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IEEE-ISTO
Printer Working Group
IPP Fax Project
Standard for IPPFAX/1.0 Protocol

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

- This document is available electronically at: [wd-ifx10-20031014.pdf, .doc](#)
- A version showing the changes from the previous version is available at: [wd-ifx10-20031014-rev.pdf](#)
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89 2) leave the subject line blank

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

91 subscribe ifx

92 end

93

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

96

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202

203 1 Introduction

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

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

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

215 The IPPFAX/1.0 protocol is a specialization of the IPP/1.1 [RFC2911], [RFC2910] protocol supporting a
216 subset of the IPP operations with increased conformance requirements in some cases, some restrictions in
217 other cases, and some additional REQUIRED attributes. The IPPFAX Protocol uses the 'ippfax' URL
218 scheme (instead of the 'ipp' URL scheme) for all operations. Most of the new attributes defined in this
219 document MAY be supported by IPP Printers as OPTIONAL extensions to IPP as well. Only the attributes
220 defined in this document that start with the "ippfax-" prefix MUST NOT be used in the IPP Protocol (see
221 section 1.3). In addition, IPPFAX/1.0 REQUIRES the support of the IPP Event Notification mechanism
222 [ipp-ntfy] using the 'ippget' Pull Delivery Method [ipp-get-method]. See section 19 for a comparison of
223 IPP and IPPFAX.

224 An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least PDF/is [ifx-pdfis]
225 which is defined for the 'application/pdf' document format MIME type. A Print System MAY be
226 configured to support both the IPPFAX and IPP protocols concurrently for a single output device (or
227 multiple output devices), but each protocol requires separate Printer objects with distinct URLs. Note - It
228 is assumed that the reader is familiar with IPP/1.1 [RFC2911], [RFC2910], [RFC3196], and [ipp-iig-bis].
229 See section 22.

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

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

237

1.1 Operations used

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

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

242 2. Validate-Job – ~~Unless no job-template attributes are submitted and the document-format is~~
243 ~~PDF/is and the media-type is A4 or NA-letter, the~~ Sender MUST verify that the Receiver can
244 support the Job attributes that the Sender will send in the IPPFAX Job. ~~Note that a Sender~~
245 ~~MUST send the Validate-Job command to verify that the Operation and Job-Template~~
246 ~~attributes requested will be accepted by the Receiver. This is especially important if the~~
247 ~~document data is very large.~~

Deleted: -

248 3. Print-Job - Sender MUST submit the IPPFAX job with a single document (~~Create-Job, Send-~~
249 ~~document and Send-URI and Print-URI must not be supported by Senders or Receivers~~).

Deleted: or MAY send Create-Job and one or more Send-Document operations if the Receiver also supports these operations

250 4. ~~Get-Job-Attributes~~ - The Sender MUST support and MUST use this operation to check for
251 successful job completion unless the Sending User wishes otherwise. ~~Job-History MUST be~~
252 ~~retained by the Receiver for at least 5 minutes after job completion. See 4.3.7.2 of RFC2911 for~~
253 ~~printer object Job-History discussion.~~

Deleted:). Note that a sender MUST perform a Validate-Job before a Create-Job operation because not all operation attributes that are permitted on a Validate-Job (e.g. document-format) are valid on a Create-Job**Deleted:** Get-Notifications

254

1.2 Typical exchange

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

257 1. The Sending User determines the network location of the Receiver (value of the “printer-uri”
258 operation attribute) – see section 4.1. This document does not specify how the Sending User does
259 this. Possible methods include directory lookup, search engines, business cards, network
260 enumeration protocols such as SLP, etc. See section 21 for the Generic Directory Schema for
261 IPPFAX.

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

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

- 268 4. The Sender selects the most appropriate data format depending on the Receiver's basic capabilities.
269 The PDF/is data format is described in detail in the "PDF Image-Streamable (PDF/is)" specification
270 [ifx-pdfis].
- 271 5. The Sender MUST validate whether or not the Receiver will accept all of the attributes of the
272 IPPFAX Job from this Sending User using the Validate-Job operation. See section 7.2. If the
273 Receiver rejects the Validate-Job operation, the Sender can avoid sending the data.
- 274 6. The Sender either (1) scans the Document and converts it into an acceptable data format or (2)
275 generates or forwards the Document representation in an acceptable data format – see section 6.5.
- 276 7. As part of the Validation and Job creation, the following identities are determined and exchanged:
277 Sender, Sending User, Receiver, and Receiving User – see section 8.
- 278 8. The Sender transmits the Document data to the Receiver – see section 9.
- 279 9. The Sending User receives a confirmation that the Receiver received the Document data – see
280 section 9.4.
- 281 10. In addition the Sender MUST support and the Sending User MAY choose to receive an Event
282 Notification that the Document has been successfully Delivered – see sections 9.3 and 9.6.
- 283 If the Sender is unable to initiate or complete the exchange then it is assumed that the Sender will perform
284 some form of retry. The mechanisms used and the user-visible behavior in this case is an implementer's
285 choice and beyond the scope of this document.

286 **1.3 Namespace used for attributes**

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

292 On the other hand, unless explicitly specified otherwise, all existing IPP attributes, including future IPP
293 extensions, apply to the IPPFAX Protocol as well, including attributes which have an "ipp-" prefix. For
294 example, the IPP/1.1 "ipp-attribute-fidelity" operation attribute (see [RFC2911] section 3.2.1.1 and 3.2.1.2)
295 and the IPP/1.1 "ipp-versions-supported" Printer Description attribute (see [RFC2911] section 4.4.14) are
296 also used in the IPPFAX protocol, even though they have the "ipp-" prefix.
297

298 2 Terminology

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

300 2.1 Conformance Terminology

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

308 2.2 Other Terminology

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

311 **IPP Protocol** The protocol defined in [RFC2911] and [RFC2910] and any IPP Protocol Extension
312 document (see section 17). For the IPP/1.1 Protocol each operation request must use the ‘ipp’ URL
313 scheme.

314 **IPPFAX Protocol** The protocol defined in this or a future revision document and any future extension
315 document. For the IPPFAX Protocol each operation request **MUST** use the ‘ippfax’ URL scheme (see
316 section 4.1 and 15). Unless a specific version number is appended to “IPPFAX”, such as “IPPFAX/1.0”,
317 the term IPPFAX applies to all versions.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

352 **PDF/is** The file format defined by [ifx-pdfs].

