The Printer Working Group
Standard for IPPFAX/1.0 Protocol

Proposed Standard - Working Draft
510n.y-P0.17

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35 **Abstract:** This document specifies the IPPFAX/1.0 protocol. The IPPFAX requirements [ifx-req] are
36 derived from the requirements for Internet Fax [RFC2542].
37 In summary, IPPFAX is used to provide a synchronous, reliable exchange of image Documents between
38 clients and servers. The primary use envisaged of this protocol is to provide a synchronous image
39 transmission service for the Internet. Contrast this with the Internet FAX protocol specified in [RFC2305]
40 and [RFC2532] that uses the SMTP mail protocol as a transport.
41 The IPPFAX/1.0 protocol is a specialization of the IPP/1.1 [RFC2911], [RFC2910] protocol supporting a
42 subset of the IPP operations with increased conformance requirements in some cases, some restrictions in
43 other cases, and some additional REQUIRED attributes. The IPPFAX Protocol uses the 'ippfax' URL
44 scheme (instead of the 'ipp' URL scheme) in all its operations. Most of the new attributes defined in this
45 document MAY be supported by IPP Printers as OPTIONAL extensions to IPP as well. In addition,
46 IPPFAX/1.0 REQUIRES the support of the IPP Event Notification mechanism [ipp-ntfy] using the 'ippget'
47 Pull Delivery Method [ipp-get-method].
48 An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least the PDF/is as specified
49 in [ifx-pdfis] which is defined for the 'application/pdf' document format MIME type . A Print System MAY be
50 configured to support both the IPPFAX and IPP protocols concurrently, but each protocol requires separate
51 Printer objects with distinct URLs.
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53 This document is available electronically at:
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55   pwg-ifx-ippfax-P17-030709.pdf, .doc

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

57   pwg-ifx-ippfax-P17-030709-rev.pdf

58 The latest version of this specification is available at:

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

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1 Introduction

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

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

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

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

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

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

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

264 **1.1 Operations used**

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

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

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

271 3. Print-Job - Sender MUST submit the IPPFAX job with a single document (or MAY send
272 Create-Job and one or more Send-Document operations if the Receiver also supports these
273 operations). Note that a sender MUST perform a Validate-Job before a Create-Job operation
274 because not all operation attributes that are permitted on a Validate-Job (e.g. document-format)
275 are valid on a Create-Job.

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

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278 **1.2 Typical exchange**

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

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

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

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

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

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

298   6. The Sender either (1) scans the Document and converts it into an acceptable data format or (2)
299   generates or forwards the Document representation in an acceptable data format – see section 6.5.

300   7. As part of the Validation and Job creation, the following identities are determined and exchanged: | Deleted: C |
301   Sender, Sending User, Receiver, and Receiving User – see section 8.

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

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

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

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

310   **1.3 Namespace used for attributes**

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

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

322   **2 Terminology**

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

324 **2.1 Conformance Terminology**

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

332 **2.2 Other Terminology**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

382 The terminology defined in the IPP "Event Notifications and Subscriptions" specification [ipp-ntfy] and
383 "The 'ippget' Delivery Method for Event Notifications" specification [ipp-get-method], such as **Event**
384 **Notification**, **Event**, **Subscription Object**, **Per-Job Subscription**, **Per-Printer Subscription**, **Push**

> **Deleted: Job Creation Operation** The IPP or IPPFAX operations that create IPP or IPPFAX Jobs, respectively, i.e., the Print-Job, Print-URI, and Create-Job operations (see [RFC2911]).¶

385 **Delivery Method**, and **Pull Delivery Method** is also used in this document with the same capitalization
386 conventions and semantics.

3 IPPFAX Model

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

3.1 Printer Object Relationships

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

3.2 A Printer object with multiple URLs

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

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

408 Note: For a Printer object that supports multiple URLs, neither the IPP/1.1 protocol nor the IPPFAX/1.0
409 protocol provides a way for the administrator to Set or Get the values of Printer attributes whose values
410 MAY depend on the URL used and/or MAY depend on the authenticated role of the requesting user. So,
411 for example, there is no way to set the differing values of the "operations-supported" Printer attribute (see
412 section 6.4) that depend on the URL using the IPP or IPPFAX protocol. Providing such means is left for
413 future work as a single specification for use by both IPP and IPPFAX.

3.3 A Print System supporting both IPP and IPPFAX protocols

414

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

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

4 Common IPPFAX Operation Attribute Semantics

427

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

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

432

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

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

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

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

444 in the target "printer-uri" operation attribute that the client supplies MUST determine the protocol, the
445 Printer object, and the semantics that the Print System performs.

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

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

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

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

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

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

469 The value of this operation attribute indicates the version of the IPPFAX Protocol and encoding that the
470 Sender is requesting and the Receiver is returning. The Sender MUST supply this operation attribute in
471 every request and the Receiver MUST return this operation attribute in every response. This operation
472 attribute MUST be placed in the Operation Attributes Group *immediately* after the operation attributes
473 whose order is specified in IPP/1.1 [RFC2911]. The semantics of the "ippfax-version-number" operation
474 attribute serves the same purpose for the IPPFAX Protocol as the IPP/1.1 "version-number" parameter
475 serves for the IPP Protocol (see [RFC2911] section 3.1.8).

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

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

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

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

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

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

501 **5 Get-Printer-Attributes operation semantics**

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

504 **5.1 document-format (mimeMediaType) operation attribute ([RFC2911] section 3.2.5.1)**

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

508   1. The Sender SHOULD supply the "document-format" operation attribute (IPP client may) and, if
509   supplied, the value MUST be "application/PDF".

510 # 6 IPPFAX Printer Description Attributes

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

513 Table 1 lists all the IPPFAX conformance requirements for IPP and IPPFAX Printer Description attributes
514 whose semantics are defined in this document.

515 All Printer Description attributes not listed in Table 1 have the same conformance requirements as defined
516 in IPP/1.1 [RFC2911] or IPP Notifications [ipp-ntfy]. Any other Printer Description attributes defined in
517 other documents are OPTIONAL for IPPFAX.

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

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

Attribute Name (attribute syntax)	IPP Printer support [RFC 2911]	Receiver support	Section
printer-uri-supported (1setOf uri) *	must	MUST	6.1, 1
ipp-versions-supported (1setOf type2 keyword) *	must	MUST***	6.2
ippfax-versions-supported (1setOf type2 keyword)	MUST NOT	MUST***	6.3
operations-supported (1setOf type2 enum) *	must	MUST	6.4
document-format-supported (1setOf mimeMediaType) *	must	MUST	6.5
document-format-version-supported (1setOf text(127)) **	may	MUST	6.6
digital-signature-supported (1setOf type2 keyword) **	may	MUST	6.7
pdl-override-supported (type2 keyword) *	must	MUST	6.8

521   * These IPP/1.1 attributes are defined in [RFC2911], but have enhanced semantics defined in this
522   document.
523   ** These attributes are defined in [?Close-Job extensions?], but have enhanced semantics defined in this
524   document.
525   *** A Printer object that supports IPPFAX MUST NOT support IPP as well, but MUST support the "ipp-
526   versions-supported" attribute to indicate the version(s) of IPP that are supported *as part of IPPFAX*
527   *operations*. A Print System that supports both IPP and IPPFAX MUST support them as separate
528   Printer objects (see section 3.3).

529   **6.1 printer-uri-supported (1setOf uri) ([RFC 2911] section 4.4.1)**

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

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

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

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

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

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

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

551 '1.1': The "IPP part" of the IPPFAX operations meets the protocol and encoding conformance
552   requirements of IPP version 1.1 as specified in [RFC2911], [RFC2910], and IPP extensions.
553
554   Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for
555   keywords, by starting with an ASCII digit, instead of an ASCII lower case letter.

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

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

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

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

574 Standard keyword values are:

575   '1.0': Meets the conformance requirements of IPPFAX version 1.0 as specified in this document.
576
577   Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for
578   keywords, by starting with an ASCII digit, instead of an ASCII lower case letter. However, for
579   consistency with IPP, these IPPFAX version keyword values are defined compatibly with the IPP
580   version keyword values.

