyword)
  notify-events-supported (1setOf type2 keyword)
  notify-max-events-supported (integer(2:MAX))
	n/a	MUST	[ipp-ntfy]

notify-attributes (1setOf type2 keyword)	MAY	MAY	[ipp-ntfy]
notify-attributes-supported (1setOf type2 keyword)	n/a	MAY	[ipp-ntfy]
notify-user-data (octetString(63))	MAY	MUST	[ipp-ntfy]
notify-charset (charset)	MAY	MUST	[ipp-ntfy]
charset-supported (1setOf charset)	n/a	MUST	[RFC2911]
notify-natural-language (naturalLanguage)	MAY	MUST	[ipp-ntfy]
generated-natural-language-supported (1setOf naturalLanguage)	n/a	MUST	[RFC2911]
notify-lease-duration (integer(0:67108863))	MAY	MUST	[ipp-ntfy]
notify-lease-duration-default (integer(0:67108863)) notify-lease-duration-supported (1setOf (integer(0: 67108863) | rangeOfInteger(0:67108863)))	n/a	MUST	[ipp-ntfy]
notify-time-interval (integer(0:MAX))	MAY	MUST	[ipp-ntfy]

838 * The Sender MUST supply at least the "notify-recipient-uri" attribute for any Push Delivery Method.
839 ** The Sender MUST supply at least the "notify-pull-method" attribute for any Pull Delivery Method, such
840   as the REQUIRED 'ippget' Delivery Method.
841

842 **9.3.1 notify-pull-method (type2 keyword) Subscription Template attribute [ipp-ntfy]**

843 This Subscription Template attribute defined in [ipp-ntfy] indicates the Pull Delivery Method. A Sender
844 MUST supply this attribute with the 'ippget' Delivery Method keyword value [ipp-get-method] in order to
845 determine when the Document has been Delivered so that the Sender can give a positive acknowledgement
846 to the Sending User. A Receiver MUST support the subset of the IPP Notification specification [ipp-ntfy]
847 indicated in this document and the 'ippget' Notification Delivery Method [ipp-get-method].

848 **9.3.2 Notification Event Conformance Requirements**

849 Table 9 lists the conformance requirements for notification events.

850 The Receiver MUST support the 'job-progress' event (which is OPTIONAL in [ipp-ntfy]), as well as all of
851 the REQUIRED events in [ipp-ntfy] ('none', 'printer-state-change', 'printer-stopped', 'job-state-change',
852 'job-created', and 'job-completed'). However, the Receiver MUST NOT support any Printer Events in
853 Per-Job Subscriptions, since that would give an IPPFAX Sender information about the Printer while the
854 Printer was printing other IPPFAX Jobs. If the Sender subscribes to the 'job-progress' event, the Receiver
855 MUST generate an event for every sheet, as moderated by the Printer's "notify-time-interval" attribute
856 [ipp-ntfy], which the Sender can obtain using the Get-Notifications request.

857 For the purposes of IPPFAX, the 'job-completed' event notifications means that the Receiver has delivered
858 the IPPFAX Job somewhere; either actually delivered printed sheets to the output bin or forwarded the job
859 and document to some other system.

860 **Table 9 - Notification Events conformance requirements**

Event	IPP/1.1 Printer Conformance	Sender Conformance for Job Creation support	Sender Use	Receiver Conformance per-Job	Receiver Conformance Per-Printer	Section
none	must	MAY	MAY	MUST	MUST	9.3.2
Job Events:						
job-state-changed	must	MAY	MAY	MAY	MUST	9.3.2
job-created	must	MAY	MAY	MAY	MUST	9.3.2
job-completed	must	MUST	MAY	MUST	MUST	9.3.2
job-stopped	may	MAY	MAY	MAY	MAY	
job-config-changed	may	MUST NOT	MUST NOT	MUST NOT	MUST NOT	
job-progress	may	MAY	MAY	MUST	MAY	9.3.2
Printer Events:						
printer-state-changed	must	MUST NOT	MUST NOT	MUST NOT	MUST	9.3.2
printer-restarted	may	MUST NOT	MUST NOT	MUST NOT	MAY	
printer-shutdown	may	MUST NOT	MUST NOT	MUST NOT	MAY	
printer-stopped	must	MUST NOT	MUST NOT	MUST NOT	MUST	9.3.2
printer-config-changed	may	MUST NOT	MUST NOT	MUST NOT	MAY	
printer-media-changed	may	MUST NOT	MUST NOT	MUST NOT	MAY	
printer-finishings-changed	may	MUST NOT	MUST NOT	MUST NOT	MAY	
printer-queue-order-changed	may	MUST NOT	MUST NOT	MUST NOT	MAY	

861

862 **9.4 Confirmation using the Document Creation response**

863 The Sender knows when the Receiver has successfully received the entire Document when the Receiver
864 returns the 'successful-ok' status code in the Print-Job, or Send-Document. The Sender MUST then inform
865 the Sending User by means outside the scope of this standard that the document has successfully been
866 received. See section 9.3.2 for informing the Sending User when the document has been successfully
867 printed.

868 **9.5 Sender URI Stamping**

869 The Sender MUST place the Sender's URI, i.e., the value of the "sender-uri" attribute (see section 8.3),
870 along with the date and time, in one of the following places, DEPENDING ON IMPLEMENTATION:

871   1. On a cover page automatically generated by the Sender that is sent before the rest of the
872   document.

873   2. Merged with the first page of the document.

874   3. At the top of every page of the sent Document.

875 The Sender MAY include additional data (Sending User, Receiver identity, etc.). As for regular FAX, it is
876 RECOMMENDED that this information be represented as bit map data, so that it is more difficult for it to
877 be modified before it gets to the Receiver.

878 **9.6 Get-Notifications operation to get Event Notifications**

879 The Sender MUST support the Get-Notifications operation with at least the 'job-completed' event (see
880 section 9.3.2). Furthermore, the Sender MUST use the Get-Notifications operations to get at least the 'job-
881 completed' event for any IPPFAX job it submits, unless the Sending User has explicitly indicated
882 otherwise to the Sender (by means outside the scope of this document). The Receiver MUST support the
883 Get-Notifications operation as defined in [ipp-get-method]. See section 9.3.2 for the events that MUST be
884 supported, since the IPPFAX conformance requirements differ from those of [ipp-ntfy].

885 # 10 IPPFAX Implementation of other IPP operations

886 Section 5 defined the semantic requirements for the Get-Printer-Attributes operation, section 7 defined the
887 semantic requirements for Validate-Job, and section 9 defined the semantic requirements for Job Creation
888 operations for IPPFAX. This section defines the IPPFAX semantics and conformance requirements for the
889 other IPP operations.

890 IPPFAX restricts the use of IPP in certain cases in order to make attaching a Receiver to the Internet a safe
891 option – see section 11.

892 The Receiver MUST fully support the Print-Job, Validate-Job, Get-Printer-Attributes and Get-Notifications
893 operations, as defined by this document. The following subsections define restrictions and conformance
894 requirements placed on the Cancel-Job, Get-Job-Attributes, Get-Jobs, Enable-Printer, Disable-Printer, Set-
895 Printer-Attributes, and Get-Printer-Attributes operations. For a conforming IPPFAX Receiver
896 implementation, the support for each of the IPP operations is indicated in Table 10and Table 11.

897 There is no requirement for the Receiver to implement any of the OPTIONAL features of IPP unless
898 explicitly stated elsewhere in this document. If a Receiver implementation supports administrative
899 operations, such as Create-Printer-Subscriptions, Disable-Printer, etc., then it MUST provide a method of
900 restricting available operations for non-authorized clients to the operations specified herein.

