



A Project of the PWG IPPFAX Working Group

The IPPFAX/1.0 Protocol

IEEE-ISTO Printer Working Group

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Abstract

This document specifies the IPPFAX/1.0 protocol. The IPPFAX requirements [ifx-req] are derived from the requirements for Internet Fax [internet-fax-goals].

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

The IPPFAX/1.0 protocol is a specialization of the IPP/1.1 [RFC2911], [RFC2910] protocol supporting a subset of the IPP operations with increased conformance requirements in some cases, some restrictions in other cases, and some additional REQUIRED attributes. The IPPFAX Protocol uses the 'ippfax' URL scheme (instead of the 'ipp' URL scheme) in all its operations. Most of the new attributes defined in this document MAY be supported by IPP Printers as OPTIONAL extensions to IPP as well. In addition, IPPFAX/1.0 REQUIRES the support of the IPP Event Notification mechanism [ipp-ntfy] using the 'ippget' Pull Delivery Method [ipp-get-method].

31 An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least the PDFax S
32 Profile as specified in [ifx-pdfax] which is defined for the 'image/tiffapplication/pdf' document
33 format MIME type ~~[image-tiff] and MAY support additional PDFax Profiles for the 'image/tiff'~~
34 ~~and 'image/tiff-fx' [image-tiff-fx] document format MIME types.~~ A Print System MAY be
35 configured to support both the IPPFAX and IPP protocols concurrently, but each protocol requires
36 separate Printer objects with distinct URLs.

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

41 ~~When approved as a PWG standard, this document will be available from:~~
42 ~~<ftp://ftp.pwg.org/pub/pwg/standards/pwg5102.1.pdf>, .doc, .rtf~~
43

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189

190 1 Introduction

191 This document specifies the IPPFAX/1.0 protocol. The IPPFAX requirements [ifx-req] are derived from
192 the requirements for Internet Fax [internet-fax-goals].

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

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

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

211 An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least the PDFax (~~Universal~~
212 ~~Image Format~~) SF Profile [ifx-pdfax] which is defined for the 'image/tiffapplication/pdf' document format
213 MIME type ~~[image-tiff]~~ and MAY support additional PDFax Profiles for the ~~'image/tiff'~~ and ~~'image/tiff-~~
214 ~~fx'~~ ~~[image-tiff-fx]~~ document format MIME types. A Print System MAY be configured to support both the
215 IPPFAX and IPP protocols concurrently for a single output device (or multiple output devices), but each
216 protocol requires separate Printer objects with distinct URLs. Note - It is assumed that the reader is
217 familiar with IPP/1.1 [RFC2911], [RFC2910], [RFC3196], and [ipp-iig-bis]. See section 23.

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

222 1.1 Operations used

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

- 225 1. Get-Printer-Attributes - Sender MUST verify that the Printer object is an (IPPFAX) Receiver
226 and SHOULD determine some of the Receiver's basic capabilities, such as PDFax profiles
227 supported.
- 228 2. Validate-Job - Sender MUST verify that the Receiver can support the Job attributes that the
229 Sender will send in the IPPFAX Job.
- 230 3. Print-Job - Sender MUST submit the IPPFAX job with a single document (or MAY send
231 Create-Job & one or more Send-Document operations if the Receiver also supports these
232 operations)
- 233 4. Get-Notifications - The Sender MUST support and MUST use this operation to check for
234 successful job completion unless the Sending User wishes otherwise.

235 1.2 Typical exchange

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

- 238 1. The Sending User determines the network location of the Receiver (value of the "printer-uri"
239 operation attribute) – see section 4.1. This document does not specify how the Sending User does
240 this. Possible methods include directory lookup, search engines, business cards, network
241 enumeration protocols such as SLP, etc. See section 22 for the Generic Directory Schema for
242 IPPFAX.
- 243 2. The Sending User either (1) loads the Document into the Sender or (2) causes the Sender to
244 generate the Document data by means outside the scope of this document, indicates the Receiver's
245 network location and starts the exchange.
- 246 3. The Sender MUST validate whether or not the Receiver is an IPPFAX-capable Printer and
247 SHOULD determine the basic capabilities of the Receiver, including document format, profiles, and
248 profile extensions – see section 7.1.
- 249 4. The Sender decides on the most appropriate data format depending on the Receiver's basic
250 capabilities. The PDFax data formats and profiles are described in detail in the "Universal Image
251 Format (PDFax)" specification [ifx-pdfax].
- 252 5. The Sender MUST validate whether or not the Receiver will accept all of the attributes of the
253 IPPFAX Job from this Sending User using the Validate-Job operation. See section 7.2. If the
254 Receiver rejects the Validate-Job operation, the Sender can avoid sending the data.

- 255 6. The Sender either (1) scans the Document and converts it into an acceptable data format or (2)
256 generates or forwards the Document representation in an acceptable data format – see section 6.6.
- 257 7. As part of the Validation and Job Creation, the following identities are determined and exchanged:
258 Sender, Sending User, Receiver, and Receiving User – see section 8.
- 259 8. The Sender transmits the Document data to the Receiver – see section 9.
- 260 9. The Sending User receives a confirmation that the Receiver received the Document data – see
261 section 9.4.
- 262 10. In addition the Sender **MUST** support and the Sending User **MAY** choose to receive an Event
263 Notification that the Document has been successfully Delivered – see sections 9.3 and 9.6
- 264 If the Sender is unable to initiate or complete the exchange then it is assumed that the Sender will perform
265 some form of retry. The mechanisms used and the user-visible behavior in this case is an implementer’s
266 choice and beyond the scope of this document.

267 1.3 Namespace used for attributes

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

273
274 On the other hand, unless explicitly specified otherwise, all existing IPP attributes, including future IPP
275 extensions, apply to the IPPFAX Protocol as well, including attributes which have an “ipp-” prefix. For
276 example, the IPP/1.1 “ipp-attribute-fidelity” operation attribute (see [RFC2911] section 3.2.1.1 and 3.2.1.2)
277 and the IPP/1.1 “ipp-versions-supported” Printer Description attribute (see [RFC2911] section 4.4.14) are
278 also used in the IPPFAX protocol, even though they have the “ipp-” prefix.

279 2 Terminology

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

281 2.1 Conformance Terminology

282 Capitalized terms, such as **MUST**, **MUST NOT**, **REQUIRED**, **SHOULD**, **SHOULD NOT**, **MAY**,
283 **NEED NOT**, and **OPTIONAL**, have special meaning relating to conformance to this specification. These
284 terms are defined in [RFC2911] section 13.1 on conformance terminology, most of which is taken from
285 RFC 2119 [RFC2119]. In order to help the reader compare and contrast the IPP and IPPFAX protocols,
286 this document uses lower case “must”, “may” etc., to reproduce IPP Protocol conformance requirements

287 for IPP clients and IPP Printer objects as stated in other documents. If such reproduction in this document
288 contradicts an IPP document, it is a mistake, and that IPP document prevails.

289 **2.2 Other Terminology**

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

292 **IPP Protocol** The protocol defined in [RFC2911] and [RFC2910] and any IPP Protocol Extension
293 document (see section 18). For the IPP/1.1 Protocol each operation request must use the ‘ipp’ URL
294 scheme.

295 **IPPFAX Protocol** The protocol defined in this or a future revision document and any future extension
296 document. For the IPPFAX Protocol each operation request **MUST** use the ‘ippfax’ URL scheme (see
297 section 4.1 and 16). Unless a specific version number is appended to “IPPFAX”, such as “IPPFAX/1.0”,
298 the term IPPFAX applies to all versions.

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

308 Note: For brevity, this document uses the term “Receiver” instead of “IPPFAX Printer object”.
309 This document uses the term “Printer object” (and “Printer”) when the statement is intended to
310 apply to a Printer object that **MAY** support the IPP Protocol or the IPPFAX protocol (but not both).

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

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

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

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

320 **client** A hardware and/or software entity that initiates protocol operation requests and accepts responses.
321 A client **MAY** be: (1) an IPP client, (2) an IPPFAX client, or (3) both. However, this document uses the

322 term “Sender”, instead of “IPPFAX client”. This document uses the term “client” when the statement is
323 intended to apply to a client that MAY support the IPP Protocol, the IPPFAX protocol, or both protocols.

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

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

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

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

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

331 **Attribute Coloring** The changing of attributes and/or values returned by a single Printer object in a Get-
332 Printer-Attributes response depending on operation attributes supplied in the request, specifically the
333 “document-format” (see section 5.1 and [RFC2911] section 3.2.5.1) and “pdfax-profile-requested”
334 operation attributes.

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

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

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

339 ~~**TIFF** The Tag Image File Format defined by [TIFF] and identified by the ‘image/tiffapplication/pdf’
340 MIME Media type (see [image-tiff]).~~

341 ~~**TIFF-FX** The file format defined in [RFC2301], [tiff-fx], and [tiff-fx-ext1] as extensions to [TIFF]
342 commonly known as TIFF-FX and identified by the ‘image/tiffapplication/pdf-fx’ MIME Media type (see
343 [image-tiff-fx]). [RFC2301] formally defines minimal, extended and lossless JBIG modes (Profiles S, F, J)
344 for black and white fax, and base JPEG, lossless JBIG and Mixed Raster Content modes (Profiles C, L, M)
345 for color and grayscale fax. These modes or profiles correspond to the content of the applicable ITU-T
346 Recommendations (see the References section in [ifx-pdfax]).~~

347 **PDFax** The file format defined by [ifx-pdfax].

348 ~~**PDFax Profile (Universal Image Format Profile)**~~ The set of ~~TIFF-FX~~PDF-profiles with higher
349 conformance requirements and relaxed constraints for improved quality (see [ifx-pdfax]).

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

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

355 The terminology defined in the IPP “Event Notifications and Subscriptions” specification [ipp-ntfy] and
356 “The ‘ippget’ Delivery Method for Event Notifications” specification [ipp-get-method], such as **Event**
357 **Notification**, **Event**, **Subscription Object**, **Per-Job Subscription**, **Per-Printer Subscription**, **Push**
358 **Delivery Method**, and **Pull Delivery Method** is also used in this document with the same capitalization
359 conventions and semantics.

360 **3 IPPFAX Model**

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

362 **3.1 Printer Object Relationships**

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

368 **3.2 A Printer object with multiple URLs**

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

373 The three parallel “printer-uri-supported” (1setOf uri), “uri-authentication-supported” (1setOf type2
374 keyword), and “uri-security-supported” (1setOf type2 keyword) Printer Description attributes (see
375 [RFC2911] sections 4.4.1, 4.4.2, and 4.4.3, respectively) MUST contain the URLs, authentication, and
376 security, respectively, supported by the Printer object. See also the OPTIONAL “printer-xri-supported”
377 (collection) Printer Description attribute [ipp-set-ops], which, if supported, MUST be used to set these
378 three parallel attributes using the protocol.

