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The Printer Working Group
Standard for IPPFAX/1.0 Protocol

Proposed Standard - Working Draft
510n.y-P0.16

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35 **Abstract:** This document specifies the IPPFAX/1.0 protocol. The IPPFAX requirements [ifx-req] are
36 derived from the requirements for Internet Fax [RFC2542].
37 In summary, IPPFAX is used to provide a synchronous, reliable exchange of image Documents between
38 clients and servers. The primary use envisaged of this protocol is to provide a synchronous image
39 transmission service for the Internet. Contrast this with the Internet FAX protocol specified in [RFC2305]
40 and [RFC2532] that uses the SMTP mail protocol as a transport.
41 The IPPFAX/1.0 protocol is a specialization of the IPP/1.1 [RFC2911], [RFC2910] protocol supporting a
42 subset of the IPP operations with increased conformance requirements in some cases, some restrictions in
43 other cases, and some additional REQUIRED attributes. The IPPFAX Protocol uses the 'ippfax' URL
44 scheme (instead of the 'ipp' URL scheme) in all its operations. Most of the new attributes defined in this
45 document MAY be supported by IPP Printers as OPTIONAL extensions to IPP as well. In addition,
46 IPPFAX/1.0 REQUIRES the support of the IPP Event Notification mechanism [ipp-ntfy] using the 'ippget'
47 Pull Delivery Method [ipp-get-method].
48 An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least the PDF/is as specified
49 in [ifx-pdfis] which is defined for the 'application/pdf' document format MIME type . A Print System MAY be
50 configured to support both the IPPFAX and IPP protocols concurrently, but each protocol requires separate
51 Printer objects with distinct URLs.
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53 This document is available electronically at:
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55   pwg-ifx-ippfax-P16-030423.pdf, .doc

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

57   pwg-ifx-ippfax-P16-030423-rev.pdf

58 The latest version of this specification is available at:

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

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68 Title: The IPPFAX/1.0 Protocol

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Contents

213
214   **Table of Tables**

230

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231 **1 Introduction**

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

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

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

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

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

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

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

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1.1 Operations used

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

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

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

3. Print-Job - Sender MUST submit the IPPFAX job with a single document (or MAY send Create-Job and one or more Send-Document operations if the Receiver also supports these operations). A Validate-job MUST be perform before a Create-Job because not all operation attributes that are permitted on a Validate-Job, such as document-format, are not valid on a Create-Job.

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

1.2 Typical exchange

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

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

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

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

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

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

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

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

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

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

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

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

1.3 Namespace used for attributes

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

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

2 Terminology

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

325 **2.1 Conformance Terminology**

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

333 **2.2 Other Terminology**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3 IPPFAX Model

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

3.1 Printer Object Relationships

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

3.2 A Printer object with multiple URLs

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

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

411 Note: For a Printer object that supports multiple URLs, neither the IPP/1.1 protocol nor the IPPFAX/1.0
412 protocol provides a way for the administrator to Set or Get the values of Printer attributes whose values
413 MAY depend on the URL used and/or MAY depend on the authenticated role of the requesting user. So,
414 for example, there is no way to set the differing values of the "operations-supported" Printer attribute (see

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415 section 6.4) that depend on the URL using the IPP or IPPFAX protocol. Providing such means is left for
416 future work as a single specification for use by both IPP and IPPFAX.

417 **3.3 A Print System supporting both IPP and IPPFAX protocols**

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

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

430 **4 Common IPPFAX Operation Attribute Semantics**

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

435 **4.1 printer-uri (uri) operation attribute ([RFC2911] section 3.1.5)**

436 This operation attribute specifies the transfer path to the Receiver for the operation. As in IPP/1.1, the
437 client MUST supply the "printer-uri" operation attribute in every IPPFAX request (see [RFC2911] section
438 3.1.5). For IPPFAX, the attribute value MUST be a URL using the 'ippfax' scheme (see section 16)
439 specifying the Receiver's network location.

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

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

443 As in all URLs, the scheme identifies the protocol. For example, if a client supports both the IPP and
444 IPPFAX protocols, then the URL scheme in the "printer-uri" operation attribute that the client supplies

445 indicates the protocol and determines whether the client intends the Print System to use IPP or IPPFAX
446 semantics. Similarly, if a Print System supports both the IPP and IPPFAX protocols, then the URL scheme
447 in the target "printer-uri" operation attribute that the client supplies MUST determine the protocol, the
448 Printer object, and the semantics that the Print System performs.