901 **10.1 Operation Conformance Requirements**

902 Table 10 lists the conformance requirements for Printer operations for (1) an IPP/1.1 Printer ('ipp' URL),
903 (2) the non-privileged IPPFAX Sender, (3) an IPPFAX Receiver receiving a request from a non-privileged
904 User, and (4) an IPPFAX Receiver receiving a request from an authenticated and authorized operator or
905 administrator, if the Receiver supports operator/administrator authentication and authorization.

906 Table 11 lists the conformance requirements for Job and Subscription operations for (1) an IPP/1.1 Printer
907 ('ipp') URL, (2) the non-privileged IPPFAX Sender which MUST be on the same URL as the job was
908 created (the target "printer-uri" MUST match the Job's "job-printer-uri" Job Description attribute), (3) an
909 IPPFAX Receiver receiving a request from the Job or Subscription Object Owner, (4) from some other
910 non-privileged user, and (5) if the operation is supported at all - from an authenticated and authorized
911 operator or administrator.

912 The Receiver MUST support Subscription Creation for the Job-Creations operations that it supports, but
913 NEED NOT support any other notification operations, such as Create-Job-Subscriptions, Create-Printer-
914 Subscriptions, Get-Subscription-Attributes, Get-Subscription-Attributes, Renew-Subscription, or Cancel-
915 Subscription, even though [ipp-ntfy] requires all but the Create-Job-Subscriptions operation.

916 If a Receiver chooses to allow other IPP notification operations then it SHOULD provide a method of
917 restricting all other notification operations to authenticated administrators.

918   **Table 10 - Conformance for Printer Operations**

Operation Name	IPP/1.1 Printer support	IPPFAX Sender support for a User	IPPFAX Receiver from a User	IPPFAX Receiver from an Operator, if supported	Reference
Print-Job	must	MUST	MUST	MUST	section 9
Print-URI	may	MUST NOT	MUST NOT	MUST NOT	[RFC2911]
Validate-Job	must	MUST	MUST	MUST	section 7.2
Create-Job	may	MAY	MAY	MAY	[RFC2911]
Get-Jobs	must	MAY	MAY*	MAY	section 10.3
Get-Printer-Attributes	must	MUST	MUST	MUST	sections 5, 6
Pause-Printer	may	MUST NOT	MUST NOT	MAY	[RFC2911]
Resume-Printer	may	MUST NOT	MUST NOT	MAY	[RFC2911]
Purge-Jobs	may	MUST NOT	MUST NOT	MUST NOT	[RFC2911]
Set-Printer-Attributes	may	MUST NOT	MUST NOT	MAY	section 10.5
Get-Printer-Supported-Values	may	MUST NOT	MUST NOT	MAY	section 10.5
Create-Printer-Subscription	may	MUST NOT	MUST NOT	MAY	[ipp-ntfy]
Get-Subscriptions	may	MAY	MAY	MAY	[ipp-ntfy]
Get-Print-Support-Files	may	MAY	MAY	MAY	[ipp-install]
Enable-Printer	may	MUST NOT	MUST NOT	MAY	section 10.4
Disable-Printer	may	MUST NOT	MUST NOT	MAY	section 10.4
Pause-Printer-After-Current-Job	may	MUST NOT	MUST NOT	MAY	[RFC3380]
Hold-New-Jobs	may	MUST NOT	MUST NOT	MAY	[RFC3380]
Release-Held-New-Jobs	may	MUST NOT	MUST NOT	MAY	[RFC3380]
Deactivate-Printer	may	MUST NOT	MUST NOT	MAY	[RFC3380]
Activate-Printer	may	MUST NOT	MUST NOT	MAY	[RFC3380]
Restart-Printer	may	MUST NOT	MUST NOT	MAY	[RFC3380]
Shutdown-Printer	may	MUST NOT	MUST NOT	MAY	[RFC3380]
Startup-Printer	may	MUST NOT	MUST NOT	MAY	[RFC3380]
Cancel-Current-Job	may	MUST NOT	MUST NOT	MUST NOT	[RFC3380]
Suspend-Current-Job	may	MUST NOT	MUST NOT	MAY	[RFC3380]

919   Legend:
920   **MAY*** - If supported, Get-Job-Attributes and Get-Jobs MUST restrict certain attributes, such as "job-name", and "job-
921   originating-user-name". See section 10.3.
922   **MAY**** - For Send-Notifications, the Receiver *sends to* a User or Operator (rather than *receives from*).
923

924 **Table 11 - Conformance for Job and Subscription Operations**

Operation Name	IPP/1.1 Printer support	IPPFAX Sender support for a User	IPPFAX Receiver from Owner***	IPPFAX Receiver from Other User	IPPFAX Receiver from Operator, if supported	Reference
Send-Document	may	MAY	MAY	MUST NOT	MUST NOT	[RFC2911]
Send-URI	may	MUST NOT	MUST NOT	MUST NOT	MUST NOT	[RFC2911]
Cancel-Job	must	MUST NOT	MUST NOT	MUST NOT	MUST NOT	section 10.2
Get-Job-Attributes	must	MAY	MAY	MAY*	MAY	section 10.3
Set-Job-Attributes	must	MAY	MUST NOT	MUST NOT	MAY	[ipp-set-ops]
Hold-Job	may	MUST NOT	MUST NOT	MUST NOT	MAY	[RFC2911]
Release-Job	may	MUST NOT	MUST NOT	MUST NOT	MAY	[RFC2911]
Restart-Job	may	MUST NOT	MUST NOT	MUST NOT	MAY**	[RFC2911]
Create-Job-Subscription	may	MAY	MAY	MUST NOT	MAY	[ipp-ntfy]
Get-Subscription-Attributes	may	MAY	MAY	MUST NOT	MAY	[ipp-ntfy]
Get-Subscriptions	may	MAY	MAY	MUST NOT	MAY	[ipp-ntfy]
Renew-Subscription	may	MUST NOT	MUST NOT	MUST NOT	MAY	[ipp-ntfy]
Cancel-Subscription	may	MAY	MAY	MUST NOT	MAY***	[ipp-ntfy]
Get-Notifications	may	MUST	MUST	MUST NOT	MAY	section 9.6
Reprocess-Job	may	MUST NOT	MUST NOT	MUST NOT	MAY**	[RFC3380]
Resume-Job	may	MUST NOT	MUST NOT	MUST NOT	MAY	[RFC3380]
Promote-Job	may	MUST NOT	MUST NOT	MUST NOT	MAY	[RFC3380]
Schedule-Job-After	may	MUST NOT	MUST NOT	MUST NOT	MUST NOT	[RFC3380]

925 Legend:
926 **MAY*** - If supported, Get-Job-Attributes and Get-Jobs MUST restrict certain attributes, such as "job-name", and "job-
927 originating-user-name". See section 10.3.
928 **MAY**** - Restart-Job and Reprocess-Job are for the operator to recover from a problem with the job, not to make
929 additional copies.
930 **MAY***** - Operators MAY cancel their own subscriptions, but MUST NOT cancel subscriptions belonging to others.
931 **Owner** refers to the owner of the Job or Subscription object.

932 **10.2 Cancel-Job operation ([RFC2911] section 3.3.3)**

933 It is inappropriate for a Sender or an operator to Cancel an IPPFAX Job, i.e., to transmit a Document as an
934 IPPFAX Job, receive confirmation of its arrival and then cancel it. Therefore:

935 The Sender MUST NOT attempt to cancel the print job once it has been sent to the Receiver.

936 The Receiver MUST reject Cancel-Job operations whether issued by a user or an administrator targeted at
937 IPPFAX Jobs. The Cancel-Job operation therefore MUST be an unsupported operation for a Receiver and
938 MUST be reflected in the value of the "operations-supported" Printer attribute (see section 6.5). Note:
939 Non-support of the Cancel-Job operation is a change from the IPP behavior where Cancel-Job is required.