379 Note: For a Printer object that supports multiple URLs, neither the IPP/1.1 protocol nor the IPPFAX/1.0
380 protocol provides a way for the administrator to Set or Get the values of Printer attributes whose values
381 MAY depend on the URL used and/or MAY depend on the authenticated role of the requesting user. So,
382 for example, there is no way to set the differing values of the “operations-supported” Printer attribute (see
383 section 6.5) that depend on the URL using the IPP or IPPFAX protocol. Providing such means is left for
384 future work as a single specification for use by both IPP and IPPFAX.

385 **3.3 A Print System supporting both IPP and IPPFAX protocols**

386 From section 3.2, if a Print System supports both IPP and IPPFAX, it MUST do so with separate Printer
387 objects, not with a single Printer object with IPP and IPPFAX URLs. Each such Printer object MUST

388 support either IPP or IPPFAX, but not both. In other words, each URL for a Printer object MUST have the
389 same scheme, namely, 'ipp' or 'ippfax', i.e., MUST NOT have some URLs with the 'ipp' scheme and other
390 URLs with the 'ippfax' scheme. The reason for this requirement for separate Printer objects for IPP and
391 IPPFAX is because a URL and its Printer object is intended to represent a network resource offering a
392 particular type of service, not several different types of services.

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

398 **4 Common IPPFAX Operation Attribute Semantics**

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

403 **4.1 printer-uri (uri) operation attribute ([RFC2911] section 3.1.5)**

404 This operation attribute specifies the transfer path to the Receiver for the operation. As in IPP/1.1, the
405 client MUST supply the "printer-uri" operation attribute in every IPPFAX request (see [RFC2911] section
406 3.1.5). For IPPFAX, the attribute value MUST be a URL using the 'ippfax' scheme (see section 16)
407 specifying the Receiver's network location.

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

410 `ippfax://www.acme.com/ippfax-printers/printer5`

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

417 As in IPP/1.1 [RFC2911] for each operation, the Receiver NEED NOT validate that the "printer-uri"
418 operation attribute is present and that the value supplied by the Sender matches one of the Receiver's
419 "printer-uri-supported" Printer Description attribute (see section 6.1). For URI matching rules see section
420 16.7. If the Receiver does validate the "printer-uri" operation attribute and the URI value supplied does not
421 match any value of the Receiver's "printer-uri-supported" Printer Description attribute, the Receiver
422 MUST reject the request, return the 'client-error-attributes-or-values-not-supported' status code, and return
423 the attribute and value in the Unsupported Attributes Group.

424 **4.2 version-number parameter ([RFC2911] section 3.1.8)**

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

428 For IPPFAX version 1.0 as specified in this document, the value of the IPP “version-number” parameter
429 MUST be ‘1.1’ or a higher minor version number. The value is represented as 0x0101 (see [RFC2910])
430 where the major version number comes first (so-called “network byte order”).

431 If the Receiver does not support the supplied IPP major version *as part of the IPPFAX protocol*, the
432 Receiver MUST respond as specified in [RFC2911] section 3.1.8 with the ‘server-error-version-not-
433 supported’ status code. As in IPP/1.1, if the major version number is supported, but the minor version
434 number is not, the Receiver SHOULD accept and attempt to perform the request (or reject the request if the
435 operation is not supported), else the Receiver MUST reject the request and returns the ‘server-error-
436 version-not-supported’ status code. In all cases as in IPP/1.1, the Receiver MUST return the “version-
437 number” parameter with the value that it supports that is closest to the version number supplied by the
438 client in the “version-number” parameter in the request.

439 **4.3 ippfax-version-number (type2 keyword) operation attribute**

440 The value of this operation attribute indicates the version of the IPPFAX Protocol and encoding that the
441 Sender is requesting and the Receiver is returning. The Sender MUST supply this operation attribute in
442 every request and the Receiver MUST return this operation attribute in every response. This operation
443 attribute MUST be placed in the Operation Attributes Group *immediately* after the operation attributes
444 whose order is specified in IPP/1.1 [RFC2911]. The semantics of the “ippfax-version-number” operation
445 attribute serves the same purpose for the IPPFAX Protocol as the IPP/1.1 “version-number” parameter
446 serves for the IPP Protocol (see [RFC2911] section 3.1.8).

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

450 For IPPFAX version 1.0 as specified in this document, the value of the “ippfax-version-number” operation
451 attribute MUST be ‘1.0’ keyword value. By including an IPPFAX version number in the client request, it
452 allows the Sender to identify which version of IPPFAX the Sender is requesting to be used, i.e., the version
453 whose conformance requirements the Sender may be depending upon the Receiver to meet.

454 The Receiver MUST indicate the IPPFAX versions supported using the “ippfax-versions-supported”
455 (1setOf type2 keyword) Printer Description attribute (see section 6.3).

456 As in IPP/1.1, if the Receiver does not support the major version number supplied by the Sender, i.e., the
457 major version field of the “ippfax-version-number” operation attribute does not match any of the values of
458 the Printer’s “ippfax-versions-supported” (see section 6.3), the Receiver MUST respond with a status code
459 of ‘server-error-version-not-supported’ along with the closest version number that is supported (see
460 [RFC2911] section 13.1.5.4). If the major version number is supported, but the minor version number is

461 not, the Receiver SHOULD accept and attempt to perform the request (or reject the request if the operation
462 is not supported), else it rejects the request and returns the ‘server-error-version-not-supported’ status code.
463 In all cases, the Receiver MUST return the “ippfax-version-number” operation attribute in the response
464 with the value that it supports that is closest to the version number supplied by the Sender in the request.

465 There is no version negotiation per se. However, if after receiving a ‘server-error-version-not-supported’
466 status code from a Receiver, a Sender SHOULD try again with a different version number. A Sender MAY
467 also determine the versions supported either from a directory (see section 22) or by querying the Printer
468 object’s “ipp-versions-supported” (see section 6.2) and “ippfax-versions-supported” attributes (see section
469 6.3) to determine which IPP and IPPFAX versions are supported, respectively, as part of IPPFAX.

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

472 **5 Get-Printer-Attributes operation semantics**

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

475 **5.1 document-format (mimeMediaType) operation attribute ([RFC2911] section 3.2.5.1)**

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

- 479 1. The Sender SHOULD supply the “document-format” operation attribute (IPP client may).
- 480 2. The Receiver MUST perform Attribute Coloring for the requested (or defaulted) document
481 format (IPP Printer may).
- 482 3. Standard mimeMediaType values are defined in section 6.6.

483 **5.2 pdfax-profile-requested (type2 keyword) operation attribute**

484 This operation attribute specifies one PDFax Profile (see [ifx-pdfax]). The Sender SHOULD supply the
485 “pdfax-profile-requested” operation attribute in the Get-Printer-Attributes request if the document-format
486 supplied is ~~either ‘image/tiffapplication/pdf’ [image-tiff] or ‘image/tiff-fx’ [image-tiff-fx]~~. The Receiver
487 MUST support this operation attribute in a Get-Printer-Attributes operation.

488 If the PDFax Profile supplied by the Sender is not supported (value not contained in the Receiver’s “pdfax-
489 profiles-supported” Printer Description attribute - see section 6.7), the Receiver MUST reject the operation
490 and return the ‘client-error-document-format-not-supported’ status code.

491 The Receiver MUST perform Attribute Coloring for the attributes returned as indicated in Table 1 and
492 Table 2 depending on the value of the “document-format” and “pdfax-profile-requested” operation
493 attributes supplied by the Sender in the Get-Printer-Attributes request.

494 If the Sender omits this attribute, the Receiver responds as if the Sender had supplied the PDFax FS Profile
495 (keyword value ‘pdfax-fs’) that is REQUIRED for all Receivers to support and performs Attribute Coloring
496 for that profile. Note: There is no “pdfax-profile-default” attribute defined for Get-Printer-Attributes (or
497 for Job Creation operations).

498 Standard keyword values are defined in section 6.7.

499 **6 IPPFAX Printer Description Attributes**

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

502 Table 1 lists all the IPPFAX conformance requirements for IPP and IPPFAX Printer Description attributes
503 whose semantics are defined in this document. The Receiver conformance requirements for Attribute
504 Coloring in the Get-Printer-Attributes response that depends on the “document-format” and “pdfax-profile-
505 requested” operation attribute values supplied by the client is indicated in the column labeled “Attribute
506 Coloring”.

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

511 A Sender MUST NOT use any OPTIONAL feature in PDFax unless it first queries the Receiver to confirm
512 that the Receiver supports the feature. If the feature is not supported in the Receiver then the Sender
513 MUST NOT use the OPTIONAL feature. A Sender MUST NOT use any feature that is prohibited in
514 PDFax [ifx-pdfax] specification.

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

517

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 mimeType) *	must	MUST	MUST NOT	6.6
pdfax-profiles-supported (1setOf type2 keyword)	may	MUST	MUST	6.7
pdfax-profile-capabilities (1setOf text(MAX))	may	MUST	MUST	6.8
pdfax-color-spaces-supported (1setOf type2 keyword)	may	MUST	MUST	6.9
pdfax-data-encryption-supported (1setOf type2 keyword)	may	MUST	MUST	6.10
pdfax-jbig2-cache-size-k-octets-supported (integer(2048:MAX))	may	MUST	MUST	6.11

518 * These IPP/1.1 attributes are defined in [RFC2911], but have enhanced semantics defined in this
519 document.

520 ** A Printer object that supports IPPFAX MUST NOT support IPP as well, but MUST support the “ipp-
521 versions-supported” attribute to indicate the version(s) of IPP that are supported *as part of IPPFAX*
522 *operations*. A Print System that supports both IPP and IPPFAX MUST support them as separate
523 Printer objects (see section 3.3).
524

525

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]
pdfl-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]

526

527 **6.1 printer-uri-supported (1setOf uri) ([RFC 2911] section 4.4.1)**

528 This attribute contains the set of target URIs that the Receiver supports, i.e., the URI values that a client
529 can supply as values of the “printer-uri” target operation attribute in requests. As in IPP/1.1, the Receiver
530 MUST support this Printer Description attribute (see [RFC2911] section 4.4.1). However, a single Printer
531 object MUST NOT support both ‘ipp’ and ‘ippfax’ schemed URIs. Therefore, the schemes MUST all be
532 ‘ipp’ or all ‘ippfax’. In order for a Print System to support both IPP and IPPFAX, it MUST use separate
533 Printer objects (see section 3.3).

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

539 The Receiver MUST support the ‘ippfax’ URL scheme (see section 16) and only the ‘ippfax’ URL scheme
540 for this attribute (see section 3.3).

541 **6.2 ipp-versions-supported (1setOf type2 keyword) ([RFC2911] section 4.4.14)**

542 This attribute identifies the version or versions of the IPP Protocol that this Receiver supports as part of the
543 IPPFAX Protocol (rather than indicating that the Receiver supports the IPP Protocol), including major and
544 minor versions, i.e., the version numbers for which this Receiver meets the conformance requirements.
545 The Receiver MUST support this Printer Description attribute. The Receiver MUST compare the “version-
546 number” parameter (see section 4.2), with the values of this attribute in order to determine whether the
547 Printer supports the IPP version requested by the Sender *as part of the IPPFAX Protocol*.