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

456 **4.2 version-number parameter ([RFC2911] section 3.1.8)**

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

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

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

471 **4.3 ippfax-version-number (type2 keyword) operation attribute**

472 The value of this operation attribute indicates the version of the IPPFAX Protocol and encoding that the
473 Sender is requesting and the Receiver is returning. The Sender MUST supply this operation attribute in
474 every request and the Receiver MUST return this operation attribute in every response. This operation
475 attribute MUST be placed in the Operation Attributes Group *immediately* after the operation attributes
476 whose order is specified in IPP/1.1 [RFC2911]. The semantics of the "ippfax-version-number" operation

477 attribute serves the same purpose for the IPPFAX Protocol as the IPP/1.1 "version-number" parameter
478 serves for the IPP Protocol (see [RFC2911] section 3.1.8).

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

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

486 The Receiver MUST indicate the IPPFAX versions supported using the "ippfax-versions-supported"
487 (1setOf type2 keyword) Printer Description attribute (see section 6.3).

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

497 There is no version negotiation per se. However, if after receiving a 'server-error-version-not-supported'
498 status code from a Receiver, a Sender SHOULD try again with a different version number. A Sender MAY
499 also determine the versions supported either from a directory (see section 22) or by querying the Printer
500 object's "ipp-versions-supported" (see section 6.2) and "ippfax-versions-supported" attributes (see section
501 6.3) to determine which IPP and IPPFAX versions are supported, respectively, as part of IPPFAX.

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

504 **5 Get-Printer-Attributes operation semantics**

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

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

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

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

513

6 IPPFAX Printer Description Attributes

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

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

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

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

524   **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, 8.4
ipp-versions-supported (1setOf type2 keyword) *	must	MUST**	6.2
ippfax-versions-supported (1setOf type2 keyword)	MUST NOT	MUST**	6.3
operations-supported (1setOf type2 enum) *	must	MUST	6.4
document-format-supported (1setOf mimeMediaType) *	must	MUST	6.5
pdf-format-supported(1setOf type2 keyword)	may	MUST	6.6
digital-signature-supported(1setOf type2 keyword)	may	MUST	6.7
pdl-override-supported(type2 keyword)	must	MUST	6.8

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Deleted: printer-is-accepting-jobs (boolean) * ... [1]

Deleted: Table 2 - Additional Printer Description attributes conformance requirements¶
Attribute Name (attribute syntax) ... [2]

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

534 6.1 printer-uri-supported (1setOf uri) ([RFC 2911] section 4.4.1)

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

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

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

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

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

Standard keyword values are (from [RFC2911]):

'1.1': The "IPP part" of the IPPFAX operations meets the protocol and encoding conformance requirements of IPP version 1.1 as specified in [RFC2911], [RFC2910], and IPP extensions.

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

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

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

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

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

Standard keyword values are:

580   '1.0': Meets the conformance requirements of IPPFAX version 1.0 as specified in this document.
581
582   Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for
583   keywords, by starting with an ASCII digit, instead of an ASCII lower case letter. However, for
584   consistency with IPP, these IPPFAX version keyword values are defined compatibly with the IPP
585   version keyword values.

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

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

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

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

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

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

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

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

601   CHANGE: change this attribute to docuemt-format-version-supported (document-format-version) and then
602   reference the Document Object Specification.

603   This attribute identifies which PDF formats the Receiver supports. A receiver MUST support this attribute,
604   a producer MAY support this attribute.

605   Both the Sender and Receiver MUST support MUST support application/pdf., PDF/is-1.0. The Receiver
606   MUST only list formats that it fully supports.

607   •

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This attribute indicates whether or not the Receiver is currently accepting (IPPFAX) Job Creation requests. As in IPP/1.1, the Receiver MUST support this Printer Description attribute (see [RFC2911] section 4.4.23).¶
See section 10.4 for a discussion of how the Enable-Printer and Disable-Printer administrative operations, if implemented, affect the value of this attribute.¶

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Deleted: For example, if an end user queries a Printer that supports the Disable-Printer administrative operation, it MAY either (1) return the Disable-Printer enum or (2) use Attribute Coloring and not return the Disable-Printer enum to the end user. In either case, if an administrator queries the same Printer, it MUST return the Disable-Printer enum.