940 **10.3 Get-Job-Attributes and Get-Jobs operations ([RFC2911] sections 3.3.4 and 3.2.6)**

941 The public nature of IPPFAX interactions make it inappropriate for a client to be able to query a Receiver
942 for certain information about jobs that it did not send.

943 The Receiver SHOULD restrict the job attributes that any Sender can request for any IPPFAX Job in a Get-
944 Jobs or a Get-Job-Attributes operation to appropriate ones for a public service. For example, a Receiver
945 MAY return only the following Job attributes:

946   job-id, job-uri
947   job-k-octets, job-k-octets-completed
948   job-media-sheets, job-media-sheets-completed,
949   time-at-creation, time-at-processing
950   job-state, job-state-reasons
951   number-of-intervening-jobs
952
953 The exact choice of Job attributes that a client can query for IPPFAX Jobs, including not returning any,
954 DEPENDS ON IMPLEMENTATION and the security policy in force and is outside the scope of this
955 standard (as in IPP/1.1).

956 This attribute set allows a client to determine the load on a Receiver (and perhaps choose an alternative
957 destination or warn the Sending User).

958 See the discussion in [RFC2911] section 8.4 for a description of how a Receiver MUST behave if it
959 receives a request for an attribute outside this set.

960 An IPP administrator MAY read all attributes.

961 **10.4 Enable-Printer and Disable-Printer operations [RFC3380]**

962 The Enable-Printer and Disable-Printer operations [RFC3380] allow a remote operator to change the value
963 of the Receiver's "printer-is-accepting-jobs" (boolean) Printer Description attribute (see section 6.4) to
964 'true' or 'false', respectively. These operations are OPTIONAL for a Receiver to support.

965 These operations affect all jobs that can be submitted to the Printer object. If a Print System supports both
966 IPP and IPPFAX, then it MUST support them with separate Printer objects (see section 3.3). Therefore, a

967   client MUST issue separate operations to each Printer object in order to affect both IPP and IPPFAX jobs
968   on the same Print System, the 'ipp' URL scheme or the 'ippfax' URL scheme in the "printer-uri" target
969   operation attribute for the IPP Printer object or the Receiver (IPPFAX Printer object), respectively.

970   **10.5 Set-Printer-Attributes and Get-Printer-Supported-Values operations [ipp-set-ops]**

971   The Set-Printer-Attributes and Get-Printer-Supported-Values operations [ipp-set-ops] are OPTIONAL
972   administrative operation for IPPFAX, as for IPP. If a Receiver supports these operations, then the
973   "document-format" operation attributes MUST be supported for these operations as well so that the
974   administrator can set values that require Attribute Coloring (by document format). See the description of
975   the Get-Printer-Attributes operation in section 5 which also REQUIRES these operation attributes to be
976   supported.

11 Security considerations

978   IPPFAX presents an interesting challenge of balancing security and openness. Many of the envisaged uses
979   of IPPFAX require confidentiality of the data – at the same time the Receiver typically has no prior
980   knowledge of the Sender or the Sending User. This last point will normally rule out all user-based
981   authentication and access control. This is the reason for the restriction placed on querying and canceling
982   IPPFAX Jobs.

983   **11.1 Privacy**

984   Any exchange between a Sender and a Receiver MUST be carried using the privacy mechanism specified
985   in IPP/1.1 namely TLS [RFC2246]. In some cases this will also result in mutual authentication of the
986   Sender and Receiver (in the case where both sides have certificates).

987   The Receiver MUST have a TLS certificate.

988   The Sender MAY have a certificate. A Receiver MAY decide to reject requests that come from Senders
989   that do not have a certificate and return the 'client-error-not-authenticated' status code.

990   A Sender can either use its own certificate or it can use one associated with the Sending User.

991   Senders and Receivers SHOULD do what current browsers do, namely, be deployed with the public keys
992   of a number of the top Certificate Authorities. If a Sender gets a public key from a Receiver that it doesn't
993   recognize, the Sender MUST query the Sending User to see if the Sending User trusts the Receiver before
994   sending the IPPFAX job to the Receiver.

995 The distribution of private keys to Senders or Receivers is outside the scope of this document, but it is done
996 over the network, it MUST be over a secure channel. See Internet Key Exchange (IKE) [RFC2409].

997 **11.2 uri-authentication-supported (1setOf type2 keyword) ([RFC2911] section 4.4.2)**

998 This attribute (see [RFC2911] section 4.4.2) identifies the Client Authentication mechanism associated
999 with each URI listed in the "printer-uri-supported" attribute (see section 6.1).

1000   **Table 12 - Authentication Requirements**

"uri-authentication-supported" keyword	Sender support and usage	Receiver support and usage
none	MAY support and MAY use	MAY support and MAY use. If the 'none' value is supported by an implementation, then the administrator MUST be able to configure the Printer to not support the 'none' value (by means outsides the scope of this document)
requesting-user-name	MUST NOT	MUST NOT
basic	MAY support and MAY use when the TLS channel is secured with Data Privacy using the cipher suites indicated below* or stronger.	MAY support and MAY use when the TLS channel is secured with Data Privacy using the cipher suites indicated below* or stronger
digest	MUST support and MUST use, including the MD5 and MD5-sess algorithms and Message Integrity, unless using 'certificate' or 'negotiate'	MUST support and MAY use, including the MD5 and MD5-sess algorithms and Message Integrity
certificate	SHOULD support and MAY use when not using any of the above	MUST support and MAY use. For this value, the Receiver MUST validate the certificate for all client requests.

1001 * TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA mandated by [RFC2246].

1002   Table 13 compares the Digest Authentication requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX
1003   Senders, and IPPFAX Receivers.

1004   **Table 13 - Digest Authentication Conformance Requirements**

Feature	IPP/1.1 Client	IPP/1.1 Printer	IPPFAX Sender	IPPFAX Receiver
MD5 and MD5-sess	must support must use	should support should use	MUST support MUST use	MUST support MUST use
The Message Integrity feature	must support may use	should support may use	MUST support MUST use	MUST support MUST use

1005

1006   **11.3 uri-security-supported (1setOf type2 keyword) ([RFC2911] section 4.4.3)**

1007   This attribute (see [RFC2911] section 4.4.3) identifies the security (Integrity and Privacy) mechanisms
1008   used for each URI listed in the "printer-uri-supported" attribute (see section 6.1).

1009   **Table 14 - Security (Integrity and Privacy) Requirements**

uri-security-supported	Sender support and usage	Receiver support and usage
none	MUST NOT	MUST NOT
ssl2	MUST NOT	MUST NOT
ssl3	MUST NOT	MUST NOT
tls	TLS Data Integrity - MUST support and MUST use	MUST support and MUST use
	TLS Data Privacy - MUST support and MAY use. The Sender (device) MUST query the Sending User (human) before omitting Privacy (encryption).	MUST support and MAY use

1010

1011   Table 15 compares the TLS conformance requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX
1012   Senders, and IPPFAX Receivers.

1013   **Table 15 - Transport Layer Security (TLS) Conformance Requirements**

TLS Feature	IPP/1.1 Client	IPP/1.1 Printer	IPPFAX Sender	IPPFAX Receiver
Server Authentication	must support should use	should support may use	MUST use	MUST support
Client Authentication*	may support may use	may support may use	SHOULD support	MUST support MAY use
Data Integrity	may support may use	should support should use	MUST use	MUST support
Data Privacy	may support may use	should support may use	MUST support MAY** use.	MUST support

1014   * The 'certificate' keyword value for the "uri-authentication-supported" attribute [RFC2911].