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

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

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

363 **3 IPPFAX Model**

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

365 **3.1 Printer Object Relationships**

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

371 **3.2 A Printer object with multiple URLs**

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

376 The three parallel “printer-uri-supported” (1setOf uri), “uri-authentication-supported” (1setOf type2
377 keyword), and “uri-security-supported” (1setOf type2 keyword) Printer Description attributes (see
378 [RFC2911] sections 4.4.1, 4.4.2, and 4.4.3, respectively) MUST contain the URLs, authentication, and
379 security, respectively, supported by the Printer object. See also the OPTIONAL “printer-xri-supported”
380 (collection) Printer Description attribute [ipp-set-ops], which, if supported, MUST be used to set these
381 three parallel attributes using the protocol. [ipp-set-ops] and other system administrator operations MUST
382 only be supported if TLS client authentication has been performed and the system administrator role has
383 been confirmed.

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

390
391

3.3 A Print System supporting both IPP and IPPFAX protocols

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

399 Note: it is possible to support IPP and IPPFAX Printer objects with a single piece of code in a Print
400 System with conditional branching to handle the differences in conformance requirements between IPP and
401 IPPFAX. For example, such conditional branching could depend on the “printer-uri” operation attribute
402 supplied by the client in each request to the Print System. See section 19 for a comparison of IPP/1.1 and
403 IPPFAX/1.0.

404 4 Common IPPFAX Operation Attribute Semantics

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

409
410

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

411 This operation attribute specifies the transfer path to the Receiver for the operation. As in IPP/1.1, the
412 client MUST supply the “printer-uri” operation attribute in every IPPFAX request (see [RFC2911] section
413 3.1.5). For IPPFAX, the attribute value MUST be a URL using the ‘ippfax’ scheme (see section 15)
414 specifying the Receiver’s network location.

446
447

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

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

455 If the Sender does not supply this attribute, the Receiver MUST reject the operation, MUST return the
456 ‘client-error-bad-request’ status code, and SHOULD return the ‘ippfax-version-number’ attribute name
457 keyword in the Unsupported Attributes Group (see section 13.1).

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

462 The Receiver MUST indicate the IPPFAX versions supported using the “ippfax-versions-supported”
463 (1setOf type2 keyword) Printer Description attribute (see section 6.3).

464 As in IPP/1.1, if the Receiver does not support the major version number supplied by the Sender, i.e., the
465 major version field of the “ippfax-version-number” operation attribute does not match any of the values of
466 the Printer’s “ippfax-versions-supported” (see section 6.3), the Receiver MUST respond with a status code
467 of ‘server-error-version-not-supported’ along with the closest version number that is supported (see
468 [RFC2911] section 13.1.5.4). If the major version number is supported, but the minor version number is
469 not, the Receiver SHOULD accept and attempt to perform the request (or reject the request if the operation
470 is not supported), else it rejects the request and returns the ‘server-error-version-not-supported’ status code.
471 In all cases, the Receiver MUST return the “ippfax-version-number” operation attribute in the response
472 with the value that it supports that is closest to the version number supplied by the Sender in the request.

473 There is no version negotiation per se. However, if after receiving a ‘server-error-version-not-supported’
474 status code from a Receiver, a Sender SHOULD try again with a different version number. A Sender MAY
475 also determine the versions supported either from a directory (see section 21) or by querying the Printer
476 object’s “ipp-versions-supported” (see section 6.2) and “ippfax-versions-supported” attributes (see section
477 6.3) to determine which IPP and IPPFAX versions are supported, respectively, as part of IPPFAX.

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

480 **5 Get-Printer-Attributes operation semantics**

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

483 **5.1 document-format (mimeMediaType) operation** 484 **attribute ([RFC2911] section 3.2.5.1)**

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

- 488 1. The Sender SHOULD supply the “document-format” operation attribute (IPP client may) and, if
489 supplied, the value MUST be “application/PDF”.

490 **6 IPPFAX Printer Description Attributes**

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

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

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

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

500

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, Error! Reference source not found.
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 mimeType) *	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

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

503 ** These attributes are defined in [?Close-Job extensions?], but have enhanced semantics defined in this
504 document.

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

509 **6.1 printer-uri-supported (1setOf uri) ([RFC 2911] section** 510 **4.4.1)**

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

517 If a Print System supports both the IPP and IPPFAX protocols, it is RECOMMENDED that the Print
518 System support Printer objects whose target URIs differ only in the scheme. Then a client that queries the
519 “printer-uri-supported” attribute of one of the Printer objects with one of these two protocols, can query the

520 same Print System with the other protocol just by changing the scheme to see if the other protocol is
521 supported (as a separate Printer object).

522 The Receiver MUST support the ‘ippfax’ URL scheme (see section 15) and only the ‘ippfax’ URL scheme
523 for this attribute (see section 3.3).

524 **6.2 ipp-versions-supported (1setOf type2 keyword)**
525 **([RFC2911] section 4.4.14)**

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

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

533 ‘1.1’: The “IPP part” of the IPPFAX operations meets the protocol and encoding conformance
534 requirements of IPP version 1.1 as specified in [RFC2911], [RFC2910], and IPP extensions.

535
536 Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for
537 keywords, by starting with an ASCII digit, instead of an ASCII lower case letter.

538 **6.3 ippfax-versions-supported (1setOf type2 keyword)**

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

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

548 Since a Printer object MUST NOT support both the IPP and IPPFAX protocols, there is no ambiguity with
549 requiring a Receiver to support both the “ipp-versions-supported” and “ippfax-versions-supported” Printer
550 Description attributes (see sections 6.2 and 6.3). If a Printer object supports the “ipp-versions-supported”

551 attribute, but not the “ippfax-versions-supported” attribute, then by definition that Printer object supports
552 the IPP Protocol. If a Printer object supports the “ippfax-versions-supported” Printer Description attribute,
553 then by definition that Printer object is a Receiver and supports the IPPFAX Protocol and not the IPP
554 Protocol. For such a Printer object, the “ipp-versions-supported” attribute indicates the versions of IPP that
555 it supports *as part of IPPFAX operations*, rather than indicating that it supports the IPP Protocol (by itself).

556 Standard keyword values are:

557 ‘1.0’: Meets the conformance requirements of IPPFAX version 1.0 as specified in this document.

558

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

563

564

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

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

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

571 While all current operations are currently supported, future versions of IPPFax may introduce additional
572 operations.

573

574

575

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

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

578 Since most document formats don’t give the “blind interchange” guarantee of document presentation
579 fidelity for all implementations and configurations, the IPPFAX document formats supported MUST be a
580 subset of the IPP document formats supported.

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

582 **6.6 document-format-version-supported (1setOf**
583 **text(127))**

584 **CHANGE: Reference the “Job X extensions” Specification.**

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

587 Both the Sender and Receiver MUST support “PDF/iso-1.0”. The Receiver MAY support other versions of
588 PDF and if it does then the Receiver MUST only list formats that it fully supports.