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

581

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

584 The values of this attribute MAY depend on the URL supplied in the "printer-uri" operation attribute
585 and/or MAY depend on the authority of the authenticated requesting user. For example, a Receiver that
586 supports administrative operations MUST NOT support administrative operations for use by end users, but
587 such a Receiver MAY return the administrative operation enums to end users.

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

588

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

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

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

6.6 document-format-version-supported (1setOf text(127))

595

596 CHANGE: Reference the "Job X extensions" Specification.

597 This attribute identifies which PDF formats the Receiver supports. A Receiver MUST support this
598 attribute, a Sender MAY support this attribute.

599 Both the Sender and Receiver MUST support "PDF/is-1.0". The Receiver MAY support other versions of
600 PDF and if it does then the Receiver MUST only list formats that it fully supports.

Deleted: change this attribute to docuemt-format-version-supported (document-format-version) and then

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6.7 digital-signatures-supported (1setOf type2 keyword)

601

602 This attribute identifies which digital signature technologies are supported by the Receiver. A Receiver
603 MUST support this Printer Description attribute.

604 Digital-signature and digital-signature-supported will move to [jobX] specification. Reference them from
605 that specification

606 If the Receiver cannot validate the digital signature or if the digital signature fails to verify, then the
607 Receiver MUST notify the Receiving User using an implementation specific method.

6.8 pdl-override-supported (type2 keyword)

608

609 This attribute expresses the ability for a particular Receiver implementation to either attempt to override
610 document data instructions with IPPFAX attributes or not.
611
612 This attribute MUST have the value 'attempted' or a higher quality IANA-registered value (such as a
613 hypothetical 'guaranteed' value), and the Receiver MUST attempt to override at least the media.

7 Sender Validation of the Receiver's Capabilities

614

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

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

617

618 The Sender MUST validate that the target Printer is a valid Receiver using the Get-Printer-Attributes
619 operation as indicated in Table 2. The Sender SHOULD determine the Receiver's basic capabilities before
620 generating the document data in order to ensure the best rendering the document as intended by the Sender
621 before submitting an IPPFAX job as indicated in Table 2. The Sender MUST NOT rely solely on the
622 IPPFAX Validate-Job operation followed by the IPPFAX Print-Job/Create-Job operation, since an IPP/1.1
623 (or IPP/1.0) Printer MAY accept both IPPFAX operations (but not perform IPPFAX semantics).

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

628 The order of presentation in Table 2 is the likely order that a Sender would check the values, though the
629 Sender can request all of the attributes in a single Get-Printer-Attributes operation (and the Receiver MAY
630 return them in any order as specified in [RFC2911]).

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Deleted: A Sender MUST NOT use any feature that is prohibited in the PDF/is [ifx-pdfis] specification.¶
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631   **Table 2 - 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	6.4	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	6.5	Sender SHOULD** check which document formats the Receiver supports.
document-format-version-supported	6.6	Sender SHOULD** check which PDF versions the Receiver supports.
Job Template Printer attributes:		
media-supported	1.1.1.1	Sender SHOULD** check which media is supported, if the Sender specifies a particular media.
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.

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

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

635   After validating that the Printer is a Receiver (section 7.1), the Sender MUST validate the job attributes
636   using the Validate-Job operation (that doesn't include any Document data) before sending the IPPFAX Job
637   with the same attributes using an IPPFAX Print-Job/Create-Job operation. The Sender MUST supply all
638   the same operation and Job Template attributes in the Validate-Job request as it will supply in the
639   subsequent Print-Job/Create-Job request (see section 9).

640   The Sender MUST supply the "ipp-attribute-fidelity" operation attribute with a 'true' value (see
641   [RFC2911] section 3.2.1.1 and 15.1) in both the Validate-Job and the Print-Job/Create-Job operations.
642   Then the Receiver will reject the request if any of the Job Template attributes and values are not supported,

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643 thereby ensuring that the document is printed as intended. If the Validate-Job is rejected because of the
644 lack of support of one or more Job Template attributes, the Sender MUST query the user in order to
645 proceed without these attributes. If the Validate-Job fails for more serious reasons, such as 'server-error-
646 not-accepting-jobs' ([RFC2911] section 13.1.5.7), the Sender MUST inform the Sending User so that
647 person has the opportunity to choose to abandon the exchange or to try an IPP URL (see section 6.1) and
648 then query the Sending User if it is OK to use the IPP Protocol. The main IPPFAX features that MAY be
649 missing in the IPP Protocol are:

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

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

8 Identity exchange

655 This section defines the attributes that the Sender and the Receiver use to identify each to the other and to
656 identify the Sending User and the Receiver User. Table 3 lists these attributes and shows the Sender and
657 Receiver conformance requirements.

658   **Table 3 - 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

659   * Sender supplies in a Validate-Job, Print-Job, and Create-Job operation.

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

661 This operation attribute identifies the Sending User in MIME vCard v3.0 [RFC2426, RFC2425] format.
662 The Sender MAY send this operation attribute in an IPPFAX Print-Job/Create-Job operation. The Receiver
663 MUST support this Print-Job/Create-Job and Validate-Job operation attribute according to the vCard v3.0
664 specification and MUST populate the job's corresponding Job Description attribute. The Receiver MUST
665 support MAX (1023) octets of text. However, the Receiver MAY ignore any image, logo, and sound parts,
666 in which case it MUST still accept the Print-Job/Create-Job request and return the 'successful-ok-ignored-
667 or-substituted-attributes' status code (see [RFC2911] section 13.1.2.2), but NEED NOT return the attribute
668 and its ignored values in the Unsupported Attributes Group.

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

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

678 **8.2 receiving-user-vcard (text(MAX)) operation/Job Description attribute**

679 This operation attribute identifies the intended Receiving User in MIME vCard format [RFC2426,
680 RFC2425]. The Sender SHOULD send this operation attribute in an IPPFAX Print-Job/Create-Job or
681 Validate-Job operation. The Receiver MUST support this Print-Job/Create-Job operation attribute and
682 MUST populate the job's corresponding Job Description attribute. The Receiver MUST support MAX
683 (1023) octets of text. However, the Receiver MAY ignore any image, logo, and sound parts, in which case
684 it MUST still accept the Print-Job/Create-Job request and return the 'successful-ok-ignored-or-substituted-
685 attributes' status code (see [RFC2911] section 13.1.2.2), but NEED NOT return the attribute and its
686 ignored values in the Unsupported Attributes Group.

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

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

691 **8.3 sender-uri (uri) operation/Job Description attribute**

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

697 The Sender MUST send this operation attribute with the configured value in an IPPFAX Print-Job/Create-
698 Job operation. The Receiver MUST support this Print-Job/Create-Job operation attribute and MUST
699 populate the job's corresponding Job Description attribute.

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

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

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

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

9.1 IPP/1.1 Validate-Job and Print-Job/Create-Job operation attributes

711 Table 4 lists the operation attributes for Validate-Job and Print-Job/Create-Job operations for Senders,
712 IPP/1.1 Printers, and Receivers. Differences in Sender conformance from IPP/1.1 clients are indicated with
713 footnotes. Any other IPP operation attributes defined in other documents are OPTIONAL for IPPFAX.

Deleted: <#>printer-uri-supported (1setOf uri) Printer Description attribute ([RFC2911] section 4.4.1)¶
This IPP/1.1 Printer Description attribute (see [RFC2911] section 4.4.1) identifies the Receiving device, so that no new IPPFAX Printer Description attribute is needed. See section 6.1 for additional IPPFAX semantics for this attribute. The Sender MUST query this attribute using the Get-Printer-Attributes operation as specified in section 7.1 while supplying a target "printer-uri" operation attribute with the 'ippfax' scheme.¶

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714

Table 4 - IPP/1.1 Validate Job and Print-Job/Create-Job operation attributes

Operation attribute	Section	Sender supplies	IPP/1.1 Printer supports	Receiver supports
attributes-charset (charset)		MUST	must	MUST
attributes-natural-language (naturalLanguage)		MUST	must	MUST
printer-uri (uri) *	4.1	MUST	must	MUST
requesting-user-name (name(MAX)) *		SHOULD	must	MUST
job-name (name(MAX))		MAY	must	MUST
ipp-attribute-fidelity (boolean) *	9.1.1	MUST with 'true' value[1]	must	MUST
document-name (name(MAX)) *		MAY	must	MUST
compression (type3 keyword) *		MAY	must	MUST
document-format (mimeMediaType) *	9.1.2	MUST[2]	must	MUST
document-format-version (type2 keyword)	9.1.3	MUST[3]	may	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[3]	may	MUST
receiving-user-vcard (text(MAX))	8.2	SHOULD[3]	may	MUST
sender-uri (name(MAX))	8.3	MUST[3]	may	MUST

715   * As in IPP/1.1, these attributes are NOT Job Description attributes, only Operation attributes.
716

717   **9.1.1 ipp-attribute-fidelity operation attribute ([RFC2911] section 3.2.1.1)**

718   In IPP/1.1, this operation attribute indicates whether or not the client requires the Printer to support all Job
719   Template attributes and values supplied. The Sender MUST supply this operation attribute in the Validate-
720   Job and Print-Job/Create-Job operations and the value MUST be 'true'. A Receiver MUST validate and

---

[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.