548 Standard keyword values are (from [RFC2911]):

549 ‘1.1’: The “IPP part” of the IPPFAX operations meets the protocol and encoding conformance
550 requirements of IPP version 1.1 as specified in [RFC2911], [RFC2910], and IPP extensions.
551

552 Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for
553 keywords, by starting with an ASCII digit, instead of an ASCII lower case letter.

554 **6.3 ippfax-versions-supported (1setOf type2 keyword)**

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

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

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

572 Standard keyword values are:

573 ‘1.0’: Meets the conformance requirements of IPPFAX version 1.0 as specified in this document.
574

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

579 **6.4 printer-is-accepting-jobs (boolean) ([RFC 2911] section 4.4.23)**

580 This attribute indicates whether or not the Receiver is currently accepting (IPPFAX) Job Creation requests.
581 As in IPP/1.1, the Receiver MUST support this Printer Description attribute (see [RFC2911] section
582 4.4.23).

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

585 **6.5 operations-supported (1setOf type2 enum) ([RFC 2911] section 4.4.15)**

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

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

595 **6.6 document-format-supported (1setOf mimeType) ([RFC 2911] section 4.4.22)**

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

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

601 TODO: (Some of the following table does not apply, what should be here instead?)

602 Standard mimeType values for IPPFAX jobs ~~include~~: is limited to 'application/pdf' which both the
603 Sender and Receiver MUST support.

604 **Table 3—Document Format MIME Media Types**

mimeType	Description	Sender support	Receiver support
image/tiff [image-tiff]	TIFF format [TIFF]	MUST	MUST
image/tiff-fx [image-tiff-fx]	TIFF-FX format [tiff-fx], [tiff-fx-ext1]	MAY	MAY
application/octet-stream	auto-sensing ([RFC2911] section 4.1.9.1)	MUST NOT	MUST NOT
any other MIME types	such as 'application/pdf'** (see [IANA-MT])	MUST NOT	MUST NOT

605 ~~** Note: The recent ANSI and ISO PDF/X-1:1999, PDF/X:2001, and PDF/X-1a formats and under~~
606 ~~development PDF/X-2 and PDF/X-3 formats which are specializations of 'application/pdf' MIME~~
607 ~~type do not have registered MIME types, though some of these have the same "blind interchange"~~
608 ~~guarantee of document presentation fidelity as 'image/tiff' and 'image/tiff-fx' MIME types.~~

609 **6.7 pdfax-profiles-supported (1setOf type2 keyword)**

610 This attribute identifies which black/white, grayscale, and color PDFax Profiles the Receiver supports. A
611 Receiver MUST support this Printer Description attribute.

612 This attribute only applies to PDFax profiles. ~~does not apply to additional document formats and profiles~~
613 ~~besides the PDFax Profiles of the 'image/tiff' [image-tiff] and 'image/tiff-fx' [image-tiff-fx] document~~
614 ~~formats.~~ Therefore, this attribute MUST NOT be returned if the "document-format" operation attribute
615 supplied by the Sender in the Get-Printer-Attributes request does not support PDFax Profiles.

616 See [ifx-pdfax] ~~Appendix A~~ Tables 3-1 and 3-4 for the definition of each of these PDFax Profiles and the
617 inter-dependency requirements for PDFax Profile support. The values of this attribute MUST conform to
618 the inter-dependency requirements in [ifx-pdfax] for PDFax Profile support (for example, PDFax Profile ~~S~~
619 F MUST be supported and PDFax Profile C MUST be supported if PDFax Profile ~~L~~-M is supported, so the
620 'pdfax-sf' keyword MUST always be present and the 'pdfax-c' keyword MUST be present if the 'pdfax-~~L~~
621 m' keyword is present).

622 Standard keyword values are shown in Table 3Table 4. Refer to Table 3-1 in [ifx-pdfax] for details on
 623 Sender (Creator) and Receiver (Renderer) support. All profiles have a ~~along with the~~ IANA registered
 624 MIME Media Type of ‘application/pdf’ and File Name Extension Suffix of ‘.pdf’:

625 **Table 34 - PDFax Profile keywords**

Keyword	Description (see [ifx-pdfax])
pdfax-s	PDFax Profile S
pdfax-f	PDFax Profile F
pdfax- jt	PDFax Profile J T
pdfax-c	PDFax Profile C
pdfax-cg	PDFax Profile C with gray-scale subset
pdfax- d	PDFax Profile L
pdfax- d g	PDFax Profile L D with gray-scale subset
pdfax-m	PDFax Profile M

626 * See ~~[image-tiff-fx]~~

627

628 6.8 pdfax-profile-capabilities (1setOf text(MAX))

629 This attribute contains a ~~CONNEX~~UPDF-capability string expression as defined in [ifx-pdfax] Appendix A
 630 (TODO:) for PDFax Profiles. A Receiver MAY support this Printer Description attribute. This attribute is
 631 intended to convey the capabilities of the Receiver that exceed the minimum requirements, if any, for each
 632 supported PDFax Profile.

633 This attribute does not apply to additional document formats and profiles besides the PDFax Profiles ~~of the~~
 634 ~~‘image/tiff’ [image-tiff] and ‘image/tiff-fx’ [image-tiff-fx] document formats~~. Therefore, this attribute
 635 MUST NOT be returned if the “document-format” operation attribute supplied by the Sender in the Get-
 636 Printer-Attributes request does not support PDFax Profiles.

637 Each value MUST end with explicit White Space where ~~CONNEX~~UPDF allows White Space to occur.
 638 However, there is no need to break a ~~CONNEX~~UPDF expression into more than one value if it all fits into
 639 1023 octets of a single text value (MAX = 1023).

640 The values taken together MUST conform to the minimum value in [ifx-pdfax], plus any additional
 641 capabilities that the Receiver supports. Thus a Sender can determine additional capabilities above the
 642 minimum for the PDFax Profiles that the Receiver supports (see section 6.7).

643 **6.9 pdfax-color-spaces-supported (1setOf type2 keyword)**

644 This attribute identifies which color spaces that the Receiver supports. A Receiver MUST support this
645 Printer Description attribute.

646 This attribute only applies to PDFax color profiles “c”, “d” and “m”. Therefore, this attribute MUST NOT
647 be returned if the “document-format” operation attribute supplied by the Sender in the Get-Printer-
648 Attributes request does not support PDFax.

649 See [ifx-pdfax] for the definition of each of these color spaces and the related PDFax Profiles and the
650 inter-dependency requirements for the color spaces and PDFax Profile support. The values of this attribute
651 MUST conform to the inter-dependency requirements in [ifx-pdfax].

652 **Table 4 – Color Space keywords**

Keyword	Description (see [ifx-pdfax])
“Cal”	CalGray, CalRGB
“Lab”	Lab
“ICC”	ICCBased
“Indexed”	Indexed

653

654 **6.10 pdfax-data-encryption-supported (1setOf type2 keyword)**

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

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

659 **Table 54 – Data Encryption keywords**

Keyword
“Standard”
“PPKLite”
“Digital-Signature”

660

661 **6.11 pdfax-jbig2-cache-size-k-octets-supported (integer(2048:MAX))**

662 This attribute identifies how many k-octets of RAM are available guaranteed to be available to cache
663 uncompressed JBIG2 objects. A Receiver MUST support this Printer Description attribute if it also

664 supports JBIG2. The minimum amount of memory that a Receiver must support is 2Meg of RAM. A
665 Sender MUST query this attribute if it wishes to cache more than 2 Meg of uncompressed data.

666 See [ifx-pdfax] for the definition and management of the cache.

667

668 **7 Sender Validation of the Receiver's Capabilities**

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

671 **7.1 Sender Validates the target Printer as a Receiver and determines its basic capabilities**

672 The Sender MUST validate that the target Printer is a valid Receiver using the Get-Printer-Attributes
673 operation as indicated in Table 6Table-5. The Sender SHOULD determine the Receiver's basic capabilities
674 before generating the document data in order to ensure the best rendering the document as intended by the
675 Sender before submitting an IPPFAX job as indicated in Table 6Table-5. The Sender MUST NOT rely
676 solely on the IPPFAX Validate-Job operation followed by the IPPFAX Job Creation operation, since an
677 IPP/1.1 (or IPP/1.0) Printer MAY accept both IPPFAX operations (but not perform IPPFAX semantics).

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

682 The order of presentation in Table 6Table-5 is the likely order that a Sender would check the values, though
683 the Sender can request all of the attributes in a single Get-Printer-Attributes operation (and the Receiver
684 MAY return them in any order as specified in [RFC2911]).

685

Table 65 - 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.
pdfax-profiles-supported	6.7	Sender SHOULD** check which PDFax Profiles of the ‘image/tiff’ and ‘image/tiff-fx’ document formats the Receiver supports, if the Sender uses any PDFax profiles other than ‘pdfax-fs’.
pdfax-profile-capabilities	06.8	Sender MUST check which OPTIONAL capabilities of each PDFax Profile the Receiver supports if the Sender uses any feature that is OPTIONAL for a PDFax Profile. The Sender MUST make this check, since profile capabilities are represented as CONNEX UPDF expressions (see [ifxs-pdfax]) which the Validate-Job operation cannot check.
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.

686

687

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

688

7.2 Validating the Printer’s IPPFAX capabilities using the Validate-Job operation

689

690

691

After validating that the Printer is a Receiver (section 7.1), the Sender MUST validate the job attributes using the Validate-Job operation (that doesn’t include any Document data) before sending the IPPFAX Job with the same attributes using an IPPFAX Job Creation operation that includes the Document data. The

692 Sender MUST supply all the same operation and Job Template attributes in the Validate-Job request as it
693 will supply in the subsequent Job Creation request (see section 9).

694 The Sender MUST supply the “ipp-attribute-fidelity” operation attribute with a ‘true’ value (see
695 [RFC2911] section 3.2.1.1 and 15.1) in both the Validate-Job and the Job Creation operations. Then the
696 Receiver will reject the request if any of the Job Template attributes and values are not supported, thereby
697 ensuring that the document is printed as intended. If the Validate-Job is rejected because of the lack of
698 support of one or more Job Template attributes, the Sender MUST query the user in order to proceed
699 without these attributes. If the Validate-Job fails for more serious reasons, such as ‘server-error-not-
700 accepting-jobs ([RFC2911] section 13.1.5.7), the Sender MUST inform the Sending User so that person has
701 the opportunity to choose to abandon the exchange or to try an IPP URL (see section 6.1) and then query
702 the Sending User if it is OK to use the IPP Protocol. The main IPPFAX features that MAY be missing in
703 the IPP Protocol are:

- 704 - Guaranteed exchange: Since IPP does not mandate any data formats it is possible that the
705 Sender MAY not be able to discover a common data format that both it and the printer support.
- 706 - Identity exchange (section 8): IPP need not provide the definitive identity exchange that
707 IPPFAX does. In many cases this is acceptable.