589 **6.7 digital-signatures-supported (1setOf type2 keyword)**

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

592 **Digital-signature and digital-signature-supported will move to [jobX] specification. Reference them from**
593 **that specification**

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

596 **6.8 pdl-override-supported (type2 keyword)**

597 This attribute expresses the ability for a particular Receiver implementation to either attempt to override
598 document data instructions with IPPFAX attributes or not.

599
600 This attribute MUST have the value ‘attempted’ or a higher quality IANA-registered value (such as a
601 hypothetical ‘guaranteed’ value), and the Receiver MUST attempt to override at least the media.

602 **7 Sender Validation of the Receiver’s Capabilities**

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

605
606**7.1 Sender Validates the target Printer as a Receiver and determines its basic capabilities**

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

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

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

620

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	9.2.1.1	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.

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

623
624

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

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

630 The Sender MUST supply the “ipp-attribute-fidelity” operation attribute with a ‘true’ value (see
631 [RFC2911] section 3.2.1.1 and 15.1) in both the Validate-Job and the Print-Job/Create-Job operations.

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

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

644 8 Identity exchange

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

648 **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

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

650 8.1 sending-user-vcard (text(MAX)) operation/Job 651 Description attribute

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

660 For a sample vCard see section 19. If the Sender supplies the attribute, then the Receiver MUST use its
661 value to populate the Job object's corresponding Job Description attribute of the same name.

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

669 **8.2 receiving-user-vcard (text(MAX)) operation/Job**
670 **Description attribute**

671 This operation attribute identifies the intended Receiving User in MIME vCard format [RFC2426,
672 RFC2425]. The Sender SHOULD send this operation attribute in an IPPFAX Print-Job/Create-Job or
673 Validate-Job operation. The Receiver MUST support this Print-Job/Create-Job operation attribute and
674 MUST populate the job's corresponding Job Description attribute. The Receiver MUST support MAX
675 (1023) octets of text. However, the Receiver MAY ignore any image, logo, and sound parts, in which case
676 it MUST still accept the Print-Job/Create-Job request and return the 'successful-ok-ignored-or-substituted-
677 attributes' status code (see [RFC2911] section 13.1.2.2), but NEED NOT return the attribute and its
678 ignored values in the Unsupported Attributes Group.

679 For a sample vCard see section 19. If the Sender supplies the attribute, then the Receiver MUST use its
680 value to populate the Job object's corresponding Job Description attribute of the same name.

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

683 **8.3 sender-uri (uri) operation/Job Description attribute**

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

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

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

696 **9 Transmission using the Print-Job or Create-Job/Send-Document operations**

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

702 **9.1 IPP/1.1 Validate-Job and Print-Job/Create-Job** 703 **operation attributes**

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

707

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

708

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

709

710

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

711

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

712

713

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].

714 support this operation attribute. Note: [RFC2911] does not REQUIRE the IPP Client to supply this
715 operation attribute and allows the client to supply the ‘false’ value.

716 If the Sender does not supply this attribute or supplies the ‘false’ value, the Receiver MUST reject the
717 operation, MUST return the ‘client-error-bad-request’ status code, and SHOULD return the ‘ipp-attribute-
718 fidelity’ attribute name keyword in the Unsupported Attributes Group (see section 13.1).

719 **9.1.2 document-format (mimeMediaType) operation attribute ([RFC2911] section 3.2.1.1)**

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

724 If the Sender does not supply this attribute, the Receiver MUST reject the operation, MUST return the
725 ‘client-error-bad-request’ status code, and SHOULD return the ‘document-format’ attribute name keyword
726 in the Unsupported Attributes Group (see section 13.1).

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

729 **9.1.3 document-format-version (type2 keyword) operation attribute ([RFC2911] section**
730 **3.2.1.1)**

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

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

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

737 If the Sender supplies a value that the Receiver does not support, i.e., not a value of the Receiver’s
738 “document-format-versions-supported” Printer Description attribute, the Receiver MUST reject the
739 operation and return the ‘client-error-document-format-not-supported’ status code.

740 Standard keyword values are defined in section 6.6.

741
742

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

743 Table 5 lists all of the Job Template attributes defined in other IPP documents for use in Validate-Job and
744 Print-Job/Create-Job operations and shows their conformance for IPPFAX Jobs. As in [RFC2911], the
745 term “Job Template attribute” is actually up to four attributes: the “xxx” Job attribute, and the “xxx-
746 default”, “xxx-supported”, and possibly the “xxx-ready” Printer attributes. Any other IPP Job Template
747 attributes defined in other documents are OPTIONAL for IPPFAX.

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

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

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

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

772

773

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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]

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]

776 **9.2.1 media (type2 keyword | name(MAX)) Job Template attribute ([RFC2911] section**
777 **4.2.11)**

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

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

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

788 PDF Crop boxes SHOULD be used when the Sender knows that the imageable region is less than the
789 media size. If the crop box is the union of the lesser size of Letter and A4 minus 1/4 of an inch, then the
790 Sender can be sure that the majority of Receivers can print the complete image without loss of data.
791 However, this does mean that there is the possibility that data may be lost.
792

793 Standard keyword values are defined in section 9.2.1.1.

794 **9.2.1.1 media-supported Job Template Printer attributes**

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

797 'na_letter_8.5x11in'

798 'iso_a4_210x297mm'

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

801 **9.2.2 printer-resolution (resolution) Job Template attribute ([RFC2911] section 4.2.12)**

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

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

- 810 1. The PDF/is Document should always control its own resolution, rather than having IPPFAX trying
811 to override.
- 812 2. The Sender needs to be able to query the Receiver for supported resolutions to enable the Sender to
813 produce the PDF/is document in a supported resolution.

814 **9.2.2.1 printer-resolution-supported Job Template Printer attribute**

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

817 supported” Printer attribute. Thus this attribute allows the Sender to determine the resolution(s) supported
818 in addition to the minimum resolution required.

819
820

9.3 Subscription Template Attributes Conformance Requirements

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

824

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]

825 * The Sender MUST supply at least the “notify-recipient-uri” attribute for any Push Delivery Method.