1015   ** The Sender MUST query the Sending User before omitting the Data Privacy encryption.

1016   Senders and Receivers MUST support the TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite as
1017   mandated by RFC 2246 [RFC2246]. All stronger cipher suites are OPTIONAL; weaker cipher suites
1018   MUST NOT be supported or used by Senders or Receivers.

1019   A Receiver MAY support Basic Authentication (described in HTTP/1.1 [RFC2617]) for Client
1020   Authentication if the TLS channel is secured with Data Privacy. TLS with the above mandated cipher suite
1021   or stronger can provide such a secure channel.

1022   **11.4 Using IPPFAX with TLS**

1023   The Sender MUST use only TLS for all IPPFAX operations on the IPPFAX URL. The client MUST start
1024   the transaction in TLS, rather than using HTTP upgrade requests. The following paragraph of [RFC2818]
1025   further explains:

1026   The agent acting as the HTTP client should also act as the TLS client. It should initiate a
1027   connection to the server on the appropriate port and then send the TLS ClientHello to begin the TLS
1028   handshake. When the TLS handshake has finished. The client may then initiate the first HTTP
1029   request. All HTTP data MUST be sent as TLS "application data". Normal HTTP behavior,
1030   including retained connections should be followed.

1031   Contrast this IPPFAX requirement with the IPP requirement in section 8.2 of [RFC2910]. The following
1032   client actions compare IPP with IPPFAX from a client's point of view:

1033   IPP/1.1 sequence:
1034   1. Start TCP connection
1035   2. Zero or more HTTP/IPP requests
1036   3. HTTP/IPP request with Upgrade to TLS header
1037   4. TLS handshake
1038   5. finish the HTTP/IPP request securely
1039   6. Send more HTTP/IPP requests securely ...
1040
1041   IPPFAX sequence:
1042   1. Start TCP connection
1043   2. Send TLS ClientHello
1044   3. rest of TLS handshake
1045   4. Send HTTP/IPPFAX requests securely ... (which usually will be a Get-Printer-Attributes,
1046   followed by Validate-Job and Print-Job operations).
1047

11.5 Access control

1049   It is expected that the majority of IPPFAX Receivers will operate in a public mode when operating on the
1050   Internet, so that anonymous users can send documents without requiring client authentication
1051   (corresponding to the 'none' value for the "uri-authentication-supported" attribute - see section 11.2).
1052   However a Receiver MAY protect itself using any Client Authentication method specified in [RFC2911]
1053   (digest authentication [RFC2069] for example) to restrict access to any or all of its functionality.

1054   However, the primary intent of IPPFAX is to create a controlled public access mode. It therefore does not
1055   really make much sense to combine IPPFAX and user authentication; they are achieving the same thing.

11.6 Reduced feature set

1057   An administrator or device implementer MAY choose to setup up a Print Service so that it only works as a
1058   IPPFAX Receiver (i.e., offers no 'native' IPP operations and does not accept IPP Jobs). In this mode it
1059   offers a restricted set of features and MAY be more safely connected to the Internet.

1060   A Receiver that is operating in this mode MUST do so by rejecting any non-IPPFAX request and return a
1061   'client-error-attributes-or-values-not-supported' error status code as indicated in section 4.1 for an
1062   unsupported value of the "printer-uri" operation attribute. For job operations attempted on IPPFAX Jobs,
1063   the Receiver MUST return the 'client-error-not-authorized' error status code, unless the Sender is
1064   authenticated as the system administrator and the Receiver supports such access.

12 Gateways to other systems

A common scenario will be where IPPFAX acts as an on-ramp or off-ramp to other Document transmission systems.

12.1 Off-Ramps

In the IPPFAX 'Off-ramp' scenario the user with a Document to send uses an IPPFAX Sender to transmit a Document to an IPPFAX Receiver within a gateway that in turn transmits it to some other destination, i.e. GSTN FAX. Handling Off-ramps is beyond the scope of this document, but may be a future IPPFAX extensions building on the Off-ramp work of the Internet FAX WG.

12.2 On-Ramps

In the IPPFAX On-Ramp scenario the user originally sent the Document using some other mechanism to some intermediate agent. The intermediate agent, acting as an IPPFAX Sender, then uses the IPPFAX Protocol to transmit the Document to an Receiver which MAY be either a final destination or an Off-Ramp. IPPFAX has no specific support for on-ramps.

13 Attribute Syntaxes

No new attribute syntaxes are defined.

14 Status codes

In addition to the semantics of the status codes defined in [RFC2911] and [ipp-get-method], the following additional semantics are defined for [RFC2911] status codes:

14.1 client-error-bad-request (0x0400) [RFC2911 section 13.1.4.1]

The client has failed to supply one or more attributes in a request which are REQUIRED to be supplied. The requirement can be because of the Printer's current configuration or because of some other attributes that the client supplied. The Printer MUST reject the request, MUST return the 'client-error-bad-request' status code, and SHOULD return the keyword attribute name(s) (but not the values) of the missing attribute(s) in the Unsupported Attributes Group in the response.

1089 **14.2 document-format-not-supported (0x040A) [RFC2911 section 13.1.4.11]**

1090 The concept of a document format is extended to include the PDF/is image compression technologies. This
1091 status code is returned if the document format is not supported, including unknown PDF/is image
1092 compression technologies.

1093 # 15 Conformance Requirements

1094 This section summarizes the conformance requirements for Senders and Receivers that are defined
1095 elsewhere in this document.

1096   1. A Sender and Receiver MUST observe the attribute name space conventions specified in section
1097   1.3.

1098   2. The Sender MUST supply and the Receiver MUST support (1) the "printer-uri" operation attribute
1099   with the 'ippfax' scheme, (2) the "version-number" parameter with the IPP/1.1 '1.1' (or higher
1100   minor version) value, and (3) the "ippfax-version-number" operation attribute with the IPPFAX/1.0
1101   '1.0' keyword value in all operations to get the IPPFAX semantics as described in section 4.

1102   3. The Receiver MUST support the Get-Printer-Attributes operation as described in sections 5.

1103   4. The Receiver MUST support the Printer Description attributes as specified in section 6.

1104   5. The Sender MUST validate that the target Printer is IPPFAX-capable using the Get-Printer-
1105   Attributes operation and validate that the Receiver supports the job using the Validate-Job operation
1106   as specified in section 7.

1107   6. The Sender MUST supply and the Receiver MUST support the operation/Job Description attributes
1108   for Identify Exchange as described in section 8.

1109   7. The Sender MUST support submitting and the Receiver MUST accept IPPFAX Jobs as defined in
1110   section 9.

1111   8. The Sender MUST place the Sender's identity in the document according to section 9.5.

1112   9. The Sender and Receiver MUST support the IPP Notification for Job Creation operations, the
1113   'ippget' Delivery Method, the Get-Notifications operation for the events indicated in sections 9.6,
1114   9.3, and 9.3.2, respectively.

1115   10. The Sender and Receiver MUST support the operations as indicated in section 10.

1116   11. The Sender and Receiver MUST support the security mechanisms indicated in section 11, including
1117   TLS.

16 IPPFAX URL Scheme

1119   This section is intended for use in registering the 'ippfax' URL scheme with IANA and fully conforms to
1120   the requirements in [RFC2717].

16.1 IPPFAX URL Scheme Applicability and Intended Usage

1122   This document defines the 'ippfax' URL (Uniform Resource Locator) scheme for specifying the location of
1123   an IPPFAX Receiver which implements the IPPFAX Protocol specified in this document.