708 8 Identity exchange

709 This section defines the attributes that the Sender and the Receiver use to identify each to the other and to
710 identify the Sending User and the Receiver User. Table 7Table 6 lists these attributes and shows the
711 Sender and Receiver conformance requirements.

712 **Table 76 - 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

713 * Sender supplies in a Validate-Job and Job Creation operations.

714 ** Sender supplies in a Get-Printer-Attributes request.

715 8.1 sending-user-vcard (text(MAX)) operation/Job Description attribute

716 This operation attribute identifies the Sending User in MIME vCard v3.0 [RFC2426, RFC2425] format.
717 The Sender MAY send this operation attribute in an IPPFAX Job Creation operation. The Receiver MUST
718 support this Job Creation and Validate-Job operation attribute according to the vCard v3.0 specification
719 and MUST populate the job’s corresponding Job Description attribute. The Receiver MUST support MAX
720 (1023) octets of text. However, the Receiver MAY ignore any image, logo, and sound parts, in which case
721 it MUST still accept the Job Creation request and return the ‘successful-ok-ignored-or-substituted-

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

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

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

733 **8.2 receiving-user-vcard (text(MAX)) operation/Job Description attribute**

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

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

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

746 **8.3 sender-uri (uri) operation/Job Description attribute**

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

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

755 The Receiver MUST use its value to populate the Job object's corresponding Job Description attribute of
756 the same name. This value is only a comment (since it can be spoofed) and is used for logging purposes

757 and has nothing to do with authentication (for which see section 11). This attribute is more akin to an
758 email 'Reply-To' field.

759 **8.4 printer-uri-supported (1setOf uri) Printer Description attribute ([RFC2911] section 4.4.1)**

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

765 **9 Transmission using the Print-Job or Create-Job/Send-Document operations**

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

771 **9.1 IPP/1.1 Validate-Job and Job Creation operation attributes**

772 | Table 8~~Table 7~~ lists the operation attributes for Validate-Job and Job Creation operations for Senders,
773 IPP/1.1 Printers, and Receivers. Differences in Sender conformance from IPP/1.1 clients are indicated with
774 footnotes. Any other IPP operation attributes defined in other documents are OPTIONAL for IPPFAX.

775

Table 87 - 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 (mimeType) *	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
pdfax-profiles (1setOf type2 keyword) *	9.1.3	MUST	may	MUST

776

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

777

778

779

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

780

781

782

783

784

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

785

786

787

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

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.

788 9.1.2 document-format (mimeMediaType) operation attribute ([RFC2911] section 3.2.1.1)

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

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

796 If the Sender supplies a value that the Receiver does not support, i.e., not a value of the Receiver’s
797 “document-format-supported” Printer Description attribute, the Receiver MUST reject the operation and
798 return the ‘client-error-document-format-not-supported’ status code (IPP conformance).

799 Standard mimeType values are defined in section 6.6.

800 9.1.3 pdfax-profiles (1setOf type2 keyword) Job Creation operation attribute

801 This attribute identifies the PDFax Profiles of the document that the Sender is sending. The Sender
802 SHOULD supply this operation attribute in the Validate-Job and Job Creation operations as a hint to the
803 Receiver as to what the PDFax Profiles are ~~when the document format is ‘image/tiff’ [image-tiff] or~~
804 ~~‘image/tiff-fx’ [image-tiff-fx]~~. A Receiver MUST validate and support this operation attribute.

805 If the Sender supplies a value that the Receiver does not support, i.e., not a value of the Receiver’s “pdfax-
806 profiles-supported” Printer Description attribute, the Receiver MUST reject the operation and return the
807 ‘client-error-document-format-not-supported’ status code (IPP conformance extended to PDFax profiles -
808 see section 14.2).

809 If the Sender does not supply this attribute, the Receiver MUST accept the job anyway and validate as soon
810 as possible that the Receiver can successfully render the document data. If possible, it is
811 RECOMMENDED that such validation happen by examining the first part of the data before returning the
812 Job Creation response. Note: there is no “pdfax-profiles-default” attribute defined.

813 If the Sender supplies a value that the Receiver determines later is incorrect when processing the document
814 data, the document data takes precedence. Only if the Receiver does not support the discovered profile,
815 MUST the Receiver abort the job.

816 Standard keyword values are defined in section 6.7.

817 9.2 Job Template Attributes (for Validate-Job and Job Creation operations)

818 Table 9~~Table 8~~ lists all of the Job Template attributes defined in other IPP documents for use in Validate-
819 Job and Job Creation operations and shows their conformance for IPPFAX Jobs. As in [RFC2911], the
820 term “Job Template attribute” is actually up to four attributes: the “xxx” Job attribute, and the “xxx-

821 default”, “xxx-supported”, and possibly the “xxx-ready” Printer attributes. Any other IPP Job Template
822 attributes defined in other documents are OPTIONAL for IPPFAX.

823 As in IPP/1.1, if a Receiver supports the “xxx” Job Template attribute, then it MUST support the
824 corresponding “xxx-default” (if defined) and “xxx-supported” Printer attributes as well, and MAY support
825 the “xxx-ready” attribute (if defined).

826 In Table 9 **Table 8**, if the “Sender supply” and “Receiver support” columns contain an explicit single value,
827 the Sender MAY send and the Receiver MAY support the Job Template attribute for an IPPFAX Job, but
828 MUST support only the indicated value. Note: Each such single value has been selected as the value for
829 the attribute that would correspond to the *expected behavior* if the attribute were not supported at all. If
830 these attributes are supplied in an IPPFAX Job with any other value, the Receiver MUST reject the Job
831 Creation operation (since the value isn’t supported and “ipp-attribute-fidelity” MUST be ‘true’). If the
832 Receiver supports this attribute, the Receiver MUST return only the indicated value in the Get-Printer-
833 Attributes response for the corresponding “xxx-supported”, “xxx-default” Printer attributes. Note: These
834 are attributes which might degrade the appearance of the document or provide a significantly non-FAX
835 feature if the non-default value were supplied and supported, such as “number-up” = 2 or “job-priority” =
836 100, respectively.

837 In Table 9 **Table 8**, if the “Sender supply” and “Receiver support” columns contain “MUST NOT”, the
838 Sender MUST NOT supply and the Receiver MUST NOT support the Job Template attribute for an
839 IPPFAX Job. If these attributes are supplied in an IPPFAX Job, the Receiver MUST reject the Job
840 Creation operation (since the attribute isn’t supported and “ipp-attribute-fidelity” MUST be ‘true’). When
841 querying the Receiver with the Get-Printer-Attributes operation, the corresponding “xxx-default” and “xxx-
842 supported” MUST NOT be returned. Note: These are attributes which might degrade the appearance of the
843 document or provide a significantly non-FAX feature and do not have an obvious value which corresponds
844 to the behavior when the attribute is not supported at all, such as media-input-tray-check (type3 keyword |
845 name(MAX)) or output-bin (type2 keyword | name(MAX)).

846 In Table 9 **Table 8**, the “Receiver Attribute Coloring” column indicates the Receiver conformance
847 requirements for Attribute Coloring in the Get-Printer-Attributes response that depends on the “document-
848 format” and “pdfax-profile-requested” operation attribute values supplied by the Sender. The ‘n/a’ value
849 indicates not applicable, since the attribute either MUST NOT be supported or MUST have only the
850 indicated single value.

851 **Table 98 - 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]

Job Template attribute	Sender supply *	Receiver support *	Receiver Attribute Coloring	Reference
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]
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	[ipp-job-prog]
sides (type2 keyword)	MAY	MAY	MAY	[RFC2911]
x-image-position (type2 keyword)	'none'	'none'	n/a	[ipp-prod-print]

Job Template attribute	Sender supply *	Receiver support *	Receiver Attribute Coloring	Reference
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]
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]

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

855 **9.2.1 media (type2 keyword | name(MAX)) Job Template attribute ([RFC2911] section**
856 **4.2.11)**

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

861 The PDFax Profiles standard [ifx-pdfax] REQUIRES that both the Sender and the Receiver be able to
862 determine the dimensions from the keyword value. Therefore, the keyword values MUST be Media Size
863 Self Describing names defined in the PWG Standardized Name standard [pwg-media].

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

865 'na_letter_8.5x11in'
866 'iso_a4_210x297mm'

867 **9.2.1.1 media-supported and media-ready Job Template Printer attributes**

868 The Sender MUST query the values of the “media-supported” and “media-ready” attributes ([RFC2911]
869 section 4.2.11), since the Sender MUST supply the “media” Job Template attribute in the Job Creation
870 operation. The “media-ready” attribute indicates which media are currently loaded and will not require
871 human intervention in order to be used.

872 Standard keyword values are defined in section 9.2.1.

873 **9.2.2 printer-resolution (resolution) Job Template attribute ([RFC2911] section 4.2.12)**

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

878 For PDFax Documents, if the Sender supplies the “printer-resolution” (resolution) Job Template attribute,
879 the value MUST agree with the resolution of each of the pages of the PDFax Document. If the supplied
880 value disagrees with the resolution of any of the pages of the PDFax Document, the Receiver MUST obey
881 the resolution in the PDFax document, on a page by page basis.

882 Note: The main purpose of requiring the Receiver to support the “printer-resolution” Job Template
883 attribute is so that the Sender can query the corresponding “printer-resolution-supported” (1setOf
884 resolution) Printer attribute to see what resolutions are supported in addition to the ones REQUIRED for
885 the PDFax Profiles supported. See section 9.2.2.1.

886 **9.2.2.1 printer-resolution-supported Job Template Printer attribute**

887 If the Sender is using a resolution for a PDFax Profile that is not one of the REQUIRED resolutions for the
888 PDFax Profile being used, then the Sender SHOULD query the “printer-resolution-supported” Printer
889 attribute. The Receiver MUST support Attribute Coloring (by document format and by PDFax profile) for
890 the ‘~~image/tiff~~application/pdf’ [image-tiff] and ‘~~image/tiff~~application/pdf-fx’ [image-tiff-fx] document-
891 formats. Thus this attribute allows the Sender to determine the additional resolutions supported in addition
892 to the resolutions required for support of each of the PDFax Profiles without having to interpret the
893 ~~CONN~~UPDF-expression values of the “pdfax-profile-capabilities” Printer Description attribute (see
894 section ~~06.8~~).

895 **9.3 Subscription Template Attributes Conformance Requirements**

896 Table ~~10~~~~Table-9~~ lists the conformance requirements for Subscription attributes on the Job Creation and
897 Validate-Job requests. The attributes in Subscription Objects are shown immediately followed (indented)
898 by their corresponding Default and Supported Printer Attributes.

899

Table 109 - 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]

900
901
902
903

* The Sender MUST supply at least the “notify-recipient-uri” attribute for any Push Delivery Method.
** The Sender MUST supply at least the “notify-pull-method” attribute for any Pull Delivery Method, such as the REQUIRED ‘ippget’ Delivery Method.