826 ** The Sender MUST supply at least the “notify-pull-method” attribute for any Pull Delivery Method, such
827 as the REQUIRED ‘ippget’ Delivery Method.
828

829 **9.3.1 notify-pull-method (type2 keyword) Subscription Template attribute [ipp-ntfy]**

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

835 **9.3.2 Notification Event Conformance Requirements**

836 Table 7 lists the conformance requirements for notification events.

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

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

847

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-finishing-changed	may	MUST NOT	MUST NOT	MUST NOT	MAY	
printer-queue-order-changed	may	MUST NOT	MUST NOT	MUST NOT	MAY	

848

849

9.4 Confirmation using the Document Creation response

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

855 **9.5 Originator identifier image**

856 The Sender MUST place an originator identifier, i.e., the value of the “sender-uri” attribute (see section
857 8.3), along with the date and time, in one of the following places, DEPENDING ON
858 IMPLEMENTATION:

- 859 1. On a cover page automatically generated by the Sender that is sent before the rest of the
860 document.
- 861 2. Merged with the first page of the document.
- 862 3. At the top of every page of the sent Document.

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

866 **9.6 Get-Notifications operation to get Event Notifications**

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

873 **10 IPPFAX Implementation of other IPP operations**

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

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

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

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

889 **10.1 Operation Conformance Requirements**

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

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

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

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

906

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]

907
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909
910

Legend:

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

911

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]

912

Legend:

913

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

914

915

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

916

917

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

918

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

919

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

920

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

921

922

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

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

927 **10.3 Get-Job-Attributes and Get-Jobs operations**
928 **([RFC2911] sections 3.3.4 and 3.2.6)**

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

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

934 job-id, job-uri
935 job-k-octets, job-k-octets-completed
936 job-media-sheets, job-media-sheets-completed,
937 time-at-creation, time-at-processing
938 job-state, job-state-reasons
939 number-of-intervening-jobs

940
941 The exact choice of Job attributes that a client can query for IPPFAX Jobs, including not returning any,
942 DEPENDS ON IMPLEMENTATION and the security policy in force and is outside the scope of this
943 standard (as in IPP/1.1).

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

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

948 An IPP administrator MAY read all attributes.

949 **10.4 Enable-Printer and Disable-Printer operations**
950 **[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.

962 **10.5 Set-Printer-Attributes and Get-Printer-Supported-** 963 **Values operations [ipp-set-ops]**

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

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

968 **11 Security considerations**

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

974 **11.1 Data Integrity and authentication**

975 Any exchange between a Sender and a Receiver MUST be carried using the data integrity mechanism
976 specified in IPP/1.1 namely TLS/1.0 [RFC2246] or later versions of TLS.

977 A Receiver MUST have a TLS certificate and be authenticated by the sender.

978 A Sender MAY have a TLS certificate for client authentication. A Receiver MAY decide to reject
979 requests that come from Senders that do not have a TLS certificate and return the ‘client-error-not-
980 authenticated’ status code.

- 981 A Sender MAY use its own TLS certificate or it can use one associated with the Sending User.
- 982 A Receiver MUST have a TLS certificate, and the Send MUST have the public keys of the top level public
983 key Certificate Authorities (as current browsers do). If a Sender gets a public key from a Receiver that is
984 doesn't recognize, the Sender MUST resolve the unrecognized key or inform the Sending User that data
985 integrity has been lost and MUST abort the job.
- 986 The distribution of private keys to Senders or Receivers is outside the scope of this document, but if it is
987 done over the network, it MUST be over a secure channel. See Internet Key Exchange (IKE) [RFC2409].

988 **11.2 Data Privacy**

- 989 An exchange between the Sender and Receiver MAY be carried using the data privacy mechanism in
990 IPP/1.1 namely TLS/1.0 [RFC2246]

991
992**11.3 uri-authentication-supported (1setOf type2 keyword)
([RFC2911] section 4.4.2)**993 This attribute (see [RFC2911] section 4.4.2) identifies the Client Authentication mechanism associated
994 with each URI listed in the “printer-uri-supported” attribute (see section 6.1).995 **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

996 * TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA mandated by [RFC2246].

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

999 **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

1000

1001
1002

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

1003 This attribute (see [RFC2911] section 4.4.3) identifies the security (Integrity and Privacy) mechanisms
 1004 used for each URI listed in the “printer-uri-supported” attribute (see section 6.1).

1005 **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

1006

1007 Table 13 compares the TLS conformance requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX
1008 Senders, and IPPFAX Receivers.

1009 **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

1010 * The 'certificate' keyword value for the "uri-authentication-supported" attribute [RFC2911].

1011 ** The Sender MUST query the Sending User before omitting the Data Privacy encryption.

1012 Senders and Receivers MUST support the TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite as
1013 mandated by RFC 2246 [RFC2246]. All stronger cipher suites are OPTIONAL; weaker cipher suites
1014 MUST NOT be supported or used by Senders or Receivers.

1015 A Receiver MAY support Basic Authentication (described in HTTP/1.1 [RFC2617]) for Client
1016 Authentication if the TLS channel is secured with Data Privacy. TLS with the above mandated cipher suite
1017 or stronger can provide such a secure channel.

1018 **11.5 Using IPPFAX with TLS**

1019 The Sender MUST use only TLS for all IPPFAX operations on the IPPFAX URL. The client MUST start
1020 the transaction in TLS, rather than using HTTP upgrade requests. The following paragraph of [RFC2818]
1021 further explains:

1022 The agent acting as the HTTP client should also act as the TLS client. It should initiate a
1023 connection to the server on the appropriate port and then send the TLS ClientHello to begin the TLS
1024 handshake. When the TLS handshake has finished. The client may then initiate the first HTTP
1025 request. All HTTP data MUST be sent as TLS "application data". Normal HTTP behavior,
1026 including retained connections should be followed.

1027 Contrast this IPPFAX requirement with the IPP requirement in section 8.2 of [RFC2910]. The following
1028 client actions compare IPP with IPPFAX from a client's point of view:

- 1029 IPP/1.1 sequence:
1030 1. Start TCP connection
1031 2. Zero or more HTTP/IPP requests
1032 3. HTTP/IPP request with Upgrade to TLS header
1033 4. TLS handshake
1034 5. Finish the HTTP/IPP request securely
1035 6. Send more HTTP/IPP requests securely ...

- 1036
1037 IPPFAX sequence:
1038 1. Start TCP connection
1039 2. Send TLS ClientHello
1040 3. Rest of TLS handshake
1041 4. Send HTTP/IPPFAX requests securely ... (which usually will be a Get-Printer-Attributes,
1042 followed by Validate-Job and Print-Job operations).
1043

1044 **11.6 Access control**

1045 It is expected that the majority of IPPFAX Receivers will operate in a public mode when operating on the
1046 Internet, so that anonymous users can send documents without requiring client authentication
1047 (corresponding to the ‘none’ value for the “uri-authentication-supported” attribute - see section 11.3).
1048 However a Receiver MAY protect itself using any Client Authentication method specified in [RFC2911]
1049 (digest authentication [RFC2069] for example) to restrict access to any or all of its functionality.