1124   The 'ippfax' URL scheme defined in this document is based on the ABNF for the basic hierarchical URL
1125   syntax in [RFC2396]; however relative URL forms, parameters, and/or query parts are NOT allowed in an
1126   IPPFAX URL. The 'ippfax' URL scheme is case-insensitive in the host name or host address part;
1127   however the path part is case-sensitive, as in [RFC2396]. Codepoints outside [US-ASCII] MUST be hex
1128   escaped by the mechanism defined in [RFC2396].

1129   The intended usage of the 'ippfax' URL scheme is COMMON.

16.2 IPPFAX URL Scheme Associated IPPFAX Port

1131   All IPPFAX URLs which do NOT explicitly specify a port MUST be used over IANA-assigned well-
1132   known port xxx [TBA by IANA] for the IPPFAX Protocol.

1133   See: IANA Port Numbers Registry [IANA-PORTREG].

16.3 IPPFAX URL Scheme Associated MIME Type

1135   All IPPFAX protocol operations (requests and responses) MUST be conveyed in an 'application/ipp'
1136   MIME media type [RFC2910] as registered in [IANA-MT]. IPPFAX URLs MUST refer to IPPFAX
1137   Receivers which support this 'application/ipp' operation encoding.

1138   See: IANA MIME Media Types Registry [IANA-MT].

16.4 IPPFAX URL Scheme Character Encoding

The IPPFAX URL scheme defined in this document is based on the ABNF for the HTTP URL scheme defined in HTTP/1.1 [RFC2616], which is derived from the URI Generic Syntax [RFC2396] and further updated by [RFC2732] and [RFC2373] (for IPv6 addresses in URLs). The IPPFAX URL scheme is case-insensitive in the 'scheme' and 'host' (host name or host address) part; however, the 'abs_path' part is case-sensitive, as in [RFC2396]. Code points outside [US-ASCII] MUST be hex escaped by the mechanism specified in [RFC2396].

16.5 IPPFAX URL Scheme Syntax in ABNF

The IPP protocol places a limit of 1023 octets (NOT characters) on the length of a URI (see section 4.1.5 'uri' in [RFC2911]). An IPPFAX Receiver MUST return 'client-error-request-value-too-long' (see section 13.1.4.10 in [RFC2911]) when a URI received in a request is too long.

Note: IPPFAX Receivers ought to be cautious about depending on URI lengths above 255 bytes, because some older client or proxy implementations might not properly support these lengths.

IPPFAX URLs MUST be represented in absolute form. Absolute URLs always begin with a scheme name followed by a colon. For definitive information on URL syntax and semantics, see "Uniform Resource Identifiers (URI): Generic Syntax and Semantics" [RFC2396]. This specification adopts the definitions of "port", "host", "abs_path", and "query" from [RFC2396], as updated by [RFC2732] and [RFC2373] (for IPv6 addresses in URLs).

The IPPFAX URL scheme syntax in ABNF is as follows:

```
    ippfax_URL = "ippfax:" "//" host [ ":" port ] [ abs_path [ "?" query ]]
```

If the port is empty or not given, the IANA-assigned port as defined in section 16.2 is assumed. The semantics are that the identified resource (see section 5.1.2 of [RFC2616]) is located at the IPPFAX Notification Recipient listening for HTTP connections on that port of that host, and the Request-URI for the identified resource is 'abs_path'.

Note: The use of IP addresses in URLs SHOULD be avoided whenever possible (see [RFC1900]).

If the 'abs_path' is not present in the URL, it MUST be given as "/" when used as a Request-URI for a resource (see section 5.1.2 of [RFC2616]). If a proxy receives a host name which is not a fully qualified domain name, it MAY add its domain to the host name it received. If a proxy receives a fully qualified domain name, the proxy MUST NOT change the host name.

16.6 IPPFAX URL Examples

The following are examples of valid IPPFAX URLs for Notification Recipient objects (using DNS host names):

```
ippfax://abc.com
ippfax://abc.com/listener
```

Note: The use of IP addresses in URLs SHOULD be avoided whenever possible (see [RFC1900]).

The following literal IPv4 addresses:

```
192.9.5.5                    ; IPv4 address in IPv4 style
186.7.8.9                    ; IPv4 address in IPv4 style
```

are represented in the following example IPPFAX URLs:

```
ippfax://192.9.5.5/listener
ippfax://186.7.8.9/listeners/tom
```

The following literal IPv6 addresses (conformant to [RFC2373]):

```
::192.9.5.5                  ; IPv4 address in IPv6 style
::FFFF:129.144.52.38         ; IPv4 address in IPv6 style
2010:836B:4179::836B:4179    ; IPv6 address per RFC 2373
```

are represented in the following example IPPFAX URLs:

```
ippfax://[::192.9.5.5]/listener
ippfax://[::FFFF:129.144.52.38]/listener
ippfax://[2010:836B:4179::836B:4179]/listeners/tom
```

16.7 IPPFAX URL Comparisons

When comparing two IPPFAX URLs to decide if they match or not, the comparer MUST use the same rules as those defined for HTTP URI comparisons in [RFC2616], with the sole following exception:

- A port that is empty or not given MUST be treated as equivalent to the port as defined in section 16.2 for that IPPFAX URL;

17 IANA Considerations

IANA shall register the ippfax URL scheme as defined in section 16 according to the procedures of [RFC2717] and assign a well known port.

```
Operation Attributes:
ippfax-version-number (type2 keyword)              IEEE-ISTO 510n.y 4.3

Operation/Job Description attributes:
sending-user-vcard (text(MAX))                     IEEE-ISTO 510n.y 8.1
receiving-user-vcard (text(MAX                     IEEE-ISTO 510n.y 8.2
sender-uri (uri)                                   IEEE-ISTO 510n.y 8.3

Printer Description Attributes:
ippfax-versions-supported (1setOf type2 keyword) IEEE-ISTO 510n.y 6.3
```

18 References

Normative

[IANA-MT]
    IANA Registry of Media Types: ftp://ftp.iana.orgisi.edu/in-notes/iana/assignments/media-types/

[IANA-PORTREG]
    IANA Port Numbers Registry. ftp://ftp.isi.edu/in-notes/iana/assignments/port-numbers

[ifx-pdfis]
    Seeler, R., "PDF Image-Streamable (PDF/is)", Work in Progress,
    ftp://pwg.org/pub/pwg/QUALDOCS/pwg-ifx-pdfis-latest.pdf

Informative

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

[RFC2542]
    Masinter , "Terminology and Goals for Internet Fax", RFC2542

1231 [RFC3380]
1232   Kugler, C, Hastings, T., Lewis, H., "Internet Printing Protocol (IPP): Job and Printer Administrative
1233   Operations", <draft-ietf-RFC3380-03.txt>, July 17, 2001.

1234 [RFC 3382]
1235   deBry, R., , Hastings, T., Herriot, R., "Internet Printing Protocol (IPP): collection attribute
1236   syntax",RFC 3382, September, 2002 .

1237 [ipp-get-method]
1238   Herriot, Kugler, and Lewis, "The 'ippget' Delivery Method for Event Notifications" , <draft-ietf-
1239   ipp-notify-get-06.txt>, November 19, 2001

1240 [ipp-iig-bis]
1241   Hastings, T., Manros, C., Zehler, P., Kugler, C., and H. Holst, "Internet Printing Protocol/1.1:
1242   Implementer's Guide", draft-ietf-ipp-implementers-guide-v11-04.txt, work in progress, intended to
1243   obsolete RFC 3196 [RFC3196], October 8, 2001.

1244 [RFC 3381]
1245   Hastings, T., Bergman, R., Lewis, H., "Internet Printing Protocol (IPP): Job Progress
1246   Attributes",RFC 3381, September, 2002.