904

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

905
906
907
908
909

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

910

9.3.2 Notification Event Conformance Requirements

911

Table 11 ~~Table 10~~ lists the conformance requirements for notification events.

912 The Receiver MUST support the ‘job-progress’ event (which is OPTIONAL in [ipp-ntfy]), as well as all of
 913 the REQUIRED events in [ipp-ntfy] (‘none’, ‘printer-state-change’, ‘printer-stopped’, ‘job-state-change’,
 914 ‘job-created’, and ‘job-completed’). However, the Receiver MUST NOT support any Printer Events in
 915 Per-Job Subscriptions, since that would give an IPPFAX Sender information about the Printer while the
 916 Printer was printing other IPPFAX Jobs. If the Sender subscribes to the ‘job-progress’ event, the Receiver
 917 MUST generate an event for every sheet, as moderated by the Printer’s “notify-time-interval” attribute
 918 [ipp-ntfy], which the Sender can obtain using the Get-Notifications request.

919 For the purposes of IPPFAX, the ‘job-completed’ event notifications means that the Receiver has delivered
 920 the IPPFAX Job somewhere; either actually delivered printed sheets to the output bin or forwarded the job
 921 and document to some other system.

922 **Table 1110 - 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	

923

924 **9.4 Confirmation using the Document Creation response**

925 The Sender knows when the Receiver has successfully received the entire Document when the Receiver
 926 returns the ‘successful-ok’ status code in the Print-Job, or Send-Document. The Sender MUST then inform

927 the Sending User by means outside the scope of this standard that the document has successfully been
928 received. See section 9.3.2 for informing the Sending User when the document has been successfully
929 printed.

930 **9.5 Sender URI Stamping**

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

- 933 1. On a cover page automatically generated by the Sender that is sent before the rest of the
934 document.
- 935 2. Merged with the first page of the document.
- 936 3. At the top of every page of the sent Document.

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

940 **9.6 Get-Notifications operation to get Event Notifications**

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

947 **10 IPPFAX Implementation of other IPP operations**

948 Section 5 defined the semantic requirements for the Get-Printer-Attributes operation, section 7 defined the
949 semantic requirements for Validate-Job, and section 9 defined the semantic requirements for Job Creation
950 operations for IPPFAX. This section defines the IPPFAX semantics and conformance requirements for the
951 other IPP operations.

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

954 The Receiver **MUST** fully support the Print-Job, Validate-Job, Get-Printer-Attributes and Get-Notifications
955 operations, as defined by this document. The following subsections define restrictions and conformance
956 requirements placed on the Cancel-Job, Get-Job-Attributes, Get-Jobs, Enable-Printer, Disable-Printer, Set-
957 Printer-Attributes, and Get-Printer-Attributes operations. For a conforming IPPFAX Receiver
958 implementation, the support for each of the IPP operations is indicated in Table 12 ~~Table 11~~ and Table
959 13 ~~Table 12~~.

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

964 **10.1 Operation Conformance Requirements**

965 | Table 12~~Table 11~~ lists the conformance requirements for Printer operations for (1) an IPP/1.1 Printer ('ipp'
966 URL), (2) the non-privileged IPPFAX Sender, (3) an IPPFAX Receiver receiving a request from a non-
967 privileged User, and (4) an IPPFAX Receiver receiving a request from an authenticated and authorized
968 operator or administrator, if the Receiver supports operator/administrator authentication and authorization.

969 | Table 13~~Table 12~~ lists the conformance requirements for Job and Subscription operations for (1) an IPP/1.1
970 Printer ('ipp') URL, (2) the non-privileged IPPFAX Sender which MUST be on the same URL as the job
971 was created (the target "printer-uri" MUST match the Job's "job-printer-uri" Job Description attribute), (3)
972 an IPPFAX Receiver receiving a request from the Job or Subscription Object Owner, (4) from some other
973 non-privileged user, and (5) if the operation is supported at all - from an authenticated and authorized
974 operator or administrator.

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

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

981

Table 12H - 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]
Send-Notifications	may	MUST NOT	MAY **	MAY	[ipp-indp- method]
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	[ipp-ops-set2]
Hold-New-Jobs	may	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Release-Held-New-Jobs	may	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Deactivate-Printer	may	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Activate-Printer	may	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Restart-Printer	may	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Shutdown-Printer	may	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Startup-Printer	may	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Cancel-Current-Job	may	MUST NOT	MUST NOT	MUST NOT	[ipp-ops-set2]
Suspend-Current-Job	may	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]

Legend:

MAY* - If supported, Get-Job-Attributes and Get-Jobs MUST restrict certain attributes, such as “job-name”, and “job-originating-user-name”. See section 10.3.

MAY** - For Send-Notifications, the Receiver *sends to* a User or Operator (rather than *receives from*).

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Table 1312 - 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**	[ipp-ops-set2]
Resume-Job	may	MUST NOT	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Promote-Job	may	MUST NOT	MUST NOT	MUST NOT	MAY	[ipp-ops-set2]
Schedule-Job-After	may	MUST NOT	MUST NOT	MUST NOT	MUST NOT	[ipp-ops-set2]

988

Legend:

989

MAY* - If supported, Get-Job-Attributes and Get-Jobs MUST restrict certain attributes, such as “job-name”, and “job-originating-user-name”. See section 10.3.

990

MAY** - Restart-Job and Reprocess-Job are for the operator to recover from a problem with the job, not to make additional copies.

991

MAY*** - Operators MAY cancel their own subscriptions, but MUST NOT cancel subscriptions belonging to others.

992

Owner refers to the owner of the Job or Subscription object.

993

994

995

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

996

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

997

998

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

999

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

1000

1001

1002

1003 **10.3 Get-Job-Attributes and Get-Jobs operations ([RFC2911] sections 3.3.4 and 3.2.6)**

1004 The public nature of IPPFAX interactions make it inappropriate for a client to be able to query a Receiver
1005 for certain information about jobs that it did not send.

1006 The Receiver SHOULD restrict the job attributes that any Sender can request for any IPPFAX Job in a Get-
1007 Jobs or a Get-Job-Attributes operation to appropriate ones for a public service. For example, a Receiver
1008 MAY return only the following Job attributes:

1009 job-id, job-uri
1010 job-k-octets, job-k-octets-completed
1011 job-media-sheets, job-media-sheets-completed,
1012 time-at-creation, time-at-processing
1013 job-state, job-state-reasons
1014 number-of-intervening-jobs

1015
1016 The exact choice of Job attributes that a client can query for IPPFAX Jobs, including not returning any,
1017 DEPENDS ON IMPLEMENTATION and the security policy in force and is outside the scope of this
1018 standard (as in IPP/1.1).

1019 This attribute set allows a client to determine the load on a Receiver (and perhaps choose an alternative
1020 destination or warn the Sending User).

1021 See the discussion in [RFC2911] section 8.4 for a description of how a Receiver MUST behave if it
1022 receives a request for an attribute outside this set.

1023 An IPP administrator MAY read all attributes.

1024 **10.4 Enable-Printer and Disable-Printer operations [ipp-ops-set2]**

1025 The Enable-Printer and Disable-Printer operations [ipp-ops-set2] allow a remote operator to change the
1026 value of the Receiver's "printer-is-accepting-jobs" (boolean) Printer Description attribute (see section 6.4)
1027 to 'true' or 'false', respectively. These operations are OPTIONAL for a Receiver to support.

1028 These operations affect all jobs that can be submitted to the Printer object. If a Print System supports both
1029 IPP and IPPFAX, then it MUST support them with separate Printer objects (see section 3.3). Therefore, a
1030 client MUST issue separate operations to each Printer object in order to affect both IPP and IPPFAX jobs
1031 on the same Print System, the 'ipp' URL scheme or the 'ippfax' URL scheme in the "printer-uri" target
1032 operation attribute for the IPP Printer object or the Receiver (IPPFAX Printer object), respectively.

1033 **10.5 Set-Printer-Attributes and Get-Printer-Supported-Values operations [ipp-set-ops]**

1034 The Set-Printer-Attributes and Get-Printer-Supported-Values operations [ipp-set-ops] are OPTIONAL
1035 administrative operation for IPPFAX, as for IPP. If a Receiver supports these operations, then the
1036 "document-format" and "pdfax-profile-requested" operation attributes MUST be supported for these

1037 operations as well so that the administrator can set values that require Attribute Coloring (by document
1038 format and PDFax profile). See the description of the Get-Printer-Attributes operation in section 5 which
1039 also REQUIRES these operation attributes to be supported.

1040 **11 Security considerations**

1041 IPPFAX presents an interesting challenge of balancing security and openness. Many of the envisaged uses
1042 of IPPFAX require confidentiality of the data – at the same time the Receiver typically has no prior
1043 knowledge of the Sender or the Sending User. This last point will normally rule out all user-based
1044 authentication and access control. This is the reason for the restriction placed on querying and canceling
1045 IPPFAX Jobs.

1046 **11.1 Privacy**

1047 Any exchange between a Sender and a Receiver **MUST** be carried using the privacy mechanism specified
1048 in IPP/1.1 namely TLS [RFC2246]. In some cases this will also result in mutual authentication of the
1049 Sender and Receiver (in the case where both sides have certificates).

1050 The Receiver **MUST** have a TLS certificate.

1051 The Sender **MAY** have a certificate. A Receiver **MAY** decide to reject requests that come from Senders
1052 that do not have a certificate and return the ‘client-error-not-authenticated’ status code.

1053 A Sender can either use its own certificate or it can use one associated with the Sending User.

1054 Senders and Receivers **SHOULD** do what current browsers do, namely, be deployed with the public keys
1055 of a number of the top Certificate Authorities. If a Sender gets a public key from a Receiver that it doesn’t
1056 recognize, the Sender **MUST** query the Sending User to see if the Sending User trusts the Receiver before
1057 sending the IPPFAX job to the Receiver.

1058 The distribution of private keys to Senders or Receivers is outside the scope of this document, but it is done
1059 over the network, it **MUST** be over a secure channel. See Internet Key Exchange (IKE) [RFC2409].

1060 **11.2 uri-authentication-supported (1setOf type2 keyword) ([RFC2911] section 4.4.2)**

1061 This attribute (see [RFC2911] section 4.4.2) identifies the Client Authentication mechanism associated
 1062 with each URI listed in the “printer-uri-supported” attribute (see section 6.1).

1063 **Table 1413 - 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 outside 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.

1064 * TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA mandated by [RFC2246].

1065 Table 15~~Table 14~~ compares the Digest Authentication requirements for IPP/1.1 clients, IPP/1.1 Printers,
 1066 IPPFAX Senders, and IPPFAX Receivers.

1067 **Table 1514 - 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

1068

1069 **11.3 uri-security-supported (1setOf type2 keyword) ([RFC2911] section 4.4.3)**

1070 This attribute (see [RFC2911] section 4.4.3) identifies the security (Integrity and Privacy) mechanisms
 1071 used for each URI listed in the “printer-uri-supported” attribute (see section 6.1).