1050 However, the primary intent of IPPFAX is to create a controlled public access mode. It therefore does not
1051 really make much sense to combine IPPFAX and user authentication; they are achieving the same thing.

1052 **11.7 Reduced feature set**

1053 An administrator or device implementer MAY choose to setup up a Print Service so that it only works as an
1054 IPPFAX Receiver (i.e., offers no ‘native’ IPP operations and does not accept IPP Jobs). In this mode it
1055 offers a restricted set of features and MAY be more safely connected to the Internet.

1056 A Receiver that is operating in this mode MUST do so by rejecting any non-IPPFAX request and return a
1057 ‘client-error-attributes-or-values-not-supported’ error status code as indicated in section 4.1 for an
1058 unsupported value of the “printer-uri” operation attribute. For job operations attempted on IPPFAX Jobs,
1059 the Receiver MUST return the ‘client-error-not-authorized’ error status code, unless the Sender is
1060 authenticated as the system administrator and the Receiver supports such access.

1061 **12 Attribute Syntaxes**

1062 No new attribute syntaxes are defined.

1063 **13 Status codes**

1064 In addition to the semantics of the status codes defined in [RFC2911] and [ipp-get-method], the following
1065 additional semantics are defined for [RFC2911] status codes:

1066 **13.1 client-error-bad-request (0x0400) [RFC2911 section** 1067 **13.1.4.1]**

1068 The client has failed to supply one or more attributes in a request which are REQUIRED to be supplied.
1069 The requirement can be because of the Printer's current configuration or because of some other attributes
1070 that the client supplied. The Printer MUST reject the request, MUST return the 'client-error-bad-request'
1071 status code, and SHOULD return the keyword attribute name(s) (but not the values) of the missing
1072 attribute(s) in the Unsupported Attributes Group in the response.

1073 **13.2 document-format-not-supported (0x040A) [RFC2911** 1074 **section 13.1.4.11]**

1075 The concept of a document format is extended to include the PDF/is image compression technologies. This
1076 status code is returned if the document format is not supported, including unknown pdf-formats as defined
1077 in 6.6 and unknown PDF/is image compression technologies.

1078 **14 Conformance Requirements**

1079 This section summarizes the conformance requirements for Senders and Receivers that are defined
1080 elsewhere in this document.

- 1081 1. A Sender and Receiver MUST observe the attribute name space conventions specified in section
1082 1.3.
- 1083 2. The Sender MUST supply and the Receiver MUST support (1) the "printer-uri" operation attribute
1084 with the 'ippfax' scheme, (2) the "version-number" parameter with the IPP/1.1 '1.1' (or higher
1085 minor version) value, and (3) the "ippfax-version-number" operation attribute with the IPPFAX/1.0
1086 '1.0' keyword value in all operations to get the IPPFAX semantics as described in section 4.
- 1087 3. The Receiver MUST support the Get-Printer-Attributes operation as described in sections 5.

- 1088 4. The Receiver MUST support the Printer Description attributes as specified in section 6.
- 1089 5. The Sender MUST validate that the target Printer is IPPFAX-capable using the Get-Printer-
1090 Attributes operation and validate that the Receiver supports the job using the Validate-Job operation
1091 as specified in section 7.
- 1092 6. The Sender MUST supply and the Receiver MUST support the operation/Job Description attributes
1093 for Identify Exchange as described in section 8.
- 1094 7. The Sender MUST support submitting and the Receiver MUST accept IPPFAX Jobs as defined in
1095 section 9.
- 1096 8. The Sender MUST place the Sender's identity in the document according to section **Error!**
1097 **Reference source not found.**
- 1098 9. The Sender and Receiver MUST support the IPP Notification for Print-Job/Create-Job operations,
1099 the 'ippget' Delivery Method, and the Get-Notifications operation for the events indicated in
1100 sections 9.3, 9.3.1, and 9.6, respectively.
- 1101 10. The Sender and Receiver MUST support the operations as indicated in section 10.
- 1102 11. The Sender and Receiver MUST support the security mechanisms indicated in section 11, including
1103 TLS.
- 1104 The [set-ops], enable-printer and disable-printer operations MUST only be preformed on a connection that
1105 has been authenticated by TLS and the user has the rights to perform them.

1106 **15 IPPFAX URL Scheme**

1107 This section is intended for use in registering the 'ippfax' URL scheme with IANA and fully conforms to
1108 the requirements in [RFC2717].

1109 **15.1 IPPFAX URL Scheme Applicability and Intended** 1110 **Usage**

1111 This document defines the 'ippfax' URL (Uniform Resource Locator) scheme for specifying the location of
1112 an IPPFAX Receiver which implements the IPPFAX Protocol specified in this document.

1113 The 'ippfax' URL scheme defined in this document is based on the ABNF for the basic hierarchical URL
1114 syntax in [RFC2396]; however relative URL forms, parameters, and/or query parts are NOT allowed in an
1115 IPPFAX URL. The 'ippfax' URL scheme is case-insensitive in the host name or host address part;

1116 however the path part is case-sensitive, as in [RFC2396]. Codepoints outside [US-ASCII] MUST be hex
1117 escaped by the mechanism defined in [RFC2396].

1118 The intended usage of the 'ippfax' URL scheme is COMMON.

1119 **15.2 IPPFAX URL Scheme Associated IPPFAX Port**

1120 All IPPFAX URLs which do NOT explicitly specify a port MUST be used over IANA-assigned well-
1121 known port xxx [TBA by IANA] for the IPPFAX Protocol.

1122 See: IANA Port Numbers Registry [IANA-PORTREG].

1123 **15.3 IPPFAX URL Scheme Associated MIME Type**

1124 All IPPFAX protocol operations (requests and responses) MUST be conveyed in an 'application/ipp'
1125 MIME media type [RFC2910] as registered in [IANA-MT]. IPPFAX URLs MUST refer to IPPFAX
1126 Receivers which support this 'application/ipp' operation encoding.

1127 See: IANA MIME Media Types Registry [IANA-MT].

1128 **15.4 IPPFAX URL Scheme Character Encoding**

1129 The IPPFAX URL scheme defined in this document is based on the ABNF for the HTTP URL scheme
1130 defined in HTTP/1.1 [RFC2616], which is derived from the URI Generic Syntax [RFC2396] and further
1131 updated by [RFC2732] and [RFC2373] (for IPv6 addresses in URLs). The IPPFAX URL scheme is case-
1132 insensitive in the 'scheme' and 'host' (host name or host address) part; however, the 'abs_path' part is
1133 case-sensitive, as in [RFC2396]. Code points outside [US-ASCII] MUST be hex escaped by the
1134 mechanism specified in [RFC2396].