[3] These attributes were not defined in [RFC2911].

721 support this operation attribute. Note: [RFC2911] does not REQUIRE the IPP Client to supply this
722 operation attribute and allows the client to supply the 'false' value.

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

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

727 This operation attribute identifies the MIME Media Type of the document that the Sender is sending. The
728 Sender MUST supply this operation attribute in the Validate-Job and Print-Job/Create-Job operations and
729 the value MUST be "application/PDF". A Receiver MUST validate that the value of attribute is
730 "application/pdf". Note: [RFC2911] does not REQUIRE the IPP Client to supply this operation attribute.

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> **Deleted:** and support
> **Deleted:** this operation attribute

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

734 Because only one document-format MAY be supported, attribute coloring is not relevant for IPPFax. If the
735 Sender desires to send a different format, then it should use a different transmission protocol than IPPFax.

> **Deleted:** If the Sender supplies a value that the Receiver does not support, i.e., not a value of the Receiver's "document-format-supported" Printer Description attribute, the Receiver MUST reject the operation and return the 'client-error-document-format-not-supported' status code (IPP conformance).¶
> Standard mimeMediaType values are defined in section 6.5.¶

9.1.3 document-format-version (type2 keyword) operation attribute ([RFC2911] section 3.2.1.1)

> **Deleted:** document-object specification

738 This attribute should be taken from the JobX specification. Revise this section Reference the JobX spec.

> **Deleted:** Completely define here and note that it the exact same as the document-object specification

739 (Add somewhere a mention that Sender must support generating and transmitting PDF/is-1.0. Maybe in
740 section 1 to make it clear that it is a basic part of IPPFAX?)

741 This operation attribute identifies the type2 keyword of the pdf document that the Sender is sending. The
742 Sender MUST supply this operation attribute in the Validate-Job and Print-Job/Create-Job operations. A
743 Receiver MUST validate and support this operation attribute.

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744 If the Sender supplies a value that the Receiver does not support, i.e., not a value of the Receiver's
745 "document-format-versions-supported" Printer Description attribute, the Receiver MUST reject the
746 operation and return the 'client-error-document-format-not-supported' status code.

> **Deleted:** pdf-format-supported

747 Standard keyword values are defined in section 6.6.

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748 | **9.2 Job Template Attributes (for Validate-Job and Print-Job/Create-Job operations)**

749 Table 5 lists all of the Job Template attributes defined in other IPP documents for use in Validate-Job and
750 Print-Job/Create-Job operations and shows their conformance for IPPFAX Jobs. As in [RFC2911], the

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751 term "Job Template attribute" is actually up to four attributes: the "xxx" Job attribute, and the "xxx-
752 default", "xxx-supported", and possibly the "xxx-ready" Printer attributes. Any other IPP Job Template
753 attributes defined in other documents are OPTIONAL for IPPFAX.

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

757 In Table 5, if the "Sender supply" and "Receiver support" columns contain an explicit single value, the
758 Sender MAY send and the Receiver MAY support the Job Template attribute for an IPPFAX Job. When
759 supported, the Sender MUST send and the Receiver MUST support only the indicated value; that is, there
760 is only one allowed value. Each such single value has been selected as the value for the attribute that would
761 correspond to the *expected behavior* if the attribute were not supported at all. If these attributes are
762 supplied in an IPPFAX Job with any other value, the Receiver MUST reject the Print-Job/Create-Job
763 operation (since the value isn't supported and "ipp-attribute-fidelity" MUST be 'true').

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764 If the Receiver supports this attribute, the Receiver MUST return only the indicated value in the Get-
765 Printer-Attributes response for the corresponding "xxx-supported" and "xxx-default" Printer attributes.
766 Note: These are attributes which might degrade the appearance of the document or provide a significantly
767 non-FAX feature if the non-default value were supplied and supported, such as "number-up" = 2 or "job-
768 priority" = 100, respectively.

769 In Table 5, if the "Sender supply" and "Receiver support" columns contain "MUST NOT", the Sender
770 MUST NOT supply and the Receiver MUST NOT support the Job Template attribute for an IPPFAX Job.
771 If these attributes are supplied in an IPPFAX Job, the Receiver MUST reject the Print-Job/Create-Job
772 operation (since the attribute isn't supported and "ipp-attribute-fidelity" MUST be 'true'). When querying
773 the Receiver with the Get-Printer-Attributes operation, the corresponding "xxx-default" and "xxx-
774 supported" MUST NOT be returned. Note: These are attributes which might degrade the appearance of the
775 document or provide a significantly non-FAX feature and do not have an obvious value which corresponds
776 to the behavior when the attribute is not supported at all, such as media-input-tray-check (type3 keyword |
777 name(MAX)) or output-bin (type2 keyword | name(MAX)).

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778   **Table 5 - IPPFAX Semantics for Job Template Attributes**

Job Template attribute	Sender supply /Receiver support	Explicit value (if restricted)	Reference
copies (integer(1:MAX))	MAY	1	[RFC2911]
cover-back (collection)	MAY		[ipp-prod-print]
cover-front (collection)	MAY		[ipp-prod-print]
document-overrides (collection)	MAY		[ipp-coll]
finishings (1setOf type2 enum)	MAY		[RFC2911]
finishings-col (collection)	MAY		[ipp-prod-print]
force-front-side (1setOf integer(1:MAX))	MAY		[ipp-prod-print]
imposition-template (type2 keyword	name(MAX))	MAY	'none'	[ipp-prod-print]
insert-sheet (1setOf collection)	MAY	'insert-count' = 0	[ipp-prod-print]
job-account-id (name(MAX))	MAY		[ipp-prod-print]
job-accounting-sheets (collection)	MAY		[ipp-prod-print]
job-accounting-user-id (name(MAX))	MAY		[ipp-prod-print]
job-error-sheet (collection)	MAY		[ipp-prod-print]
job-hold-until (type3 keyword	name(MAX))	MAY	'no-hold'	[RFC2911]
job-message-to-operator (text(MAX))	MAY		[ipp-prod-print]
job-priority (integer(1:100))	MAY	50	[RFC2911]
job-sheet-message (text(MAX))	MAY		[ipp-prod-print]
job-sheets (type3 keyword	name(MAX))	MAY		[RFC2911]
job-sheets-col (collection)	MAY		[ipp-prod-print]
media (type3 keyword	name(MAX))	MUST (see section 9.2.1)		[RFC2911]
media-col (collection)	MAY		[ipp-prod-print]
media-input-tray-check (type3 keyword	name(MAX))	MUST NOT		[ipp-prod-print]
multiple-document-handling (type2 keyword)	MAY		[RFC2911]
number-up (integer(1:MAX))	MAY	1	[RFC2911]
orientation-requested (type2 enum)	MUST NOT		[RFC2911]
output-bin (type2 keyword	name(MAX))	MUST NOT		[ipp-output-bin]
page-delivery (type2 keyword)	MAY	'system-specified'	[ipp-prod-print]
page-order-received (type2 keyword)	MAY	'1-to-n-order'	[ipp-prod-print]
page-overrides (1setOf collection)	MAY		[ipp-coll]