1072 **Table 16~~15~~ - 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

1073

1074 Table 17~~Table 16~~ compares the TLS conformance requirements for IPP/1.1 clients, IPP/1.1 Printers,
 1075 IPPFAX Senders, and IPPFAX Receivers.

1076 **Table 17~~16~~ - 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

1077 * The ‘certificate’ keyword value for the “uri-authentication-supported” attribute [RFC2911].

1078 ** The Sender MUST query the Sending User before omitting the Data Privacy encryption.

1079 Senders and Receivers MUST support the TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite as
 1080 mandated by RFC 2246 [RFC2246]. All stronger cipher suites are OPTIONAL; weaker cipher suites
 1081 MUST NOT be supported or used by Senders or Receivers.

1082 A Receiver MAY support Basic Authentication (described in HTTP/1.1 [RFC2617]) for Client
 1083 Authentication if the TLS channel is secured with Data Privacy. TLS with the above mandated cipher suite
 1084 or stronger can provide such a secure channel.

1085 11.4 Using IPPFAX with TLS

1086 The Sender MUST use only TLS for all IPPFAX operations on the IPPFAX URL. The client MUST start
1087 the transaction in TLS, rather than using HTTP upgrade requests. The following paragraph of [RFC2818]
1088 further explains:

1089 The agent acting as the HTTP client should also act as the TLS client. It should initiate a
1090 connection to the server on the appropriate port and then send the TLS ClientHello to begin the TLS
1091 handshake. When the TLS handshake has finished. The client may then initiate the first HTTP
1092 request. All HTTP data MUST be sent as TLS “application data”. Normal HTTP behavior,
1093 including retained connections should be followed.

1094 Contrast this IPPFAX requirement with the IPP requirement in section 8.2 of [RFC2910]. The following
1095 client actions compare IPP with IPPFAX from a client’s point of view:

1096 IPP/1.1 sequence:

- 1097 1. Start TCP connection
- 1098 2. Zero or more HTTP/IPP requests
- 1099 3. HTTP/IPP request with Upgrade to TLS header
- 1100 4. TLS handshake
- 1101 5. finish the HTTP/IPP request securely
- 1102 6. Send more HTTP/IPP requests securely ...

1103

1104 IPPFAX sequence:

- 1105 1. Start TCP connection
- 1106 2. Send TLS ClientHello
- 1107 3. rest of TLS handshake
- 1108 4. Send HTTP/IPPFAX requests securely ... (which usually will be a Get-Printer-Attributes,
1109 followed by Validate-Job and Print-Job operations).

1110

1111 11.5 Access control

1112 It is expected that the majority of IPPFAX Receivers will operate in a public mode when operating on the
1113 Internet, so that anonymous users can send documents without requiring client authentication
1114 (corresponding to the ‘none’ value for the “uri-authentication-supported” attribute - see section 11.2).
1115 However a Receiver MAY protect itself using any Client Authentication method specified in [RFC2911]
1116 (digest authentication [RFC2069] for example) to restrict access to any or all of its functionality.

1117 However, the primary intent of IPPFAX is to create a controlled public access mode. It therefore does not
1118 really make much sense to combine IPPFAX and user authentication; they are achieving the same thing.

1119 **11.6 Reduced feature set**

1120 An administrator or device implementer MAY choose to setup up a Print Service so that it only works as a
1121 IPPFAX Receiver (i.e., offers no 'native' IPP operations and does not accept IPP Jobs). In this mode it
1122 offers a restricted set of features and MAY be more safely connected to the Internet.

1123 A Receiver that is operating in this mode MUST do so by rejecting any non-IPPFAX request and return a
1124 'client-error-attributes-or-values-not-supported' error status code as indicated in section 4.1 for an
1125 unsupported value of the "printer-uri" operation attribute. For job operations attempted on IPPFAX Jobs,
1126 the Receiver MUST return the 'client-error-not-authorized' error status code, unless the Sender is
1127 authenticated as the system administrator and the Receiver supports such access.

1128 **12 Gateways to other systems**

1129 A common scenario will be where IPPFAX acts as an on-ramp or off-ramp to other Document transmission
1130 systems.

1131 **12.1 Off-Ramps**

1132 In the IPPFAX 'Off-ramp' scenario the user with a Document to send uses an IPPFAX Sender to transmit a
1133 Document to an IPPFAX Receiver within a gateway that in turn transmits it to some other destination, i.e.
1134 GSTN FAX. Handling Off-ramps is beyond the scope of this document, but may be a future IPPFAX
1135 extensions building on the Off-ramp work of the Internet FAX WG.

1136 **12.2 On-Ramps**

1137 In the IPPFAX On-Ramp scenario the user originally sent the Document using some other mechanism to
1138 some intermediate agent. The intermediate agent, acting as an IPPFAX Sender, then uses the IPPFAX
1139 Protocol to transmit the Document to an Receiver which MAY be either a final destination or an Off-Ramp.
1140 IPPFAX has no specific support for on-ramps.

1141 **13 Attribute Syntaxes**

1142 No new attribute syntaxes are defined.

1143 **14 Status codes**

1144 In addition to the semantics of the status codes defined in [RFC2911] and [ipp-get-method], the following
1145 additional semantics are defined for [RFC2911] status codes:

1146 14.1 client-error-bad-request (0x0400) [RFC2911 section 13.1.4.1]

1147 The client has failed to supply one or more attributes in a request which are REQUIRED to be supplied.
1148 The requirement can be because of the Printer's current configuration or because of some other attributes
1149 that the client supplied. The Printer MUST reject the request, MUST return the 'client-error-bad-request'
1150 status code, and SHOULD return the keyword attribute name(s) (but not the values) of the missing
1151 attribute(s) in the Unsupported Attributes Group in the response.

1152 14.2 document-format-not-supported (0x040A) [RFC2911 section 13.1.4.11]

1153 The concept of a document format is extended to include the PDFax Profile. This status code is returned if
1154 the document format is not supported, including the indicated PDFax Profile.

1155 15 Conformance Requirements

1156 This section summarizes the conformance requirements for Senders and Receivers that are defined
1157 elsewhere in this document.

- 1158 1. A Sender and Receiver MUST observe the attribute name space conventions specified in section
1159 1.3.
- 1160 2. The Sender MUST supply and the Receiver MUST support (1) the "printer-uri" operation attribute
1161 with the 'ippfax' scheme, (2) the "version-number" parameter with the IPP/1.1 '1.1' (or higher
1162 minor version) value, and (3) the "ippfax-version-number" operation attribute with the IPPFAX/1.0
1163 '1.0' keyword value in all operations to get the IPPFAX semantics as described in section 4.
- 1164 3. The Receiver MUST support the Get-Printer-Attributes operation as described in sections 5.
- 1165 4. The Receiver MUST support the Printer Description attributes as specified in section 6.
- 1166 5. The Sender MUST validate that the target Printer is IPPFAX-capable using the Get-Printer-
1167 Attributes operation and validate that the Receiver supports the job using the Validate-Job operation
1168 as specified in section 7.
- 1169 6. The Sender MUST supply and the Receiver MUST support the operation/Job Description attributes
1170 for Identify Exchange as described in section 8.
- 1171 7. The Sender MUST support submitting and the Receiver MUST accept IPPFAX Jobs as defined in
1172 section 9.
- 1173 8. The Sender MUST place the Sender's identity in the document according to section 9.5.
- 1174 9. The Sender and Receiver MUST support the IPP Notification for Job Creation operations, the
1175 'ippget' Delivery Method, the Get-Notifications operation for the events indicated in sections 9.6,
1176 9.3, and 9.3.2, respectively.

1177 10. The Sender and Receiver MUST support the operations as indicated in section 10.

1178 11. The Sender and Receiver MUST support the security mechanisms indicated in section 11, including
1179 TLS.

1180 **16 IPPFAX URL Scheme**

1181 This section is intended for use in registering the ‘ippfax’ URL scheme with IANA and fully conforms to
1182 the requirements in [RFC2717].

1183 **16.1 IPPFAX URL Scheme Applicability and Intended Usage**

1184 This document defines the ‘ippfax’ URL (Uniform Resource Locator) scheme for specifying the location of
1185 an IPPFAX Receiver which implements the IPPFAX Protocol specified in this document.

1186 The ‘ippfax’ URL scheme defined in this document is based on the ABNF for the basic hierarchical URL
1187 syntax in [RFC2396]; however relative URL forms, parameters, and/or query parts are NOT allowed in an
1188 IPPFAX URL. The ‘ippfax’ URL scheme is case-insensitive in the host name or host address part;
1189 however the path part is case-sensitive, as in [RFC2396]. Codepoints outside [US-ASCII] MUST be hex
1190 escaped by the mechanism defined in [RFC2396].

1191 The intended usage of the ‘ippfax’ URL scheme is COMMON.

1192 **16.2 IPPFAX URL Scheme Associated IPPFAX Port**

1193 All IPPFAX URLs which do NOT explicitly specify a port MUST be used over IANA-assigned well-
1194 known port **xxx [TBA by IANA]** for the IPPFAX Protocol.

1195 See: IANA Port Numbers Registry [IANA-PORTREG].

1196 **16.3 IPPFAX URL Scheme Associated MIME Type**

1197 All IPPFAX protocol operations (requests and responses) MUST be conveyed in an ‘application/ipp’
1198 MIME media type [RFC2910] as registered in [IANA-MT]. IPPFAX URLs MUST refer to IPPFAX
1199 Receivers which support this ‘application/ipp’ operation encoding.

1200 See: IANA MIME Media Types Registry [IANA-MT].

1201 **16.4 IPPFAX URL Scheme Character Encoding**

1202 The IPPFAX URL scheme defined in this document is based on the ABNF for the HTTP URL scheme
1203 defined in HTTP/1.1 [RFC2616], which is derived from the URI Generic Syntax [RFC2396] and further
1204 updated by [RFC2732] and [RFC2373] (for IPv6 addresses in URLs). The IPPFAX URL scheme is case-

1205 insensitive in the ‘scheme’ and ‘host’ (host name or host address) part; however, the ‘abs_path’ part is
1206 case-sensitive, as in [RFC2396]. Code points outside [US-ASCII] MUST be hex escaped by the
1207 mechanism specified in [RFC2396].

1208 **16.5 IPPFAX URL Scheme Syntax in ABNF**

1209 The IPP protocol places a limit of 1023 octets (NOT characters) on the length of a URI (see section 4.1.5
1210 ‘uri’ in [RFC2911]). An IPPFAX Receiver MUST return ‘client-error-request-value-too-long’ (see section
1211 13.1.4.10 in [RFC2911]) when a URI received in a request is too long.

1212 Note: IPPFAX Receivers ought to be cautious about depending on URI lengths above 255 bytes, because
1213 some older client or proxy implementations might not properly support these lengths.