1135 **15.5 IPPFAX URL Scheme Syntax in ABNF**

1136 The IPP protocol places a limit of 1023 octets (NOT characters) on the length of a URI (see section 4.1.5
1137 'uri' in [RFC2911]). An IPPFAX Receiver MUST return 'client-error-request-value-too-long' (see section
1138 13.1.4.10 in [RFC2911]) when a URI received in a request is too long.

1139 Note: IPPFAX Receivers ought to be cautious about depending on URI lengths above 255 bytes, because
1140 some older client or proxy implementations might not properly support these lengths.

1141 IPPFAX URLs MUST be represented in absolute form. Absolute URLs always begin with a scheme name
1142 followed by a colon. For definitive information on URL syntax and semantics, see “Uniform Resource
1143 Identifiers (URI): Generic Syntax and Semantics” [RFC2396]. This specification adopts the definitions of
1144 “port”, “host”, “abs_path”, and “query” from [RFC2396], as updated by [RFC2732] and [RFC2373] (for
1145 IPv6 addresses in URLs).

1146 The IPPFAX URL scheme syntax in ABNF is as follows:

```
1147     ippfax_URL = "ippfax:" "/" host [ ":" port ] [ abs_path [ "?" query ] ]
```

1148
1149 If the port is empty or not given, the IANA-assigned port as defined in section 15.2 is assumed. The
1150 semantics are that the identified resource (see section 5.1.2 of [RFC2616]) is located at the IPPFAX
1151 Notification Recipient listening for HTTP connections on that port of that host, and the Request-URI for
1152 the identified resource is ‘abs_path’.

1153 Note: The use of IP addresses in URLs SHOULD be avoided whenever possible (see [RFC1900]).

1154 If the ‘abs_path’ is not present in the URL, it MUST be given as “/” when used as a Request-URI for a
1155 resource (see section 5.1.2 of [RFC2616]). If a proxy receives a host name which is not a fully qualified
1156 domain name, it MAY add its domain to the host name it received. If a proxy receives a fully qualified
1157 domain name, the proxy MUST NOT change the host name.

1158 **15.6 IPPFAX URL Examples**

1159 The following are examples of valid IPPFAX URLs for Notification Recipient objects (using DNS host
1160 names):

```
1161     ippfax://abc.com  
1162     ippfax://abc.com/listener
```

1163
1164 Note: The use of IP addresses in URLs SHOULD be avoided whenever possible (see [RFC1900]).

1165 The following literal IPv4 addresses:

```
1166     192.9.5.5           ; IPv4 address in IPv4 style  
1167     186.7.8.9          ; IPv4 address in IPv4 style
```

1168
1169 are represented in the following example IPPFAX URLs:

```
1170     ippfax://192.9.5.5/listener  
1171     ippfax://186.7.8.9/listeners/tom
```

1172

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1306 **18 Authors' addresses**

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Contact Information:

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IPPFAX Web Page: <http://www.pwg.org/qualdocs/>

1311

IPPFAX Mailing List: ifx@pwg.org

1312

1313

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

1314

1) send it to majordomo@pwg.org

1315

2) leave the subject line blank

1316

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

1317

subscribe ifx

1318

end

1319

1320

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

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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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Lloyd McIntyre - Xerox	Yuji Sasaki - JCI
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1328 **19 Appendix A: Comparison of IPP/1.1 and IPPFAX/1.0 (Informative)**

1329 This informative appendix compares IPP/1.1 and IPPFAX/1.0 with references to the appropriate sections
 1330 for details. If this appendix contradicts or omits any differences, it is a mistake and the body of this
 1331 document still prevails. Most of the differences are in conformance requirements only. Therefore, for
 1332 most of the differences, it is possible to implement both with the same code (without conditional branches).

1333 Legend:

1334 ** Where IPP/1.1 and IPPFAX/1.0 have a real difference, such as IPP/1.1 must and IPPFAX/1.0
 1335 MUST NOT, (indicated below by leading **), would a conditional branch be needed in the
 1336 implementation code in order to support both IPP/1.1 and IPPFAX/1.0.

1337 * Where IPP/1.1 is a may and IPPFAX/1.0 is a MUST NOT (indicated below by a leading *),
 1338 would a conditional branch be needed in the implementation code in order to support both IPP/1.1
 1339 and IPPFAX/1.0, *but only if the IPP/1.1 part supports the feature.*

1340 Differences between the IPP/1.1 protocol and the IPPFAX/1.0 protocol:

- 1341 1. ** IPP uses the ‘ipp’ URL scheme with a default port of 631, while IPPFAX uses the ‘ippfax’ URL
 1342 scheme with a default port of xxx [TBA by IANA] (section 4.1 and 15).

1343 2. ** IPP has only one version number parameter, while IPPFAX has two version numbers: the
1344 “version-number” parameter for IPP (section 4.2) and the “ippfax-version-number” operation
1345 attribute for IPPFAX (section 4.3).

1346 Differences between an IPP client and a Sender:

1347 1. An IPP Client may use any IPP operation, while a Sender MUST use at least Get-Printer-Attributes
1348 (sections 5 and 7.1), Validate-Job (section 7.2), and Print-Job operations (section 9). A Sender
1349 MUST use the Get-Notifications operation, unless the Sending User has explicitly indicated
1350 otherwise (section 9.6).

1351 2. In the Get-Printer-Attributes request, an IPP Client may supply the “document-format” operation
1352 attribute, while a Sender SHOULD (sections 5.1 and **Error! Reference source not found.**).

1353 3. ** In the Print-Job/Create-Job operations and the Validate-Job operation, an IPP Client may supply
1354 the “ipp-attribute-fidelity” operation attribute with either the ‘true’ or ‘false’ value or may omit the
1355 attribute entirely, while the Sender MUST always supply the attribute and with the ‘true’ value
1356 (sections 7.2 and 9.1.1).

1357 4. * An IPP Client may support any MIME Media Type as the value of the “document-format”
1358 operation attribute, while the Sender MUST support the ‘application/pdf’ MIME Media Type.

1359 5. The Sender and the Receiver MUST support “PDF/is” pdf-format.

1360 6. In the Print-Job/Create-Job operations and the Validate-Job operation, an IPP Client may supply
1361 the “media” Job Template attribute, while the Sender MUST supply it (section 9.2.1).

1362 7. * An IPP Client may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the
1363 “media” Job Template attribute or the Media Size Self Describing Name keyword values defined
1364 in the IEEE-ISTO 5101.1 “Media Standardized Names” [pwg-media], while the Sender MUST use
1365 the keyword values from [pwg-media] (section 9.2.1).