1247 [ipp-ntfy]
1248   Isaacson, S., Martin, J., deBry, R., Hastings, T., Shepherd, M., Bergman, R., "Internet Printing
1249   Protocol/1.1: IPP Event Notification Specification", <draft-ietf-ipp-not-spec-08.txt>, November 19,
1250   2001.

1251 [ipp-output-bin]
1252   Hastings, T., and R. Bergman, "Internet Printing Protocol (IPP): output-bin attribute extension",
1253   IEEE-ISTO 5100.2-2001, February 7, 2001, ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.2.pdf.

1254 [ipp-prod-print]
1255   Ocke, K., Hastings, T., "Internet Printing Protocol (IPP): Production Printing Attributes - Set1",
1256   IEEE-ISTO 5100.3-2001, February 12, 2001, ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.3.pdf.

1257 [ipp-set-ops]
1258   Hastings, Herriot, Kugler, and Lewis, "Job and Printer Set Operations", <draft-ietf-ipp-job-printer-
1259   set-ops-05.txt>, August 28, 2001.

1260 [ipp-uri-scheme]
1261   Herriot, McDonald, "IPP URL Scheme", <draft-ietf-ipp-url-scheme-03.txt>,April 3, 2001

This is an unapproved IEEE-ISTO PWG Working Draft Standard, subject to change.

1262   [pwg-media]
1263   Bergman, Hastings, "Media Standardized Names", work in progress, when approved:
1264   ftp://ftp.pwg.org/pub/pwg/standards/pwg5101.1.pdf; current draft:
1265   ftp://ftp.pwg.org/pub/pwg/media-sizes/pwg-media-12.pdf, September 24, 2001.

1266   [RFC1900]
1267   B. Carpenter, Y. Rekhter. Renumbering Needs Work, RFC 1900, February 1996.

1268   [RFC2069]
1269   Franks, Hallam-Baker, Hostetler, Leach, Luotonen,, Sink, Stewart, "An Extension to HTTP: Digest
1270   Access Authentication", RFC2069

1271   [RFC2119]
1272   Bradner, S., "Key words for use in RFCs to Indicate Requirement Level", RFC2119

1273   [RFC2246]
1274   Dierks, Allen "The TLS Protocol Version 1.0", RFC 2246

1275   [RFC2305]
1276   Toyoda, Ohno, Murai, Wing "A Simple Mode of Facsimile Using Internet Mail" RFC2305

1277   [RFC2373]
1278   R. Hinden, S. Deering. IP Version 6 Addressing Architecture, RFC 2373, July 1998.

1279   [RFC2396]
1280   Berners-Lee, T. et al. Uniform Resource Identifiers (URI): Generic Syntax, RFC 2396, August
1281   1998

1282   [RFC2409]
1283   Harkins, D., and D. Carrel, "The Internet Key Exchange (IKE)", RFC 2409, November 1998

1284   [RFC2425]
1285   T. Howes, M. Smith, F. Dawson, "A MIME Content-Type for Directory Information", RFC 2425,
1286   September 1998

1287   [RFC2426]
1288   Dawson, Howes, "vCard MIME Directory Profile", RFC 2426, September 1998 [version v3.0].

1289   [RFC2532]
1290   Masinter, Wing, "Extended Facsimile Using Internet Mail", RFC2532

1291 [RFC2616]
1292   R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, "Hypertext
1293   Transfer Protocol - HTTP/1.1", RFC 2616, June 1999.

1294 [RFC2617]
1295   J. Franks, P. Hallam-Baker, J. Hostetler, S. Lawrence, P. Leach, A. Luotonen, L. Stewart, "HTTP
1296   Authentication: Basic and Digest Access Authentication", RFC 2617, June 1999.

1297 [RFC2732]
1298   R. Hinden, B. Carpenter, L. Masinter. Format for Literal IPv6 Addresses in URL's, RFC 2732,
1299   December 1999.

1300 [RFC2818]
1301   E. Rescorla, "HTTP Over TLS", May 2000

1302 [RFC2910]
1303   Herriot, Butler, Moore, Turner, Wenn, "Internet Printing Protocol/1.1: Encoding and Transport",
1304   RFC2910, September 2000

1305 [RFC2911]
1306   deBry, Hastings, Herriot, Isaacson, Powell, "Internet Printing Protocol/1.1: Model and Semantics",
1307   RFC2911, September 2000.

1308 [RFC3196]
1309   Hastings, T., Manros, C., Zehler, P., Kugler, C., and H. Holst, "Internet Printing Protocol/1.1:
1310   Implementer's Guide", RFC 3196, November, 2001.

1311 [X509]
1312   CCITT. Recommendation X.509: "The Directory - Authentication Framework". 1988.

This is an unapproved IEEE-ISTO PWG Working Draft Standard, subject to change.

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Contact Information:

    IPP Web Page: http://www.pwg.org/ipp/
    IPP Mailing List: ipp@pwg.org

    To subscribe to the ipp mailing list, send the following email:
       1) send it to majordomo@pwg.org
       2) leave the subject line blank
       3) put the following two lines in the message body:
           subscribe ipp
           end

1327   Implementers of this specification document are encouraged to join the IPP Mailing List in order to
1328   participate in any discussions of clarification issues and review of registration proposals for additional
1329   attributes and values. In order to reduce spam the mailing list rejects mail from non-subscribers, so
1330   you must subscribe to the mailing list in order to send a question or comment to the mailing list.
1331
1332   Other Participants:

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1333   20 Appendix A: Comparison of IPP/1.1 and IPPFAX/1.0 (Informative)

1334   This informative appendix compares IPP/1.1 and IPPFAX/1.0 with references to the appropriate sections
1335   for details. If this appendix contradicts or omits any differences, it is a mistake and the body of this
1336   document still prevails. Most of the differences are in conformance requirements only. Therefore, for
1337   most of the differences, it is possible to implement both with the same code (without conditional branches).

1338   Legend:

1339   ** Where IPP/1.1 and IPPFAX/1.0 have a real difference, such as IPP/1.1 must and IPPFAX/1.0
1340   MUST NOT, (indicated below by leading **), would a conditional branch be needed in the
1341   implementation code in order to support both IPP/1.1 and IPPFAX/1.0.

1342   * Where IPP/1.1 is a may and IPPFAX/1.0 is a MUST NOT (indicated below by a leading *),
1343   would a conditional branch be needed in the implementation code in order to support both IPP/1.1
1344   and IPPFAX/1.0, *but only if the IPP/1.1 part supports the feature*.

1345 Differences between the IPP/1.1 protocol and the IPPFAX/1.0 protocol:

1346   1. ** IPP uses the 'ipp' URL scheme with a default port of 631, while IPPFAX uses the 'ippfax' URL
1347   scheme with a default port of xxx [TBA by IANA] (section 4.1 and 16).

1348   2. ** IPP has only one version number parameter, while IPPFAX has two version numbers: the
1349   "version-number" parameter for IPP (section 4.2) and the "ippfax-version-number" operation
1350   attribute for IPPFAX (section 4.3).

1351 Differences between an IPP client and a Sender:

1352   1. An IPP Client may use any IPP operation, while a Sender MUST use at least Get-Printer-Attributes
1353   (sections 5 and 7.1), Validate-Job (section 7.2), and Print-Job operations (section 9). A Sender
1354   MUST use the Get-Notifications operation, unless the Sending User has explicitly indicated
1355   otherwise (section 9.6).

1356   2. In the Get-Printer-Attributes request, an IPP Client may supply the "document-format" operation
1357   attribute, while a Sender SHOULD (sections 5.1 and 0) in order to get Attribute Coloring.