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Deleted: Receiver support
Deleted: *
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Deleted: MAY
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Deleted: MAY
Deleted: MAY
Deleted: MAY
Deleted: 'none'
Deleted: 'insert-count' = 0
Deleted: MAY
Deleted: MAY
Deleted: MAY
Deleted: MAY
Deleted: 'no-hold'
Deleted: MAY
Deleted: 50
Deleted: MAY
Deleted: MAY
Deleted: MAY
Deleted: MUST (see section 9.2.1)
Deleted: media-supported (DMC-We shouldn't put "xxx–supported" attrs in this table. Otherwise, have to put all of them.) ... [4]
Deleted: MAY
Deleted: MUST NOT
Deleted: MAY
Deleted: 1
Deleted: 'portrait'
Deleted: 'portrait'
Deleted: MUST NOT
Deleted: 'system-specified'
Deleted: '1-to-n-order'
Deleted: MAY

Job Template attribute	Sender supply /Receiver support	Explicit value (if restricted)	Reference
page-ranges (1setOf rangeOfInteger(1:MAX))	MAY	1:MAX	[RFC2911]
pages-per-subset (1setOf integer(1:MAX))	MUST NOT		[ipp-prod-print]
presentation-direction-number-up (type2 keyword)	MAY	'toright-tobottom'	[ipp-prod-print]
print-quality (type2 enum)	MAY	'high'	[RFC2911]
printer-resolution (resolution)	MUST NOT (see section 9.2.2)		[RFC2911]
separator-sheets (collection)	MAY		[ipp-prod-print]
sheet-collate (type2 keyword)	MUST NOT		[RFC 3381]
sides (type2 keyword)	MAY		[RFC2911]
x-image-position (type2 keyword)	MAY	'none'	[ipp-prod-print]
x-image-shift (integer(MIN:MAX))	MAY	0	[ipp-prod-print]
x-side1-image-shift (integer(MIN:MAX))	MAY	0	[ipp-prod-print]
x-side2-image-shift (integer(MIN:MAX))	MAY	0	[ipp-prod-print]
y-image-position (type2 keyword)	MAY	'none'	[ipp-prod-print]
y-image-shift (integer(MIN:MAX))	MAY	0	[ipp-prod-print]
y-side1-image-shift (integer(MIN:MAX))	MAY	0	[ipp-prod-print]
y-side2-image-shift (integer(MIN:MAX))	MAY	0	[ipp-prod-print]

779 **9.2.1 media (type2 keyword | name(MAX)) Job Template attribute ([RFC2911] section**
780 **4.2.11)**

781 This Job Template attribute ([RFC2911] section 4.2.11) identifies the medium to be used for all sheets of
782 the job. The Sender MUST supply and the Receiver MUST support the "media" Job Template attribute in
783 the Validate-Job and Print-Job/Create-Job requests. The Receiver MUST support the "media-default", and
784 "media-supported" Printer attributes and MAY support the "media-ready" Printer attribute.

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

787 At a minimum, an IPPFAX receiver MUST be able to render the sizes A4 and NA Letter and be able to
788 print on at least one of those two sizes. The Receiver MAY scale down at most 10% (PDF/is directives may
789 prohibit this scaling), overflow to another page, or truncate. If the Receiver does truncate then it must
790 notify the Receiving User. Any scaling preformed MUST be isomorphic.

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Deleted: *
Deleted: *
Deleted: 1:MAX
Deleted: MUST NOT
Deleted: 'toright-tobottom'
Deleted: 'high'
Deleted: MUST NOT (see section 9.2.2)
Deleted: printer-resolution-supported (1setOf resolution) (DMC- See argument above.) ... [5]
Deleted: MAY
Deleted: 'collated'
Deleted: 'collated'
Deleted: MAY
Deleted: 'none'
Deleted: 0
Deleted: 0
Deleted: 0
Deleted: 'none'
Deleted: 0
Deleted: 0
Deleted: 0
Deleted: <#>*
Formatted: Bullets and Numbering
Deleted: <#>If a single value is indicated, then a Receiver MAY support the indicated Job Template attribute, but MUST support only the indicated value. Note: Each such single value has been selected as the value for the attribute that would correspond to the *expected behavior* if the attribute were not supported at all. ¶
Deleted: Job Creation
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Deleted: it, along with
Deleted: "media-ready"
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791 PDF Crop boxes SHOULD be used when the Sender knows that the imageable region is less than the
792 media size. If the crop box is the union of the lesser size of Letter and A4 minus ¼ of an inch, then the
793 Sender can be sure that the majority of Receivers can print the complete image without loss of data.
794 However, this does mean that there is the possibility that data may lost.
795

796 Standard keyword values are defined in section 9.2.1.1.

797 **9.2.1.1 media-supported Job Template Printer attributes**

798 The following standard keywords MUST be supported. Any other paper sizes supported MUST use the
799 self-describing names as defined in ([5101.1]):

800 'na_letter_8.5x11in'
801 'iso_a4_210x297mm'
802 'choice_iso_a4_210x297mm_na_letter_8.5x11in' - represents both 'na_letter_8.5x11in' and
803   'iso_a4_210x297mm' and indicates that either is acceptable. See [jobx].

804 **9.2.2 printer-resolution (resolution) Job Template attribute ([RFC2911] section 4.2.12)**

805 This Job Template attribute ([RFC2911] section 4.2.12) identifies the cross-feed and feed direction
806 resolutions that the Printer uses for the Job. The Sender MUST NOT supply the "printer-resolution" Job
807 Template attribute in the Validate-Job and Print-Job/Create-Job requests and the Receiver MUST NOT
808 support it. However, the Receiver MUST support the "printer-resolution-default" and "printer-resolution-
809 supported" attributes.

810 Note: Saying that a Receiver MUST NOT support a given Job Template attribute while also saying that the
811 Receiver MUST support the corresponding "xxx-supported" and "xxx-default" attributes is an exception to
812 the rule in section 4.2 of [RFC2911]. The reason for this exception is twofold:

813   1. The PDF/is Document should always control its own resolution, rather than having IPPFAX trying
814   to override.

815   2. The Sender needs to be able to query the Receiver for supported resolutions to enable the Sender to
816   produce the PDF/is document in a supported resolution.

817 **9.2.2.1 printer-resolution-supported Job Template Printer attribute**

818 The Receiver MUST support this attribute. If the Sender is using a resolution for PDF/is that is not the
819 REQUIRED minimum resolution for PDF/is, then the Sender SHOULD query the "printer-resolution-

---

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

Deleted: Print-Job/Create-Job operation. The "media-ready" attribute indicates which media are currently loaded and will not require human intervention in order to be used. ¶

Inserted: Print-Job/Create-Job

Deleted: New Media name pwg_letter-or-A4 which will represent both (Needs to be registered) MUST be supported. If specified in the *media* attribute then indicates that either'na_letter_8.5x11in' or 'iso_a4_210x297mm' would be acceptable.¶

Deleted: if the corresponding media sizes are supported

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820 supported" Printer attribute. Thus this attribute allows the Sender to determine the resolution(s) supported
821 in addition to the minimum resolution required.

9.3 Subscription Template Attributes Conformance Requirements

823 Table 6 lists the conformance requirements for Subscription attributes on the Print-Job/Create-Job and
824 Validate-Job requests. The attributes in Subscription Objects are shown immediately followed (indented)
825 by their corresponding Default and Supported Printer Attributes.

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826 **Table 6 - Subscription Template attributes conformance requirements**

Attribute Name (attribute syntax) Attribute in Subscription Object Default and Supported Printer Attributes	Sender Conformance in Print-Job/Create-Job 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]

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

830

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

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

9.3.2 Notification Event Conformance Requirements

838 Table 7 lists the conformance requirements for notification events.

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

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

849   **Table 7 - Notification Events conformance requirements**

Event	IPP/1.1 Printer Conformance	Sender Conformance for Print-Job/Create-Job 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	

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850

851   **9.4 Confirmation using the Document Creation response**

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

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857   **9.5 Originator identifier image**

858   The Sender MUST place an originator identifier, i.e., the value of the "sender-uri" attribute (see section
859   8.3), along with the date and time, in one of the following places, DEPENDING ON
860   IMPLEMENTATION:

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

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

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

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

868   **9.6 Get-Notifications operation to get Event Notifications**

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

875   **10 IPPFAX Implementation of other IPP operations**

876   Section 5 defined the semantic requirements for the Get-Printer-Attributes operation, section 7 defined the
877   semantic requirements for Validate-Job, and section 9 defined the semantic requirements for Print-
878   Job/Create-Job operations for IPPFAX. This section defines the IPPFAX semantics and conformance
879   requirements for the other IPP operations.