1366 8. There are no requirements for an IPP Client to indicate the client or the client user in the document,
1367 while the Sender MUST supply the “sender-uri” value along with a date and time, on at least the
1368 cover page (section **Error! Reference source not found.**).

1369 9. An IPP Client need not support Event Notification, while the Sender MUST support at least the
1370 ‘ippget’ Pull Delivery Method (section 9.3), which REQUIRES using the Get-Notifications
1371 operation (section 9.6).

1372 10. An IPP Client may support any events, while a Sender MUST NOT support the ‘job-config-
1373 changed’ event and MUST NOT support any Printer events (section 9.3.2).

- 1374 11. An IPP Client may support Client Authentication, while a Sender MUST support at least ‘digest’
1375 and ‘certificate’ (section 11.3).
- 1376 12. An IPP Client may support Data Integrity and Data Privacy, while a Sender MUST support Data
1377 Integrity and may use Data Privacy with at least the
1378 TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.3).
- 1379 Differences between an IPP Printer and a Receiver:
- 1380 1. In the Get-Printer-Attributes response, an IPP Printer may color the attribute values returned
1381 according to the “document-format” supplied, while a Receiver MUST color the values returned
1382 according to the “document-format” operation attribute supplied (sections 5 and 6), including the
1383 “printer-resolutions-supported” attribute (section 9.2.2.1).
- 1384 2. * An IPP Printer is not required to support any particular document formats, while a Receiver
1385 MUST support the PDF/is ‘application/pdf’ format with profile pdfis-fax.
- 1386 3. * An IPP Printer may support ‘application/octet-stream’ (auto-sensing - [RFC2911] 4.1.9.1), while
1387 a Receiver MUST NOT (section 6.5).
- 1388 4. An IPP Printer may support the IPPFAX attributes: “sending-user-vcard”, “receiving-user-vcard”,
1389 and “sender-uri”, while a Receiver MUST (sections **Error! Reference source not found.**, 6, 8,
1390 and **Error! Reference source not found.**).
- 1391 5. ** An IPP Printer MUST NOT support the “ippfax-versions” and “ippfax-versions-supported”
1392 attributes, while a Receiver MUST (sections 4.3 and 6.3).
- 1393 6. ** An IPP Printer must support both values of the “ipp-attribute-fidelity” operation attribute, while
1394 the Receiver MUST only support the ‘true’ value (section 9.1.1).
- 1395 7. ** An IPP Printer must assume a value of ‘false’ if the IPP Client omits the “ipp-attribute-fidelity”
1396 operation attribute, while the Receiver MUST reject the request with the ‘client-error-bad-request’
1397 status code (section 9.1.1).
- 1398 8. An IPP Printer is not required to support any particular Job Template attributes, while a Receiver
1399 MUST support at least the “media” and “printer-resolution” Job Template attributes.
- 1400 9. * An IPP Printer may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the
1401 “media” Job Template attribute or the Media Size Self Describing Name keyword values defined
1402 in the IEEE-ISTO 5101.1 “Media Standardized Names” [pwg-media], while the Receiver MUST
1403 support a subset of the keyword values from [pwg-media] (section 9.2.1).

- 1404 10. * An IPP Printer may support any Job Template attribute values, while a Receiver is restricted to a
1405 single value for many Job Template attributes for which other values would alter the appearance of
1406 the document or provide a non-FAX-like feature (section 9.2).
- 1407 11. * An IPP Printer may support Print-URI and Send-URI operations, while a Receiver MUST NOT
1408 (section 10.1).
- 1409 12. An IPP Printer must support Get-Jobs and Get-Job-Attributes operations, while a Receiver NEED
1410 NOT (section 10.1).
- 1411 13. ** An IPP Printer must support Cancel-Job operation, while a Receiver MUST NOT (section
1412 10.2).
- 1413 14. An IPP Printer may support administrative operations without authentication, while a Receiver
1414 MUST authenticate administrative operations, if administrative operations are supported (section
1415 10.1).
- 1416 15. * An IPP Printer may support the following operations from an authenticated operator or
1417 administrator: Purge-Jobs, Cancel-Current-Job, Cancel-Job, and Schedule-Job-After, while a
1418 Receiver MUST reject such operations from an authenticated operator or administrator.
- 1419 16. An IPP Printer may support Event Notification, while a Receiver MUST support Event
1420 Notification (sections 9.3 and 10.1) and at least the 'ippget' Delivery Method (section 9.6), which
1421 REQUIRES support for the Get-Notifications operation.
- 1422 17. If an IPP Printer supports Event Notification, it must support the 'job-state-changed' and 'job-
1423 created' events for Per-Job Subscriptions, while a Receiver NEED NOT (section 9.3.2).
- 1424 18. ** If an IPP Printer supports Printer Events, then it MUST support them for both Per-Job and Per-
1425 Printer Subscriptions, while a Receiver MUST NOT support them for Per-Job Subscriptions
1426 (section 9.3.2).
- 1427 19. If an IPP Printer supports Event Notification, it may support the 'job-progress' event, while a
1428 Receiver MUST for Per-Job Subscriptions (section 9.3.2).
- 1429 20. * If an IPP Printer supports Event Notification, it may support the 'job-config-changed' event,
1430 while a Receiver MUST NOT (section 9.3.2).
- 1431 21. An IPP Printer should support and may use TLS, while a Receiver MUST support and MUST use
1432 TLS (section 11.4).
- 1433 22. An IPP Printer may support Client Authentication, while a Receiver MUST support at least
1434 'digest' and 'certificate' (section 11.3).

1435 23. An IPP Printer may support Data Integrity and Data Privacy and support them with any cipher
1436 suite, while a Receiver MUST support both Data Integrity and Data Privacy with at least the
1437 TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.3).