1358   3. ** In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the
1359   "ipp-attribute-fidelity" operation attribute with either the 'true' or 'false' value or may omit the
1360   attribute entirely, while the Sender MUST always supply the attribute and with the 'true' value
1361   (sections 7.2 and 9.1.1).

1362   4. In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the
1363   "document-format" operation attribute, while the Sender MUST supply it (section 9.1.2).

1364   5. * An IPP Client may support any MIME Media Type as the value of the "document-format"
1365   operation attribute, while the Sender MUST support the 'application/pdf' MIME Media Type.

1366   6. In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the
1367   "media" Job Template attribute, while the Sender MUST supply it (section 9.2.1).

1368   7. * An IPP Client may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the
1369   "media" Job Template attribute or the Media Size Self Describing Name keyword values defined
1370   in the IEEE-ISTO 5101.1 "Media Standardized Names" [pwg-media], while the Sender MUST use
1371   the keyword values from [pwg-media] (section 9.2.1).

8. There are no requirements for an IPP Client to indicate the client or the client user in the document, while the Sender MUST supply the "sender-uri" value along with a date and time, on at least the cover page (section 9.5).

9. An IPP Client need not support Event Notification, while the Sender MUST support at least the 'ippget' Pull Delivery Method (section 9.3), which REQUIRES using the Get-Notifications operation (section 9.6).

10. An IPP Client may support any events, while a Sender MUST NOT support the 'job-config-changed' event and MUST NOT support any Printer events (section 9.3.2).

11. An IPP Client may support Client Authentication, while a Sender MUST support at least 'digest' and 'certificate' (section 11.2).

12. An IPP Client may support Data Integrity and Data Privacy, while a Sender MUST support Data Integrity and may use Data Privacy with at least the TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.2).

Differences between an IPP Printer and a Receiver:

1. In the Get-Printer-Attributes response, an IPP Printer may color the attribute values returned according to the "document-format" supplied, while a Receiver MUST color the values returned according to the "document-format" operation attribute supplied (sections 5 and 6), including the "printer-resolutions-supported" attribute (section 9.2.2.1).

2. * An IPP Printer is not required to support any particular document formats, while a Receiver MUST support the PDF/is 'application/pdf' format with profile pdfis-fax.

3. * An IPP Printer may support 'application/octet-stream' (auto-sensing - [RFC2911] 4.1.9.1), while a Receiver MUST NOT (section 6.6).

4. An IPP Printer may support the IPPFAX attributes: "sending-user-vcard", "receiving-user-vcard", and "sender-uri", while a Receiver MUST (sections 0, 6, 8, and 1.1).

5. ** An IPP Printer MUST NOT support the "ippfax-versions" and "ippfax-versions-supported" attributes, while a Receiver MUST (sections 4.3 and 6.3).

6. ** An IPP Printer must support both values of the "ipp-attribute-fidelity" operation attribute, while the Receiver MUST only support the 'true' value (section 9.1.1).

7. ** An IPP Printer must assume a value of 'false' if the IPP Client omits the "ipp-attribute-fidelity" operation attribute, while the Receiver MUST reject the request with the 'client-error-bad-request' status code (section 9.1.1).

8. An IPP Printer is not required to support any particular Job Template attributes, while a Receiver MUST support at least the "media" and "printer-resolution" Job Template attributes, including the "media-ready" Printer attribute (section 9.2).

9. * An IPP Printer may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the "media" Job Template attribute or the Media Size Self Describing Name keyword values defined in the IEEE-ISTO 5101.1 "Media Standardized Names" [pwg-media], while the Receiver MUST support a subset of the keyword values from [pwg-media] (section 9.2.1).

10. * An IPP Printer may support any Job Template attribute values, while a Receiver is restricted to a single value for many Job Template attributes for which other values would alter the appearance of the document or provide a non-FAX-like feature (section 9.2).

11. * An IPP Printer may support Print-URI and Send-URI operations, while a Receiver MUST NOT (section 10.1).

12. An IPP Printer must support Get-Jobs and Get-Job-Attributes operations, while a Receiver NEED NOT (section 10.1).

13. ** An IPP Printer must support Cancel-Job operation, while a Receiver MUST NOT (section 10.2).

14. An IPP Printer may support administrative operations without authentication, while a Receiver MUST authenticate administrative operations, if administrative operations are supported (section 10.1).

15. * An IPP Printer may support the following operations from an authenticated operator or administrator: Purge-Jobs, Cancel-Current-Job, Cancel-Job, and Schedule-Job-After, while a Receiver MUST reject such operations from an authenticated operator or administrator.

16. An IPP Printer may support Event Notification, while a Receiver MUST support Event Notification (sections 9.3 and 10.1) and at least the 'ippget' Delivery Method (section 9.6), which REQUIRES support for the Get-Notifications operation.

17. If an IPP Printer supports Event Notification, it must support the 'job-state-changed' and 'job-created' events for Per-Job Subscriptions, while a Receiver NEED NOT (section 9.3.2).

18. ** If an IPP Printer supports Printer Events, then it MUST support them for both Per-Job and Per-Printer Subscriptions, while a Receiver MUST NOT support them for Per-Job Subscriptions (section 9.3.2).

1433 19. If an IPP Printer supports Event Notification, it may support the 'job-progress' event, while a
1434 Receiver MUST for Per-Job Subscriptions (section 9.3.2).

1435 20. * If an IPP Printer supports Event Notification, it may support the 'job-config-changed' event,
1436 while a Receiver MUST NOT (section 9.3.2).

1437 21. If an IPP Printer supports the Set-Printer-Attributes operation, then it may support setting the
1438 Attribute Coloring values according to the "document-format" operation attribute, while the
1439 Receiver, if it supports the Set-Printer-Attributes operation, MUST support setting the Attribute
1440 Coloring values according to the "document-format" operation attribute (section 10.5).

1441 22. An IPP Printer should support and may use TLS, while a Receiver MUST support and MUST use
1442 TLS (section 11.3).

1443 23. An IPP Printer may support Client Authentication, while a Receiver MUST support at least
1444 'digest' and 'certificate' (section 11.2).

1445 24. An IPP Printer may support Data Integrity and Data Privacy and support them with any cipher
1446 suite, while a Receiver MUST support both Data Integrity and Data Privacy with at least the
1447 TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.2).

1448 ## 21 Appendix B: vCard Example

1449 The following ASCII text is a complete vCard v3.0 [RFC2426, RFC2425] example:

1450 BEGIN:VCARD
1451 VERSION:3.0
1452 N:Moore;Paul
1453 FN:Paul Moore
1454 ORG:Netreon
1455 TEL;CELL;VOICE:1+206-251-7008
1456 ADR;WORK:;;10900 NE 8th St;Bellvue;WA;98004;United States of America
1457 EMAIL;PREF;INTERNET:pmoore@netreon.com
1458 REV:19991207T215341Z
1459 END:VCARD
1460

1461 ## 22 Appendix C: Generic Directory Schema for an IPPFAX Receiver

1462 This section defines a generic schema for an entry in a directory service. A directory service is a means by
1463 which service users can locate service providers. In IPPFAX environments, this means that Receivers

This is an unapproved IEEE-ISTO PWG Working Draft Standard, subject to change.

1464　(IPPFAX Printers) can be registered (either automatically or with the help of an administrator) as entries of
1465　type PRINTER in the directory using an IMPLEMENTATION SPECIFIC mechanism such as entry
1466　attributes, entry type fields, specific branches, etc. Directory clients can search or browse for entries of
1467　type PRINTER. Clients use the directory service to find entries based on naming, organizational contexts,
1468　or filtered searches on attribute values of entries. For example, a client can find all printers in the "Local
1469　Department" context. Authentication and authorization are also often part of a directory service so that an
1470　administrator can place limits on end users so that they are only allowed to find entries to which they have
1471　certain access rights. IPPFAX itself does not require any specific directory service protocol or provider.