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

882   The Receiver MUST fully support the Print-Job, Validate-Job, Get-Printer-Attributes and Get-Notifications
883   operations, as defined by this document. The following subsections define restrictions and conformance
884   requirements placed on the Cancel-Job, Get-Job-Attributes, Get-Jobs, Enable-Printer, Disable-Printer, Set-
885   Printer-Attributes, and Get-Printer-Attributes operations. For a conforming IPPFAX Receiver
886   implementation, the support for each of the IPP operations is indicated in Table 8 and Table 9.

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

891   **10.1 Operation Conformance Requirements**

892   Table 8 lists the conformance requirements for Printer operations for (1) an IPP/1.1 Printer ('ipp' URL), (2)
893   the non-privileged IPPFAX Sender, (3) an IPPFAX Receiver receiving a request from a non-privileged
894   User, and (4) an IPPFAX Receiver receiving a request from an authenticated and authorized operator or
895   administrator, if the Receiver supports operator/administrator authentication and authorization.

896   Table 9 lists the conformance requirements for Job and Subscription operations for (1) an IPP/1.1 Printer
897   ('ipp') URL, (2) the non-privileged IPPFAX Sender which MUST be on the same URL as the job was
898   created (the target "printer-uri" MUST match the Job's "job-printer-uri" Job Description attribute), (3) an
899   IPPFAX Receiver receiving a request from the Job or Subscription Object Owner, (4) from some other
900   non-privileged user, and (5) if the operation is supported at all - from an authenticated and authorized
901   operator or administrator.

902   The Receiver MUST support Subscription Creation for the Print-Job/Create-Job operations that it supports,   **Deleted:** Job Creation
903   but NEED NOT support any other notification operations, such as Create-Job-Subscriptions, Create-
904   Printer-Subscriptions, Get-Subscription-Attributes, Get-Subscription-Attributes, Renew-Subscription, or
905   Cancel-Subscription, even though [ipp-ntfy] requires all but the Create-Job-Subscriptions operation.

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

908   **Table 8 - Conformance for Printer Operations**

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

909   Legend:
910   **MAY*** - If supported, Get-Job-Attributes and Get-Jobs MUST restrict certain attributes, such as "job-name", and "job-
911   originating-user-name". See section 10.3.
912

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913 **Table 9 - Conformance for Job and Subscription Operations**

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

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

921 **10.2 Cancel-Job operation ([RFC2911] section 3.3.3)**

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

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

925 The Receiver MUST reject Cancel-Job operations whether issued by a user or an administrator targeted at
926 IPPFAX Jobs. The Cancel-Job operation therefore MUST be an unsupported operation for a Receiver and
927 MUST be reflected in the value of the "operations-supported" Printer attribute (see section 6.4).   Note:
928 Non-support of the Cancel-Job operation is a change from the IPP behavior where Cancel-Job is required.

929 **10.3 Get-Job-Attributes and Get-Jobs operations ([RFC2911] sections 3.3.4 and 3.2.6)**

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

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

935   job-id, job-uri
936   job-k-octets, job-k-octets-completed
937   job-media-sheets, job-media-sheets-completed,
938   time-at-creation, time-at-processing
939   job-state, job-state-reasons
940   number-of-intervening-jobs
941
942 The exact choice of Job attributes that a client can query for IPPFAX Jobs, including not returning any,
943 DEPENDS ON IMPLEMENTATION and the security policy in force and is outside the scope of this
944 standard (as in IPP/1.1).

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

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

949 An IPP administrator MAY read all attributes.

950 **10.4 Enable-Printer and Disable-Printer operations [RFC3380]**

951 The Enable-Printer and Disable-Printer operations [RFC3380] allow a remote operator to change the value
952 of the Receiver's "printer-is-accepting-jobs" (boolean) Printer Description attribute (see section **Error!**
953 **Reference source not found.**) to 'true' or 'false', respectively. These operations are OPTIONAL for a
954 Receiver to support.

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

960 These operations MUST only be performed when the user has been authenticated by TLS and has been
961 authorized to perform them.

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

963 The Set-Printer-Attributes and Get-Printer-Supported-Values operations [ipp-set-ops] are OPTIONAL
964 administrative operations for IPPFAX, as for IPP.

965 These operations MUST only be performed when the user has been authenticated by TLS and has been
966 authorized to perform them.

11 Security considerations

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

11.1 Privacy

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

977 The Receiver MUST have a TLS certificate.

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

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

981 Senders and Receivers SHOULD do what current browsers do, namely, be deployed with the public keys
982 of a number of the top Certificate Authorities. If a Sender gets a public key from a Receiver that it doesn't

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

983 recognize, the Sender MUST query the Sending User to see if the Sending User trusts the Receiver before
984 sending the IPPFAX job to the Receiver.

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

987 **11.2 uri-authentication-supported (1setOf type2 keyword) ([RFC2911] section 4.4.2)**

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

990   **Table 10 - 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

991 * TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA mandated by [RFC2246].

992   Table 11 compares the Digest Authentication requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX
993   Senders, and IPPFAX Receivers.

994   **Table 11 - 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

995

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

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

999   **Table 12 - 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

1000

1001   Table 13 compares the TLS conformance requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX
1002   Senders, and IPPFAX Receivers.

1003   **Table 13 - 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

1004   * The 'certificate' keyword value for the "uri-authentication-supported" attribute [RFC2911].

1005   ** The Sender MUST query the Sending User before omitting the Data Privacy encryption.

1006   Senders and Receivers MUST support the TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite as
1007   mandated by RFC 2246 [RFC2246]. All stronger cipher suites are OPTIONAL; weaker cipher suites
1008   MUST NOT be supported or used by Senders or Receivers.

1009   A Receiver MAY support Basic Authentication (described in HTTP/1.1 [RFC2617]) for Client
1010   Authentication if the TLS channel is secured with Data Privacy. TLS with the above mandated cipher suite
1011   or stronger can provide such a secure channel.

1012   **11.4 Using IPPFAX with TLS**

1013   The Sender MUST use only TLS for all IPPFAX operations on the IPPFAX URL. The client MUST start
1014   the transaction in TLS, rather than using HTTP upgrade requests. The following paragraph of [RFC2818]
1015   further explains:

1016   The agent acting as the HTTP client should also act as the TLS client. It should initiate a
1017   connection to the server on the appropriate port and then send the TLS ClientHello to begin the TLS
1018   handshake. When the TLS handshake has finished. The client may then initiate the first HTTP
1019   request. All HTTP data MUST be sent as TLS "application data". Normal HTTP behavior,
1020   including retained connections should be followed.

1021   Contrast this IPPFAX requirement with the IPP requirement in section 8.2 of [RFC2910]. The following
1022   client actions compare IPP with IPPFAX from a client's point of view:

1023   IPP/1.1 sequence:
1024   1. Start TCP connection
1025   2. Zero or more HTTP/IPP requests
1026   3. HTTP/IPP request with Upgrade to TLS header
1027   4. TLS handshake
1028   5. Finish the HTTP/IPP request securely
1029   6. Send more HTTP/IPP requests securely ...
1030
1031   IPPFAX sequence:
1032   1. Start TCP connection
1033   2. Send TLS ClientHello
1034   3. Rest of TLS handshake
1035   4. Send HTTP/IPPFAX requests securely ... (which usually will be a Get-Printer-Attributes,
1036   followed by Validate-Job and Print-Job operations).
1037

1038   **11.5 Access control**

1039   It is expected that the majority of IPPFAX Receivers will operate in a public mode when operating on the
1040   Internet, so that anonymous users can send documents without requiring client authentication
1041   (corresponding to the 'none' value for the "uri-authentication-supported" attribute - see section 11.2).
1042   However a Receiver MAY protect itself using any Client Authentication method specified in [RFC2911]
1043   (digest authentication [RFC2069] for example) to restrict access to any or all of its functionality.

1044   However, the primary intent of IPPFAX is to create a controlled public access mode. It therefore does not
1045   really make much sense to combine IPPFAX and user authentication; they are achieving the same thing.

1046   **11.6 Reduced feature set**

1047   An administrator or device implementer MAY choose to setup up a Print Service so that it only works as an
1048   IPPFAX Receiver (i.e., offers no 'native' IPP operations and does not accept IPP Jobs). In this mode it
1049   offers a restricted set of features and MAY be more safely connected to the Internet.