1214 IPPFAX URLs MUST be represented in absolute form. Absolute URLs always begin with a scheme name
1215 followed by a colon. For definitive information on URL syntax and semantics, see “Uniform Resource
1216 Identifiers (URI): Generic Syntax and Semantics” [RFC2396]. This specification adopts the definitions of
1217 “port”, “host”, “abs_path”, and “query” from [RFC2396], as updated by [RFC2732] and [RFC2373] (for
1218 IPv6 addresses in URLs).

1219 The IPPFAX URL scheme syntax in ABNF is as follows:

```
1220     ippfax_URL = "ippfax:" "//" host [ ":" port ] [ abs_path [ "?" query ] ]
```

1221
1222 If the port is empty or not given, the IANA-assigned port as defined in section 16.2 is assumed. The
1223 semantics are that the identified resource (see section 5.1.2 of [RFC2616]) is located at the IPPFAX
1224 Notification Recipient listening for HTTP connections on that port of that host, and the Request-URI for
1225 the identified resource is ‘abs_path’.

1226 Note: The use of IP addresses in URLs SHOULD be avoided whenever possible (see [RFC1900]).

1227 If the ‘abs_path’ is not present in the URL, it MUST be given as “/” when used as a Request-URI for a
1228 resource (see section 5.1.2 of [RFC2616]). If a proxy receives a host name which is not a fully qualified
1229 domain name, it MAY add its domain to the host name it received. If a proxy receives a fully qualified
1230 domain name, the proxy MUST NOT change the host name.

1231 **16.6 IPPFAX URL Examples**

1232 The following are examples of valid IPPFAX URLs for Notification Recipient objects (using DNS host
1233 names):

```
1234     ippfax://abc.com  
1235     ippfax://abc.com/listener
```

1236
1237 Note: The use of IP addresses in URLs SHOULD be avoided whenever possible (see [RFC1900]).

1238 The following literal IPv4 addresses:

1239 192.9.5.5 ; IPv4 address in IPv4 style
 1240 186.7.8.9 ; IPv4 address in IPv4 style

1241

1242 are represented in the following example IPPFAX URLs:

1243 ippfax://192.9.5.5/listener
 1244 ippfax://186.7.8.9/listeners/tom

1245

1246 The following literal IPv6 addresses (conformant to [RFC2373]):

1247 ::192.9.5.5 ; IPv4 address in IPv6 style
 1248 ::FFFF:129.144.52.38 ; IPv4 address in IPv6 style
 1249 2010:836B:4179::836B:4179 ; IPv6 address per RFC 2373

1250

1251 are represented in the following example IPPFAX URLs:

1252 ippfax://[::192.9.5.5]/listener
 1253 ippfax://[::FFFF:129.144.52.38]/listener
 1254 ippfax://[2010:836B:4179::836B:4179]/listeners/tom

1255

1256 16.7 IPPFAX URL Comparisons

1257 When comparing two IPPFAX URLs to decide if they match or not, the comparer MUST use the same
 1258 rules as those defined for HTTP URI comparisons in [RFC2616], with the sole following exception:

- 1259 • A port that is empty or not given MUST be treated as equivalent to the port as defined in section
 1260 16.2 for that IPPFAX URL;

1261 17 IANA Considerations

1262 IANA shall register the ippfax URL scheme as defined in section 16 according to the procedures of
 1263 [RFC2717] and assign a well known port.

1264 Operation Attributes:

1265 | ippfax-version-number (type2 keyword) IEEE-ISTO ~~5102.1~~510n.y

1266

1267 | pdfax-profile-requested (type2 keyword) IEEE-ISTO

1268 | ~~5102.1~~510n.y 5.2

1269 | pdfax-profiles (1setOf type2 keyword) IEEE-ISTO

1270 | ~~5102.1~~510n.y 9.1.3

1271

1272 Operation/Job Description attributes:

1273 | sending-user-vcard (text(MAX)) IEEE-ISTO ~~5102.1~~510n.y

1274 | 8.1

1275 | receiving-user-vcard (text(MAX)) IEEE-ISTO ~~5102.1~~510n.y

1276 | 8.2

1277 sender-uri (uri) IEEE-ISTO ~~5102.1~~510n.y
 1278 8.3
 1279
 1280 Printer Description Attributes:
 1281 ippfax-versions-supported (1setOf type2 keyword) IEEE-ISTO ~~5102.1~~510n.y
 1282 6.3
 1283 pdfax-profiles-supported (1setOf type2 keyword) IEEE-ISTO
 1284 ~~5102.1~~510n.y 6.7
 1285
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1419

1420

Contact Information:

1421

1422

IPP Web Page: <http://www.pwg.org/ipp/>

1423

IPP Mailing List: ipp@pwg.org

1424

1425

To subscribe to the ipp mailing list, send the following email:

1426

1) send it to majordomo@pwg.org

1427

2) leave the subject line blank

1428

3) put the following two lines in the message body:

1429

subscribe ipp

1430

end

1431

1432

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

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1434

1435

1436

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1438 20 Appendix A: Comparison of IPP/1.1 and IPPFAX/1.0 (Informative)

1439 This informative appendix compares IPP/1.1 and IPPFAX/1.0 with references to the appropriate sections
 1440 for details. If this appendix contradicts or omits any differences, it is a mistake and the body of this
 1441 document still prevails. Most of the differences are in conformance requirements only. Therefore, for
 1442 most of the differences, it is possible to implement both with the same code (without conditional branches).

1443 Legend:

1444 ** Where IPP/1.1 and IPPFAX/1.0 have a real difference, such as IPP/1.1 must and IPPFAX/1.0
 1445 MUST NOT, (indicated below by leading **), would a conditional branch be needed in the
 1446 implementation code in order to support both IPP/1.1 and IPPFAX/1.0.

1447 * Where IPP/1.1 is a may and IPPFAX/1.0 is a MUST NOT (indicated below by a leading *),
 1448 would a conditional branch be needed in the implementation code in order to support both IPP/1.1
 1449 and IPPFAX/1.0, *but only if the IPP/1.1 part supports the feature.*

1450 Differences between the IPP/1.1 protocol and the IPPFAX/1.0 protocol:

- 1451 1. ** IPP uses the 'ipp' URL scheme with a default port of 631, while IPPFAX uses the 'ippfax' URL
 1452 scheme with a default port of xxx [TBA by IANA] (section 4.1 and 16).
- 1453 2. ** IPP has only one version number parameter, while IPPFAX has two version numbers: the
 1454 "version-number" parameter for IPP (section 4.2) and the "ippfax-version-number" operation
 1455 attribute for IPPFAX (section 4.3).

1456 Differences between an IPP client and a Sender:

- 1457 1. An IPP Client may use any IPP operation, while a Sender MUST use at least Get-Printer-Attributes
1458 (sections 5 and 7.1), Validate-Job (section 7.2), and Print-Job operations (section 9). A Sender
1459 MUST use the Get-Notifications operation, unless the Sending User has explicitly indicated
1460 otherwise (section 9.6).
- 1461 2. In the Get-Printer-Attributes request, an IPP Client may supply the “document-format” and “pdfax-
1462 profile-requested” operation attributes, while a Sender SHOULD (sections 5.1 and 5.2) in order to
1463 get Attribute Coloring.
- 1464 3. ** In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the
1465 “ipp-attribute-fidelity” operation attribute with either the ‘true’ or ‘false’ value or may omit the
1466 attribute entirely, while the Sender MUST always supply the attribute and with the ‘true’ value
1467 (sections 7.2 and 9.1.1).
- 1468 4. In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the
1469 “document-format” operation attribute, while the Sender MUST supply it (section 9.1.2).
- 1470 5. * An IPP Client may support any MIME Media Type as the value of the “document-format”
1471 operation attribute, while the Sender MUST support **at least** the ‘image/tiffapplication/pdf’ MIME
1472 Media Type, ~~MAY support the ‘image/tiff-fx’ MIME Media Type, and MUST NOT support any~~
1473 ~~MIME Media Type unless it has the same “blind interchange” guarantee of document presentation~~
1474 ~~fidelity as TIFF-FX [tiff-fx] (section 6.6).~~
- 1475 6. In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the
1476 “media” Job Template attribute, while the Sender MUST supply it (section 9.2.1).
- 1477 7. * An IPP Client may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the
1478 “media” Job Template attribute or the Media Size Self Describing Name keyword values defined
1479 in the IEEE-ISTO 5101.1 “Media Standardized Names” [pwg-media], while the Sender MUST use
1480 the keyword values from [pwg-media] (section 9.2.1).
- 1481 8. There are no requirements for an IPP Client to indicate the client or the client user in the document,
1482 while the Sender MUST supply the “sender-uri” value along with a date and time, on at least the
1483 cover page (section 9.5).
- 1484 9. An IPP Client need not support Event Notification, while the Sender MUST support at least the
1485 ‘ippget’ Pull Delivery Method (section 9.3), which REQUIRES using the Get-Notifications
1486 operation (section 9.6).
- 1487 10. An IPP Client may support any events, while a Sender MUST NOT support the ‘job-config-
1488 changed’ event and MUST NOT support any Printer events (section 9.3.2).
- 1489 11. An IPP Client may support Client Authentication, while a Sender MUST support at least ‘digest’
1490 and ‘certificate’ (section 11.2).

1491 12. An IPP Client may support Data Integrity and Data Privacy, while a Sender MUST support Data
1492 Integrity and may use Data Privacy with at least the
1493 TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.2).

1494 Differences between an IPP Printer and a Receiver:

1495 1. In the Get-Printer-Attributes response, an IPP Printer may color the attribute values returned
1496 according to the “document-format” supplied, while a Receiver MUST color the values returned
1497 according to both the “document-format” and “pdfax-profile-requested” operation attributes
1498 supplied (sections 5 and 6), including the “printer-resolutions-supported” attribute (section
1499 9.2.2.1).

1500 2. * An IPP Printer is not required to support any particular document formats, while a Receiver
1501 MUST support the PDFax ‘image/tiffapplication/pdf’ format with profile pdfax-sf, ~~MAY support~~
1502 ~~‘image/tiff-fx’, and MUST NOT support any others, unless they have the same level of “blind~~
1503 ~~interchange” guarantee for document presentation fidelity as TIFF-FX (section 6.6).~~

1504 3. * An IPP Printer may support ‘application/octet-stream’ (auto-sensing - [RFC2911] 4.1.9.1), while
1505 a Receiver MUST NOT (section 6.6).

1506 4. An IPP Printer may support the IPPFAX attributes: “pdfax-profile-requested”, “pdfax-profiles-
1507 supported”, “sending-user-vcard”, “receiving-user-vcard”, “sender-uri”, and “pdfax-profiles”,
1508 while a Receiver MUST (sections 5.2, 6, 8, and 9.1.3).

1509 5. ** An IPP Printer MUST NOT support the “ippfax-versions” and “ippfax-versions-supported”
1510 attributes, while a Receiver MUST (sections 4.3 and 6.3).

1511 6. ** An IPP Printer must support both values of the “ipp-attribute-fidelity” operation attribute, while
1512 the Receiver MUST only support the ‘true’ value (section 9.1.1).