1472　Note: Some directory implementations allow for the notion of "aliasing". That is, one directory entry
1473　object can appear as multiple directory entry objects with different names for each object. In each case,
1474　each alias refers to the same directory entry object which refers to a single IPPFAX Printer object.

1475　The generic IPPFAX schema is a subset of IPPFAX Job Template and Printer Description attributes (Table
1476　1, Table 2, and [RFC2911] sections 4.2 and 4.4). These attributes are identified as either
1477　RECOMMENDED or OPTIONAL for the directory entry itself. This conformance labeling is NOT the
1478　same conformance labeling applied to the attributes of IPPFAX Printers objects. The conformance labeling
1479　in this Appendix is intended to apply to directory templates and to Receivers that subscribe by adding one
1480　or more entries to a directory. RECOMMENDED attributes SHOULD be associated with each directory
1481　entry. OPTIONAL attributes MAY be associated with the directory entry (if known or supported). In
1482　addition, all directory entry attributes SHOULD reflect the current attribute values for the corresponding
1483　IPPFAX Printer object.

1484　The names of attributes in directory schema and entries SHOULD be the same as the IPPFAX Printer
1485　attribute names as shown, as much as possible.

1486　In order to bridge between the directory service and the IPPFAX Printer object, one of the
1487　RECOMMENDED directory entry attributes is the Printer object's "printer-uri-supported" attribute. The
1488　directory client queries the "printer-uri-supported" attribute (or its equivalent) in the directory entry and
1489　then the IPPFAX client addresses the IPPFAX Printer object using one of its URIs. The "uri-security-
1490　supported" attribute identifies the protocol (if any) used to secure a channel. If a Printer object supports
1491　both IPP and IPPFAX, there should be two separate directory entries in order to represent these two
1492　services.

1493　Table 16 defines the generic schema for directory entries of abstract type PRINTER. In the future this
1494　schema could also be directory entries of type FAX. In either case, the concrete type MUST be IPPFAX.
1495　If a Printer object supports both IPP and IPPFAX, there should be two separate directory entries in order to
1496　represent these two services, one with concrete type IPP and the other with concrete type IPPFAX,
1497　respectively.

1498   **Table 16 - Generic Schema Directory Entries**

Attribute	Conformance	Reference
All of the attributes in [RFC2911] section 16 Appendix E Generic Directory Schema (including "ipp-versions-supported" - see section 6.2), plus:	As stated in [RFC2911] section 16	[RFC2911]
ippfax-versions-supported (1setOf type2 keyword)	RECOMMENDED	section 6.3

1499

23 Appendix D: Summary of other IPP documents

1501   The full set of IPP documents includes:

1502   1. Design Goals for an Internet Printing Protocol [RFC2567]
1503   2. Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
1504   3. Internet Printing Protocol/1.1: Model and Semantics (this document)
1505   4. Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]
1506   5. Internet Printing Protocol/1.1: Implementer's Guide [RFC3196] and [ipp-iig-bis]
1507   6. Mapping between LPD and IPP Protocols [RFC2569]
1508
1509   The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
1510   functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included
1511   in a printing protocol for the Internet. It identifies requirements for three types of users: end users,
1512   operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A
1513   few OPTIONAL operator operations have been added to IPP/1.1.

1514   The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document
1515   describes IPP from a high level view, defines a roadmap for the various documents that form the suite of
1516   IPP specification documents, and gives background and rationale for the IETF working group's major
1517   decisions.

1518   The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the abstract
1519   operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the
1520   encoding rules for a new Internet MIME media type called "application/ipp". This document also defines
1521   the rules for transporting over HTTP a message body whose Content-Type is "application/ipp". This
1522   document defines a new scheme named 'ipp' for identifying IPP printers and jobs.

1523   The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to
1524   implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of
1525   the considerations that may assist them in the design of their client and/or IPP object implementations. For
1526   example, a typical order of processing requests is given, including error checking. Motivation for some of
1527   the specification decisions is also included.

1528 The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of gateways
1529 between IPP and LPD (Line Printer Daemon) implementations.

24 Appendix E: Description of the IEEE Industry Standards and Technology (ISTO)

1532 The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible
1533 operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards,
1534 but also to facilitate activities that support the implementation and acceptance of standards in the
1535 marketplace. The organization is affiliated with the IEEE (http://www.ieee.org/) and the IEEE Standards
1536 Association (http://standards.ieee.org/).

1537 For additional information regarding the IEEE-ISTO and its industry programs visit:

1538 http://www.ieee-isto.org.

25 Appendix F: Description of the IEEE-ISTO PWG

1540 The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology
1541 Organization (ISTO) and is an alliance among printer manufacturers, print server developers, operating
1542 system providers, network operating systems providers, network connectivity vendors, and print
1543 management application developers chartered to make printers and the applications and operating systems
1544 supporting them work together better. All references to the PWG in this document implicitly mean "The
1545 Printer Working Group, a Program of the IEEE ISTO." In order to meet this objective, the PWG will
1546 document the results of their work as open standards that define print related protocols, interfaces,
1547 procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from
1548 the interoperability provided by voluntary conformance to these standards.

1549 In general, a PWG standard is a specification that is stable, well understood and is technically competent,
1550 has multiple, independent and interoperable implementations with substantial operational experience, and
1551 enjoys significant public support.

1552 For additional information regarding the Printer Working Group visit:

1553 http://www.pwg.org

26 Revision History (to be removed when standard is approved)

Revision	Date	Author	Notes

1	1/16/01	Paul Moore, Netreon	Initial version
2	2/27/01	Paul Moore, Gail Songer, Netreon	Specify TLS as MUST Removed Cover page and combined device Added need for big text types
3	4/11/01	Gail Songer, Netreon	Move attribute definition to first reference
4	5/24/01	Tom Hastings	Editorially updated the document to follow the style of the IPP standard documents. Added 23 issues to be reviewed. Capitalized the special terms throughout without showing revisions in order to make the document with revisions more readable.
5	5/21/01	Tom Hastings, John Pulera, Ira McDonald	Updated from the 6/6/01 telecon agreements on most of the 23 issues. There are 20 issues remaining, mostly new.
6	7/27/01	Tom Hastings, Ira McDonald	Updated from the 6/29/01 telecon. There are 41 issues remaining, mostly new.
7	10/8/01	Tom Hastings, Ira McDonald	Updated with all the resolutions to the 41 ISSUES from the August 1, 2001 IPPFAX WG meeting in Toronto, and the subsequent telecons: August, 9, 14, and 17, 2001. There are 4 (new) issues remaining.
8	11/17/01	Tom Hastings	Updated with the agreements from the IPPFAX WG meeting, 10/24/01, Texas. See minutes. There are 5 issues remaining.
9	12/31/01	Tom Hastings	Updated with the agreements reached at the 12/14/01 telecon.
10	2/19/02	Tom Hastings	Updated with the agreements reached as the 2/5/02 IPPFAX WG meeting. There are no remaining issues.
11	9/20/02	Tom Hastings	Replaced all occurrences of UIF with PDFax and uif with PDFax.
12	10/16/02 10/24/02	Rick Seeler Gail Songer	Updated to reflect PDF/is as file format. Replace CONNEG with UPDF. Attributes for OPTIONAL PDF/is functionality.
13	11/22/02	Rick Seeler	Replaced 'PDFax' with 'PDF/is' or 'pdfis'. Updated spec to match 0.3 PDF/is specification.

1555