1438 20 Appendix B: vCard Example

1439 The following ASCII text is a complete vCard v3.0 [RFC2426, RFC2425] example:

```
1440 BEGIN:VCARD
1441 VERSION:3.0
1442 N:Moore;Paul
1443 FN:Paul Moore
1444 ORG:Netreon
1445 TEL;CELL;VOICE:1+206-251-7008
1446 ADR;WORK;;;10900 NE 8th St;Bellvue;WA;98004;United States of America
1447 EMAIL;PREF;INTERNET:pmoore@netreon.com
1448 REV:19991207T215341Z
1449 END:VCARD
1450
```

1451 21 Appendix C: Generic Directory Schema for an IPPFAX Receiver

1452 This section defines a generic schema for an entry in a directory service. A directory service is a means by
1453 which service users can locate service providers. In IPPFAX environments, this means that Receivers
1454 (IPPFAX Printers) can be registered (either automatically or with the help of an administrator) as entries of
1455 type PRINTER in the directory using an IMPLEMENTATION SPECIFIC mechanism such as entry
1456 attributes, entry type fields, specific branches, etc. Directory clients can search or browse for entries of
1457 type PRINTER. Clients use the directory service to find entries based on naming, organizational contexts,
1458 or filtered searches on attribute values of entries. For example, a client can find all printers in the “Local
1459 Department” context. Authentication and authorization are also often part of a directory service so that an
1460 administrator can place limits on end users so that they are only allowed to find entries to which they have
1461 certain access rights. IPPFAX itself does not require any specific directory service protocol or provider.

1462 Note: Some directory implementations allow for the notion of “aliasing”. That is, one directory entry
1463 object can appear as multiple directory entry objects with different names for each object. In each case,
1464 each alias refers to the same directory entry object which refers to a single IPPFAX Printer object.

1465 The generic IPPFAX schema is a subset of IPPFAX Job Template and Printer Description attributes (Table
1466 1, **Error! Reference source not found.** and [RFC2911] sections 4.2 and 4.4). These attributes are
1467 identified as either RECOMMENDED or OPTIONAL for the directory entry itself. This conformance
1468 labeling is NOT the same conformance labeling applied to the attributes of IPPFAX Printers objects. The
1469 conformance labeling in this Appendix is intended to apply to directory templates and to Receivers that

1470 subscribe by adding one or more entries to a directory. RECOMMENDED attributes SHOULD be
 1471 associated with each directory entry. OPTIONAL attributes MAY be associated with the directory entry (if
 1472 known or supported). In addition, all directory entry attributes SHOULD reflect the current attribute
 1473 values for the corresponding IPPFAX Printer object.

1474 The names of attributes in directory schema and entries SHOULD be the same as the IPPFAX Printer
 1475 attribute names as shown, as much as possible.

1476 In order to bridge between the directory service and the IPPFAX Printer object, one of the
 1477 RECOMMENDED directory entry attributes is the Printer object's "printer-uri-supported" attribute. The
 1478 directory client queries the "printer-uri-supported" attribute (or its equivalent) in the directory entry and
 1479 then the IPPFAX client addresses the IPPFAX Printer object using one of its URIs. The "uri-security-
 1480 supported" attribute identifies the protocol (if any) used to secure a channel. If a Printer object supports
 1481 both IPP and IPPFAX, there should be two separate directory entries in order to represent these two
 1482 services.

1483 Table 14 defines the generic schema for directory entries of abstract type PRINTER. In the future this
 1484 schema could also be directory entries of type FAX. In either case, the concrete type MUST be IPPFAX.
 1485 If a Printer object supports both IPP and IPPFAX, there should be two separate directory entries in order to
 1486 represent these two services, one with concrete type IPP and the other with concrete type IPPFAX,
 1487 respectively.

1488 **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

1489

1490 **22 Appendix D: Summary of other IPP documents**

1491 The full set of IPP documents includes:

- 1492 1. Design Goals for an Internet Printing Protocol [RFC2567]
 1493 2. Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
 1494 3. Internet Printing Protocol/1.1: Model and Semantics (this document)
 1495 4. Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]
 1496 5. Internet Printing Protocol/1.1: Implementer's Guide [RFC3196] and [ipp-iig-bis]
 1497 6. Mapping between LPD and IPP Protocols [RFC2569]
 1498

1499 The “Design Goals for an Internet Printing Protocol” document takes a broad look at distributed printing
1500 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included
1501 in a printing protocol for the Internet. It identifies requirements for three types of users: end users,
1502 operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A
1503 few OPTIONAL operator operations have been added to IPP/1.1.

1504 The “Rationale for the Structure and Model and Protocol for the Internet Printing Protocol” document
1505 describes IPP from a high level view, defines a roadmap for the various documents that form the suite of
1506 IPP specification documents, and gives background and rationale for the IETF working group’s major
1507 decisions.

1508 The “Internet Printing Protocol/1.1: Encoding and Transport” document is a formal mapping of the abstract
1509 operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the
1510 encoding rules for a new Internet MIME media type called “application/ipp”. This document also defines
1511 the rules for transporting over HTTP a message body whose Content-Type is “application/ipp”. This
1512 document defines a new scheme named ‘ipp’ for identifying IPP printers and jobs.

1513 The “Internet Printing Protocol/1.1: Implementer’s Guide” document gives insight and advice to
1514 implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of
1515 the considerations that may assist them in the design of their client and/or IPP object implementations. For
1516 example, a typical order of processing requests is given, including error checking. Motivation for some of
1517 the specification decisions is also included.

1518 The “Mapping between LPD and IPP Protocols” document gives some advice to implementers of gateways
1519 between IPP and LPD (Line Printer Daemon) implementations.

1520 **23 Appendix E: Description of the IEEE Industry Standards and Technology** 1521 **(ISTO)**

1522 The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible
1523 operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards,
1524 but also to facilitate activities that support the implementation and acceptance of standards in the
1525 marketplace. The organization is affiliated with the IEEE (<http://www.ieee.org/>) and the IEEE Standards
1526 Association (<http://standards.ieee.org/>).

1527 For additional information regarding the IEEE-ISTO and its industry programs visit:

1528 <http://www.ieee-isto.org>.

1529 **24 Appendix F: Description of the IEEE-ISTO PWG**

1530 The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology
 1531 Organization (ISTO) and is an alliance among printer manufacturers, print server developers, operating
 1532 system providers, network operating systems providers, network connectivity vendors, and print
 1533 management application developers chartered to make printers and the applications and operating systems
 1534 supporting them work together better. All references to the PWG in this document implicitly mean “The
 1535 Printer Working Group, a Program of the IEEE ISTO.” In order to meet this objective, the PWG will
 1536 document the results of their work as open standards that define print related protocols, interfaces,
 1537 procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from
 1538 the interoperability provided by voluntary conformance to these standards.

1539 In general, a PWG standard is a specification that is stable, well understood and is technically competent,
 1540 has multiple, independent and interoperable implementations with substantial operational experience, and
 1541 enjoys significant public support.

1542 For additional information regarding the Printer Working Group visit:

1543 <http://www.pwg.org>

1544 **25 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	Updated with all the resolutions to the 41 ISSUES

		McDonald	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-profile-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".
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1547

Allow Cancel-job for Administrators.

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1548

Remove Notifications

1549

Remove Create-Job, Send-Document, Send-URI, Print-URI