1050   A Receiver that is operating in this mode MUST do so by rejecting any non-IPPFAX request and return a
1051   'client-error-attributes-or-values-not-supported' error status code as indicated in section 4.1 for an
1052   unsupported value of the "printer-uri" operation attribute. For job operations attempted on IPPFAX Jobs,
1053   the Receiver MUST return the 'client-error-not-authorized' error status code, unless the Sender is
1054   authenticated as the system administrator and the Receiver supports such access.

12 Gateways to other systems

1055

1056 A common scenario will be where IPPFAX acts as an on-ramp or off-ramp to other Document transmission
1057 systems.

12.1 Off-Ramps

1058

1059 In the IPPFAX 'Off-ramp' scenario the user with a Document to send uses an IPPFAX Sender to transmit a
1060 Document to an IPPFAX Receiver within a gateway that in turn transmits it to some other destination, i.e.
1061 GSTN FAX. Handling Off-ramps is beyond the scope of this document, but may be a future IPPFAX
1062 extension building on the Off-ramp work of the Internet FAX WG.

12.2 On-Ramps

1063

1064 In the IPPFAX On-Ramp scenario the user originally sent the Document using some other mechanism to
1065 some intermediate agent. The intermediate agent, acting as an IPPFAX Sender, then uses the IPPFAX
1066 Protocol to transmit the Document to an Receiver which MAY be either a final destination or an Off-Ramp.
1067 IPPFAX has no specific support for on-ramps.

13 Attribute Syntaxes

1068

1069 No new attribute syntaxes are defined.

14 Status codes

1070

1071 In addition to the semantics of the status codes defined in [RFC2911] and [ipp-get-method], the following
1072 additional semantics are defined for [RFC2911] status codes:

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

1073

1074 The client has failed to supply one or more attributes in a request which are REQUIRED to be supplied.
1075 The requirement can be because of the Printer's current configuration or because of some other attributes
1076 that the client supplied. The Printer MUST reject the request, MUST return the 'client-error-bad-request'
1077 status code, and SHOULD return the keyword attribute name(s) (but not the values) of the missing
1078 attribute(s) in the Unsupported Attributes Group in the response.

1079 **14.2 document-format-not-supported (0x040A) [RFC2911 section 13.1.4.11]**

1080 The concept of a document format is extended to include the PDF/is image compression technologies. This
1081 status code is returned if the document format is not supported, including unknown pdf-formats as defined
1082 in 6.6 and unknown PDF/is image compression technologies.

1083 # 15 Conformance Requirements

1084 This section summarizes the conformance requirements for Senders and Receivers that are defined
1085 elsewhere in this document.

1086   1. A Sender and Receiver MUST observe the attribute name space conventions specified in section
1087   1.3.

1088   2. The Sender MUST supply and the Receiver MUST support (1) the "printer-uri" operation attribute
1089   with the 'ippfax' scheme, (2) the "version-number" parameter with the IPP/1.1 '1.1' (or higher
1090   minor version) value, and (3) the "ippfax-version-number" operation attribute with the IPPFAX/1.0
1091   '1.0' keyword value in all operations to get the IPPFAX semantics as described in section 4.

1092   3. The Receiver MUST support the Get-Printer-Attributes operation as described in sections 5.

1093   4. The Receiver MUST support the Printer Description attributes as specified in section 6.

1094   5. The Sender MUST validate that the target Printer is IPPFAX-capable using the Get-Printer-
1095   Attributes operation and validate that the Receiver supports the job using the Validate-Job operation
1096   as specified in section 7.

1097   6. The Sender MUST supply and the Receiver MUST support the operation/Job Description attributes
1098   for Identify Exchange as described in section 8.

1099   7. The Sender MUST support submitting and the Receiver MUST accept IPPFAX Jobs as defined in
1100   section 9.

1101   8. The Sender MUST place the Sender's identity in the document according to section **Error!**
1102   **Reference source not found.**.

1103   9. The Sender and Receiver MUST support the IPP Notification for Print-Job/Create-Job operations,
1104   the 'ippget' Delivery Method, and the Get-Notifications operation for the events indicated in
1105   sections 9.3, 9.3.1, and 9.6, respectively.

Deleted: Job Creation

1106   10. The Sender and Receiver MUST support the operations as indicated in section 10.

1107   11. The Sender and Receiver MUST support the security mechanisms indicated in section 11, including
1108   TLS.

1109   The [set-ops], enable-printer and disable-printer operations MUST only be preformed on a connection that
1110   has been authenticated by TLS and the user has the rights to perform them.

16 IPPFAX URL Scheme

1112   This section is intended for use in registering the 'ippfax' URL scheme with IANA and fully conforms to
1113   the requirements in [RFC2717].

16.1 IPPFAX URL Scheme Applicability and Intended Usage

1115   This document defines the 'ippfax' URL (Uniform Resource Locator) scheme for specifying the location of
1116   an IPPFAX Receiver which implements the IPPFAX Protocol specified in this document.

1117   The 'ippfax' URL scheme defined in this document is based on the ABNF for the basic hierarchical URL
1118   syntax in [RFC2396]; however relative URL forms, parameters, and/or query parts are NOT allowed in an
1119   IPPFAX URL. The 'ippfax' URL scheme is case-insensitive in the host name or host address part;
1120   however the path part is case-sensitive, as in [RFC2396]. Codepoints outside [US-ASCII] MUST be hex
1121   escaped by the mechanism defined in [RFC2396].

1122   The intended usage of the 'ippfax' URL scheme is COMMON.

16.2 IPPFAX URL Scheme Associated IPPFAX Port

1124   All IPPFAX URLs which do NOT explicitly specify a port MUST be used over IANA-assigned well-
1125   known port xxx [TBA by IANA] for the IPPFAX Protocol.

1126   See: IANA Port Numbers Registry [IANA-PORTREG].

16.3 IPPFAX URL Scheme Associated MIME Type

1128   All IPPFAX protocol operations (requests and responses) MUST be conveyed in an 'application/ipp'
1129   MIME media type [RFC2910] as registered in [IANA-MT]. IPPFAX URLs MUST refer to IPPFAX
1130   Receivers which support this 'application/ipp' operation encoding.

1131   See: IANA MIME Media Types Registry [IANA-MT].

16.4 IPPFAX URL Scheme Character Encoding

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

16.5 IPPFAX URL Scheme Syntax in ABNF

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

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

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

The IPPFAX URL scheme syntax in ABNF is as follows:

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

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

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

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

16.6 IPPFAX URL Examples

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

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

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

The following literal IPv4 addresses:

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

are represented in the following example IPPFAX URLs:

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

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

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

are represented in the following example IPPFAX URLs:

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

16.7 IPPFAX URL Comparisons

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

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

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

17 IANA Considerations

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

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

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

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

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Formatted: Bullets and Numbering

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1311
1312   Contact Information:
1313
1314   IPPFAX Web Page: http://www.pwg.org/qualdocs/
1315   IPPFAX Mailing List: ifx@pwg.org
1316
1317   To subscribe to the IPPFAX mailing list, send the following email:

1318   1) send it to majordomo@pwg.org
1319   2) leave the subject line blank
1320   3) put the following two lines in the message body:
1321   subscribe ifx
1322   end
1323
1324   Implementers of this specification document are encouraged to join the IPPFAX Mailing List in order
1325   to participate in any discussions of clarification issues and review of registration proposals for
1326   additional attributes and values. In order to reduce spam the mailing list rejects mail from non-
1327   subscribers, so you must subscribe to the mailing list in order to send a question or comment to the
1328   mailing list.
1329
1330   Other Participants:

Aisushi Uchino - Epson	Marty Joel - Peerless
Bill Wagner - NetSilicon/DPI	Michael Wu - Heidelberg Digital
Carl-Uno Manros - Xerox	Mike Kuindersma - PrinterOn
Charles Kong - Panasonic	Norbert Schade - Oak Technology
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1331

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

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

Legend:

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

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

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

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

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

Differences between an IPP client and a Sender:

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

2. In the Get-Printer-Attributes request, an IPP Client may supply the "document-format" operation attribute, while a Sender SHOULD (sections 5.1 and **Error! Reference source not found.**).