1513 7. ** An IPP Printer must assume a value of ‘false’ if the IPP Client omits the “ipp-attribute-fidelity”
1514 operation attribute, while the Receiver MUST reject the request with the ‘client-error-bad-request’
1515 status code (section 9.1.1).

1516 8. An IPP Printer is not required to support any particular Job Template attributes, while a Receiver
1517 MUST support at least the “media” and “printer-resolution” Job Template attributes, including the
1518 “media-ready” Printer attribute (section 9.2).

1519 9. * An IPP Printer may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the
1520 “media” Job Template attribute or the Media Size Self Describing Name keyword values defined
1521 in the IEEE-ISTO 5101.1 “Media Standardized Names” [pwg-media], while the Receiver MUST
1522 support a subset of the keyword values from [pwg-media] (section 9.2.1).

1523 10. * An IPP Printer may support any Job Template attribute values, while a Receiver is restricted to a
1524 single value for many Job Template attributes for which other values would alter the appearance of
1525 the document or provide a non-FAX-like feature (section 9.2).

- 1526 11. * An IPP Printer may support Print-URI and Send-URI operations, while a Receiver MUST NOT
1527 (section 10.1).
- 1528 12. An IPP Printer must support Get-Jobs and Get-Job-Attributes operations, while a Receiver NEED
1529 NOT (section 10.1).
- 1530 13. ** An IPP Printer must support Cancel-Job operation, while a Receiver MUST NOT (section
1531 10.2).
- 1532 14. An IPP Printer may support administrative operations without authentication, while a Receiver
1533 MUST authenticate administrative operations, if administrative operations are supported (section
1534 10.1).
- 1535 15. * An IPP Printer may support the following operations from an authenticated operator or
1536 administrator: Purge-Jobs, Cancel-Current-Job, Cancel-Job, and Schedule-Job-After, while a
1537 Receiver MUST reject such operations from an authenticated operator or administrator.
- 1538 16. An IPP Printer may support Event Notification, while a Receiver MUST support Event
1539 Notification (sections 9.3 and 10.1) and at least the ‘ippget’ Delivery Method (section 9.6), which
1540 REQUIRES support for the Get-Notifications operation.
- 1541 17. If an IPP Printer supports Event Notification, it must support the ‘job-state-changed’ and ‘job-
1542 created’ events for Per-Job Subscriptions, while a Receiver NEED NOT (section 9.3.2).
- 1543 18. ** If an IPP Printer supports Printer Events, then it MUST support them for both Per-Job and Per-
1544 Printer Subscriptions, while a Receiver MUST NOT support them for Per-Job Subscriptions
1545 (section 9.3.2).
- 1546 19. If an IPP Printer supports Event Notification, it may support the ‘job-progress’ event, while a
1547 Receiver MUST for Per-Job Subscriptions (section 9.3.2).
- 1548 20. * If an IPP Printer supports Event Notification, it may support the ‘job-config-changed’ event,
1549 while a Receiver MUST NOT (section 9.3.2).
- 1550 21. If an IPP Printer supports the Set-Printer-Attributes operation, then it may support setting the
1551 Attribute Coloring values according to the “document-format” operation attribute, while the
1552 Receiver, if it supports the Set-Printer-Attributes operation, MUST support setting the Attribute
1553 Coloring values according to the “document-format” and “pdfax-profile-requested” operation
1554 attributes (section 10.5).
- 1555 22. An IPP Printer should support and may use TLS, while a Receiver MUST support and MUST use
1556 TLS (section 11.3).
- 1557 23. An IPP Printer may support Client Authentication, while a Receiver MUST support at least
1558 ‘digest’ and ‘certificate’ (section 11.2).

1559 24. An IPP Printer may support Data Integrity and Data Privacy and support them with any cipher
1560 suite, while a Receiver MUST support both Data Integrity and Data Privacy with at least the
1561 TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.2).

1562 **21 Appendix B: vCard Example**

1563 The following ASCII text is a complete vCard v3.0 [RFC2426, RFC2425] example:

```
1564 BEGIN:VCARD
1565 VERSION:3.0
1566 N:Moore;Paul
1567 FN:Paul Moore
1568 ORG:Netreon
1569 TEL;CELL;VOICE:1+206-251-7008
1570 ADR;WORK;;;10900 NE 8th St,Bellvue;WA;98004;United States of America
1571 EMAIL;PREF;INTERNET:pmoore@netreon.com
1572 REV:19991207T215341Z
1573 END:VCARD
1574
```

1575 **22 Appendix C: Generic Directory Schema for an IPPFAX Receiver**

1576 This section defines a generic schema for an entry in a directory service. A directory service is a means by
1577 which service users can locate service providers. In IPPFAX environments, this means that Receivers
1578 (IPPFAX Printers) can be registered (either automatically or with the help of an administrator) as entries of
1579 type PRINTER in the directory using an IMPLEMENTATION SPECIFIC mechanism such as entry
1580 attributes, entry type fields, specific branches, etc. Directory clients can search or browse for entries of
1581 type PRINTER. Clients use the directory service to find entries based on naming, organizational contexts,
1582 or filtered searches on attribute values of entries. For example, a client can find all printers in the “Local
1583 Department” context. Authentication and authorization are also often part of a directory service so that an
1584 administrator can place limits on end users so that they are only allowed to find entries to which they have
1585 certain access rights. IPPFAX itself does not require any specific directory service protocol or provider.

1586 Note: Some directory implementations allow for the notion of “aliasing”. That is, one directory entry
1587 object can appear as multiple directory entry objects with different names for each object. In each case,
1588 each alias refers to the same directory entry object which refers to a single IPPFAX Printer object.

1589 The generic IPPFAX schema is a subset of IPPFAX Job Template and Printer Description attributes (Table
1590 1, Table 2, and [RFC2911] sections 4.2 and 4.4). These attributes are identified as either
1591 RECOMMENDED or OPTIONAL for the directory entry itself. This conformance labeling is NOT the
1592 same conformance labeling applied to the attributes of IPPFAX Printers objects. The conformance labeling
1593 in this Appendix is intended to apply to directory templates and to Receivers that subscribe by adding one
1594 or more entries to a directory. RECOMMENDED attributes SHOULD be associated with each directory
1595 entry. OPTIONAL attributes MAY be associated with the directory entry (if known or supported). In
1596 addition, all directory entry attributes SHOULD reflect the current attribute values for the corresponding
1597 IPPFAX Printer object.

1598 The names of attributes in directory schema and entries SHOULD be the same as the IPPFAX Printer
1599 attribute names as shown, as much as possible.

1600 In order to bridge between the directory service and the IPPFAX Printer object, one of the
1601 RECOMMENDED directory entry attributes is the Printer object's "printer-uri-supported" attribute. The
1602 directory client queries the "printer-uri-supported" attribute (or its equivalent) in the directory entry and
1603 then the IPPFAX client addresses the IPPFAX Printer object using one of its URIs. The "uri-security-
1604 supported" attribute identifies the protocol (if any) used to secure a channel. If a Printer object supports
1605 both IPP and IPPFAX, there should be two separate directory entries in order to represent these two
1606 services.

1607 Table 18~~Table 17~~ defines the generic schema for directory entries of abstract type PRINTER. In the future
1608 this schema could also be directory entries of type FAX. In either case, the concrete type MUST be
1609 IPPFAX. If a Printer object supports both IPP and IPPFAX, there should be two separate directory entries
1610 in order to represent these two services, one with concrete type IPP and the other with concrete type
1611 IPPFAX, respectively.

1612 **Table 18~~17~~ - 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
pdfax-profiles-supported (1setOf type2 keyword)	RECOMMENDED	section 6.7

1613

1614 **23 Appendix D: Summary of other IPP documents**

1615 The full set of IPP documents includes:

- 1616 1. Design Goals for an Internet Printing Protocol [RFC2567]
1617 2. Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
1618 3. Internet Printing Protocol/1.1: Model and Semantics (this document)
1619 4. Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]
1620 5. Internet Printing Protocol/1.1: Implementer's Guide [RFC3196] and [ipp-iig-bis]
1621 6. Mapping between LPD and IPP Protocols [RFC2569]
1622

1623 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
1624 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included
1625 in a printing protocol for the Internet. It identifies requirements for three types of users: end users,
1626 operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A
1627 few OPTIONAL operator operations have been added to IPP/1.1.

1628 The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document
1629 describes IPP from a high level view, defines a roadmap for the various documents that form the suite of

1630 IPP specification documents, and gives background and rationale for the IETF working group's major
1631 decisions.

1632 The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the abstract
1633 operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the
1634 encoding rules for a new Internet MIME media type called "application/ipp". This document also defines
1635 the rules for transporting over HTTP a message body whose Content-Type is "application/ipp". This
1636 document defines a new scheme named 'ipp' for identifying IPP printers and jobs.

1637 The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to
1638 implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of
1639 the considerations that may assist them in the design of their client and/or IPP object implementations. For
1640 example, a typical order of processing requests is given, including error checking. Motivation for some of
1641 the specification decisions is also included.

1642 The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of gateways
1643 between IPP and LPD (Line Printer Daemon) implementations.

1644 **24 Appendix E: Description of the IEEE Industry Standards and Technology** 1645 **(ISTO)**

1646 The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible
1647 operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards,
1648 but also to facilitate activities that support the implementation and acceptance of standards in the
1649 marketplace. The organization is affiliated with the IEEE (<http://www.ieee.org/>) and the IEEE Standards
1650 Association (<http://standards.ieee.org/>).

1651 For additional information regarding the IEEE-ISTO and its industry programs visit:

1652 <http://www.ieee-isto.org>.

1653 **25 Appendix F: Description of the IEEE-ISTO PWG**

1654 The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology
1655 Organization (ISTO) and is an alliance among printer manufacturers, print server developers, operating
1656 system providers, network operating systems providers, network connectivity vendors, and print
1657 management application developers chartered to make printers and the applications and operating systems
1658 supporting them work together better. All references to the PWG in this document implicitly mean "The
1659 Printer Working Group, a Program of the IEEE ISTO." In order to meet this objective, the PWG will
1660 document the results of their work as open standards that define print related protocols, interfaces,
1661 procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from
1662 the interoperability provided by voluntary conformance to these standards.

1663 In general, a PWG standard is a specification that is stable, well understood and is technically competent,
1664 has multiple, independent and interoperable implementations with substantial operational experience, and
1665 enjoys significant public support.

1666 For additional information regarding the Printer Working Group visit:

1667 <http://www.pwg.org>

1668 **26 Revision History (to be removed when standard is approved)**

Revision	Date	Author	Notes
1	1/16/01	Paul Moore, Neteon	Initial version
2	2/27/01	Paul Moore, Gail Songer, Neteon	Specify TLS as MUST Removed Cover page and combined device Added need for big text types
3	4/11/01	Gail Songer, Neteon	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 PDFax as file format. Replace CONNEG with UPDF. Attributes for OPTIONAL PDFax functionality.

1669