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

Deleted: Job Creation

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1361   4. * An IPP Client may support any MIME Media Type as the value of the "document-format"
1362   operation attribute, while the Sender MUST support the 'application/pdf' MIME Media Type.

1363   5. The Sender and the Receiver MUST support "PDF/is" pdf-format.

1364   6. In the Print-Job/Create-Job operations and the Validate-Job operation, an IPP Client may supply
1365   the "media" Job Template attribute, while the Sender MUST supply it (section 9.2.1).

<div style="float:right">**Deleted:** Job Creation</div>

1366   7. * An IPP Client may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the
1367   "media" Job Template attribute or the Media Size Self Describing Name keyword values defined
1368   in the IEEE-ISTO 5101.1 "Media Standardized Names" [pwg-media], while the Sender MUST use
1369   the keyword values from [pwg-media] (section 9.2.1).

1370   8. There are no requirements for an IPP Client to indicate the client or the client user in the document,
1371   while the Sender MUST supply the "sender-uri" value along with a date and time, on at least the
1372   cover page (section **Error! Reference source not found.**).

1373   9. An IPP Client need not support Event Notification, while the Sender MUST support at least the
1374   'ippget' Pull Delivery Method (section 9.3), which REQUIRES using the Get-Notifications
1375   operation (section 9.6).

1376   10. An IPP Client may support any events, while a Sender MUST NOT support the 'job-config-
1377   changed' event and MUST NOT support any Printer events (section 9.3.2).

1378   11. An IPP Client may support Client Authentication, while a Sender MUST support at least 'digest'
1379   and 'certificate' (section 11.2).

1380   12. An IPP Client may support Data Integrity and Data Privacy, while a Sender MUST support Data
1381   Integrity and may use Data Privacy with at least the
1382   TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.2).

1383   Differences between an IPP Printer and a Receiver:

1384   1. In the Get-Printer-Attributes response, an IPP Printer may color the attribute values returned
1385   according to the "document-format" supplied, while a Receiver MUST color the values returned
1386   according to the "document-format" operation attribute supplied (sections 5 and 6), including the
1387   "printer-resolutions-supported" attribute (section 9.2.2.1).

1388   2. * An IPP Printer is not required to support any particular document formats, while a Receiver
1389   MUST support the PDF/is 'application/pdf' format with profile pdfis-fax.

1390   3. * An IPP Printer may support 'application/octet-stream' (auto-sensing - [RFC2911] 4.1.9.1), while
1391   a Receiver MUST NOT (section 6.5).

1392 4. An IPP Printer may support the IPPFAX attributes: "sending-user-vcard", "receiving-user-vcard",
1393   and "sender-uri", while a Receiver MUST (sections **Error! Reference source not found.**, 6, 8,
1394   and **Error! Reference source not found.**).

1395 5. ** An IPP Printer MUST NOT support the "ippfax-versions" and "ippfax-versions-supported"
1396   attributes, while a Receiver MUST (sections 4.3 and 6.3).

1397 6. ** An IPP Printer must support both values of the "ipp-attribute-fidelity" operation attribute, while
1398   the Receiver MUST only support the 'true' value (section 9.1.1).

1399 7. ** An IPP Printer must assume a value of 'false' if the IPP Client omits the "ipp-attribute-fidelity"
1400   operation attribute, while the Receiver MUST reject the request with the 'client-error-bad-request'
1401   status code (section 9.1.1).

1402 8. An IPP Printer is not required to support any particular Job Template attributes, while a Receiver
1403   MUST support at least the "media" and "printer-resolution" Job Template attributes.

> **Deleted:** , including the "media-ready" Printer attribute (section 9.2).

1404 9. * An IPP Printer may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the
1405   "media" Job Template attribute or the Media Size Self Describing Name keyword values defined
1406   in the IEEE-ISTO 5101.1 "Media Standardized Names" [pwg-media], while the Receiver MUST
1407   support a subset of the keyword values from [pwg-media] (section 9.2.1).

1408 10. * An IPP Printer may support any Job Template attribute values, while a Receiver is restricted to a
1409   single value for many Job Template attributes for which other values would alter the appearance of
1410   the document or provide a non-FAX-like feature (section 9.2).

1411 11. * An IPP Printer may support Print-URI and Send-URI operations, while a Receiver MUST NOT
1412   (section 10.1).

1413 12. An IPP Printer must support Get-Jobs and Get-Job-Attributes operations, while a Receiver NEED
1414   NOT (section 10.1).

1415 13. ** An IPP Printer must support Cancel-Job operation, while a Receiver MUST NOT (section
1416   10.2).

1417 14. An IPP Printer may support administrative operations without authentication, while a Receiver
1418   MUST authenticate administrative operations, if administrative operations are supported (section
1419   10.1).

1420 15. * An IPP Printer may support the following operations from an authenticated operator or
1421   administrator: Purge-Jobs, Cancel-Current-Job, Cancel-Job, and Schedule-Job-After, while a
1422   Receiver MUST reject such operations from an authenticated operator or administrator.

1423   16. An IPP Printer may support Event Notification, while a Receiver MUST support Event
1424   Notification (sections 9.3 and 10.1) and at least the 'ippget' Delivery Method (section 9.6), which
1425   REQUIRES support for the Get-Notifications operation.

1426   17. If an IPP Printer supports Event Notification, it must support the 'job-state-changed' and 'job-
1427   created' events for Per-Job Subscriptions, while a Receiver NEED NOT (section 9.3.2).

1428   18. ** If an IPP Printer supports Printer Events, then it MUST support them for both Per-Job and Per-
1429   Printer Subscriptions, while a Receiver MUST NOT support them for Per-Job Subscriptions
1430   (section 9.3.2).

1431   19. If an IPP Printer supports Event Notification, it may support the 'job-progress' event, while a
1432   Receiver MUST for Per-Job Subscriptions (section 9.3.2).

1433   20. * If an IPP Printer supports Event Notification, it may support the 'job-config-changed' event,
1434   while a Receiver MUST NOT (section 9.3.2).

1435   21. An IPP Printer should support and may use TLS, while a Receiver MUST support and MUST use
1436   TLS (section 11.3).

1437   22. An IPP Printer may support Client Authentication, while a Receiver MUST support at least
1438   'digest' and 'certificate' (section 11.2).

1439   23. An IPP Printer may support Data Integrity and Data Privacy and support them with any cipher
1440   suite, while a Receiver MUST support both Data Integrity and Data Privacy with at least the
1441   TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.2).

1442   21 Appendix B: vCard Example

1443   The following ASCII text is a complete vCard v3.0 [RFC2426, RFC2425] example:

```
1444        BEGIN:VCARD
1445        VERSION:3.0
1446        N:Moore;Paul
1447        FN:Paul Moore
1448        ORG:Netreon
1449        TEL;CELL;VOICE:1+206-251-7008
1450        ADR;WORK:;;10900 NE 8th St;Bellvue;WA;98004;United States of America
1451        EMAIL;PREF;INTERNET:pmoore@netreon.com
1452        REV:19991207T215341Z
1453        END:VCARD
```

1454

22 Appendix C: Generic Directory Schema for an IPPFAX Receiver

1456 This section defines a generic schema for an entry in a directory service. A directory service is a means by
1457 which service users can locate service providers. In IPPFAX environments, this means that Receivers
1458 (IPPFAX Printers) can be registered (either automatically or with the help of an administrator) as entries of
1459 type PRINTER in the directory using an IMPLEMENTATION SPECIFIC mechanism such as entry
1460 attributes, entry type fields, specific branches, etc. Directory clients can search or browse for entries of
1461 type PRINTER. Clients use the directory service to find entries based on naming, organizational contexts,
1462 or filtered searches on attribute values of entries. For example, a client can find all printers in the "Local
1463 Department" context. Authentication and authorization are also often part of a directory service so that an
1464 administrator can place limits on end users so that they are only allowed to find entries to which they have
1465 certain access rights. IPPFAX itself does not require any specific directory service protocol or provider.

1466 Note: Some directory implementations allow for the notion of "aliasing". That is, one directory entry
1467 object can appear as multiple directory entry objects with different names for each object. In each case,
1468 each alias refers to the same directory entry object which refers to a single IPPFAX Printer object.

1469 The generic IPPFAX schema is a subset of IPPFAX Job Template and Printer Description attributes (Table
1470 1, **Error! Reference source not found.** and [RFC2911] sections 4.2 and 4.4). These attributes are
1471 identified as either RECOMMENDED or OPTIONAL for the directory entry itself. This conformance
1472 labeling is NOT the same conformance labeling applied to the attributes of IPPFAX Printers objects. The
1473 conformance labeling in this Appendix is intended to apply to directory templates and to Receivers that
1474 subscribe by adding one or more entries to a directory. RECOMMENDED attributes SHOULD be
1475 associated with each directory entry. OPTIONAL attributes MAY be associated with the directory entry (if
1476 known or supported). In addition, all directory entry attributes SHOULD reflect the current attribute
1477 values for the corresponding IPPFAX Printer object.

1478 The names of attributes in directory schema and entries SHOULD be the same as the IPPFAX Printer
1479 attribute names as shown, as much as possible.

1480 In order to bridge between the directory service and the IPPFAX Printer object, one of the
1481 RECOMMENDED directory entry attributes is the Printer object's "printer-uri-supported" attribute. The
1482 directory client queries the "printer-uri-supported" attribute (or its equivalent) in the directory entry and
1483 then the IPPFAX client addresses the IPPFAX Printer object using one of its URIs. The "uri-security-
1484 supported" attribute identifies the protocol (if any) used to secure a channel. If a Printer object supports
1485 both IPP and IPPFAX, there should be two separate directory entries in order to represent these two
1486 services.

1487 Table 14 defines the generic schema for directory entries of abstract type PRINTER. In the future this
1488 schema could also be directory entries of type FAX. In either case, the concrete type MUST be IPPFAX.
1489 If a Printer object supports both IPP and IPPFAX, there should be two separate directory entries in order to

1490 represent these two services, one with concrete type IPP and the other with concrete type IPPFAX,
1491 respectively.

1492   **Table 14 - 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

1493

23 Appendix D: Summary of other IPP documents

1495 The full set of IPP documents includes:

1496   1. Design Goals for an Internet Printing Protocol [RFC2567]
1497   2. Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
1498   3. Internet Printing Protocol/1.1: Model and Semantics (this document)
1499   4. Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]
1500   5. Internet Printing Protocol/1.1: Implementer's Guide [RFC3196] and [ipp-iig-bis]
1501   6. Mapping between LPD and IPP Protocols [RFC2569]
1502
1503 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
1504 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included
1505 in a printing protocol for the Internet. It identifies requirements for three types of users: end users,
1506 operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A
1507 few OPTIONAL operator operations have been added to IPP/1.1.

1508 The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document
1509 describes IPP from a high level view, defines a roadmap for the various documents that form the suite of
1510 IPP specification documents, and gives background and rationale for the IETF working group's major
1511 decisions.

1512 The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the abstract
1513 operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the
1514 encoding rules for a new Internet MIME media type called "application/ipp". This document also defines
1515 the rules for transporting over HTTP a message body whose Content-Type is "application/ipp". This
1516 document defines a new scheme named 'ipp' for identifying IPP printers and jobs.

1517 The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to
1518 implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of

1519 the considerations that may assist them in the design of their client and/or IPP object implementations. For
1520 example, a typical order of processing requests is given, including error checking. Motivation for some of
1521 the specification decisions is also included.

1522 The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of gateways
1523 between IPP and LPD (Line Printer Daemon) implementations.

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

1526 The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible
1527 operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards,
1528 but also to facilitate activities that support the implementation and acceptance of standards in the
1529 marketplace. The organization is affiliated with the IEEE (http://www.ieee.org/) and the IEEE Standards
1530 Association (http://standards.ieee.org/).

1531 For additional information regarding the IEEE-ISTO and its industry programs visit:

1532 http://www.ieee-isto.org.

25 Appendix F: Description of the IEEE-ISTO PWG

1534 The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology
1535 Organization (ISTO) and is an alliance among printer manufacturers, print server developers, operating
1536 system providers, network operating systems providers, network connectivity vendors, and print
1537 management application developers chartered to make printers and the applications and operating systems
1538 supporting them work together better. All references to the PWG in this document implicitly mean "The
1539 Printer Working Group, a Program of the IEEE ISTO." In order to meet this objective, the PWG will
1540 document the results of their work as open standards that define print related protocols, interfaces,
1541 procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from
1542 the interoperability provided by voluntary conformance to these standards.

1543 In general, a PWG standard is a specification that is stable, well understood and is technically competent,
1544 has multiple, independent and interoperable implementations with substantial operational experience, and
1545 enjoys significant public support.

1546 For additional information regarding the Printer Working Group visit:

1547 http://www.pwg.org

1548 **26 Revision History (to be removed when standard is approved)**

Revision	Date	Author	Notes
1	1/16/01	Paul Moore, Netreon	Initial version
2	2/27/01	Paul Moore, Gail Songer, Netreon	Specify TLS as MUST Removed Cover page and combined device Added need for big text types
3	4/11/01	Gail Songer, Netreon	Move attribute definition to first reference
4	5/24/01	Tom Hastings	Editorially updated the document to follow the style of the IPP standard documents. Added 23 issues to be reviewed. Capitalized the special terms throughout without showing revisions in order to make the document with revisions more readable.
5	5/21/01	Tom Hastings, John Pulera, Ira McDonald	Updated from the 6/6/01 telecon agreements on most of the 23 issues. There are 20 issues remaining, mostly new.
6	7/27/01	Tom Hastings, Ira McDonald	Updated from the 6/29/01 telecon. There are 41 issues remaining, mostly new.
7	10/8/01	Tom Hastings, Ira McDonald	Updated with all the resolutions to the 41 ISSUES from the August 1, 2001 IPPFAX WG meeting in Toronto, and the subsequent telecons: August, 9, 14, and 17, 2001. There are 4 (new) issues remaining.
8	11/17/01	Tom Hastings	Updated with the agreements from the IPPFAX WG meeting, 10/24/01, Texas. See minutes. There are 5 issues remaining.
9	12/31/01	Tom Hastings	Updated with the agreements reached at the 12/14/01 telecon.
10	2/19/02	Tom Hastings	Updated with the agreements reached as the 2/5/02 IPPFAX WG meeting. There are no remaining issues.
11	9/20/02	Tom Hastings	Replaced all occurrences of UIF with PDFax and uif with PDFax.
12	10/16/02 10/24/02	Rick Seeler Gail Songer	Updated to reflect PDF/is as file format. Replace CONNEG with UPDF. Attributes for OPTIONAL PDF/is functionality.
13	11/22/02	Rick Seeler	Replaced 'PDFax' with 'PDF/is' or 'pdfis'. Updated spec to match 0.3 PDF/is specification.
14	03/18/03	Gail Songer	Removed pdfis-profile-requested and pdfis-supported and pdfis-profiles; all image formats are

			required Removed pdfis-cache-size-k-octets (now fixed value) Removed pdfis-banding-direction-supported Started to split references into two sections, "normative" and "informative" and update descriptions to references Other editorial changes
15	03/24/03	Gail Songer	Added digital-signatures-supported. Added pdf-format and pdf-format supported. Put "coloring" back to optional. Removed PDF data encryption (leave for a future version of PDF/is and IPPFax)
16		Gail Songer Dennis Carney	Remove all references to coloring Changed pdf-format to document-format-version Remove the requirement that [set-ops] supports document-format coloring (we only allow document-format==PDF) ALL admin operations require TLS to have authenticated the user and the user has admin rights Other editorial changes
17	05/21/03 05/28/03	Dennis Carney Tom Hastings	Editorial updates Added new 'choice_iso_a4_210x297mm_na_letter_8.5x11in' value for "media" and a reference to [jobx]. Fixed conformance for "media-ready".

1549

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

media-ready	9.2.1.1	Sender SHOULD check which media is ready (loaded, i.e., needs no human intervention to use).

printer-uri-supported	MUST **	MUST

pdf-format(type2 keyword)	**Error! Reference source not found.**	SHOULD	may	MUST

media-supported (DMC-We shouldn't put "xxx–supported" attrs in this table. Otherwise, have to put all of them.)	MAY	MUST	[RFC2911]

printer-resolution-supported (1setOf resolution) (DMC- See argument above.)	MAY	MUST	[RFC2911]