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<#>PDFx-1a:2001 ¶   ... [3]

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

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

Digital-signature and digital-signature-supported will move to the Document Object specification. Reference them from that specification

If the receiver cannot validate the digital signature or if the digital signature fails to verify, then the receiver MUST notify the receiving user using an implementation specific method.

6.8 pdl-override-supported (type2 keyword)

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

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

7 Sender Validation of the Receiver's Capabilities

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

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

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

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

If the Sender requests these attributes using Get-Printer-Attributes and some of them are not returned, then the Sender MUST query the Sending User to inform that person that the Printer does not accept IPPFAX

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635   Jobs, so that the Sender has the opportunity to choose to abandon the exchange or to try an IPP URL (see
636   section 6.1) and then query the Sending User if it is OK to use the IPP Protocol.

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

640 **Table 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.
pdf-format-supported	6.6	Sender SHOULD** check which PDF formats the Receiver supports.
Job Template Printer attributes:		
media-supported	9.2.1.1	Sender SHOULD** check which media is supported, if the Sender specifies a particular media.
media-ready	9.2.1.1	Sender SHOULD check which media is ready (loaded, i.e., needs no human intervention to use).
printer-resolutions-supported	9.2.2.1	Sender SHOULD** check which resolutions are supported, so that it can use the highest resolution supported by the Receiver.

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

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

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

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

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

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

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

8 Identity exchange

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

667   **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
printer-uri-supported	MUST **	MUST

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

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

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

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

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

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

688   **8.2 receiving-user-vcard (text(MAX)) operation/Job Description attribute**

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

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

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

701   **8.3 sender-uri (uri) operation/Job Description attribute**

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

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

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

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

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

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

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

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

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

730 **Table 4 - IPP/1.1 Validate-Job and Job Creation operation attributes**

Operation attribute	Section	Sender supplies	IPP/1.1 Printer supports	Receiver supports
attributes-charset (charset)		MUST	must	MUST
attributes-natural-language (naturalLanguage)		MUST	must	MUST
printer-uri (uri) *	4.1	MUST	must	MUST
requesting-user-name (name(MAX)) *		SHOULD	must	MUST
job-name (name(MAX))		MAY	must	MUST
ipp-attribute-fidelity (boolean) *	9.1.1	MUST with 'true' value[1]	must	MUST
document-name (name(MAX)) *		MAY	must	MUST
compression (type3 keyword) *		MAY	must	MUST
document-format (mimeMediaType) *	9.1.2	MUST[2]	must	MUST
document-natural-language (naturalLanguage) *		MAY	may	MAY
job-k-octets (integer(0:MAX))		MAY	may	MAY
job-impressions (integer(0:MAX))		MAY	may	MAY
job-media-sheets (integer(0:MAX))		MAY	may	MAY
sending-user-vcard (1setOf text(MAX))	8.1	MAY	may	MUST
receiving-user-vcard (text(MAX))	8.2	SHOULD	may	MUST
sender-uri (name(MAX))	8.3	MUST	may	MUST
pdf-format(type2 keyword)	**Error! Reference source not found.**	SHOULD	may	MUST

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

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[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.

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

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

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

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

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

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

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

754 Standard mimeMediaType values are defined in section 6.5.

755 Because only one document-fomat MAY be supported, attribute coloring is not relevant for IPPFax

756 **9.1.3 document-format-version (type2 keyword) operation attribute ([RFC2911] section
757   3.2.1.1)**

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758 This attribute should be taken from the document-object specification. Revise this section. Completely
759 define here and note that it the exact same as the document-object specification.

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760 This operation attribute identifies the type2 keyword of the pdf document that the Sender is sending. The
761 Sender MUST supply this operation attribute in the Validate-Job and Job Creation operations. A Receiver
762 MUST validate and support this operation attribute.

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

766   Standard keyword values are defined in section 6.6.

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

768   Table 5 lists all of the Job Template attributes defined in other IPP documents for use in Validate-Job and
769   Job Creation operations and shows their conformance for IPPFAX Jobs. As in [RFC2911], the term "Job
770   Template attribute" is actually up to four attributes: the "xxx" Job attribute, and the "xxx-default", "xxx-
771   supported", and possibly the "xxx-ready" Printer attributes. Any other IPP Job Template attributes defined
772   in other documents are OPTIONAL for IPPFAX.

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

776   In Table 5, if the "Sender supply" and "Receiver support" columns contain an explicit single value, the
777   Sender MAY send and the Receiver MAY support the Job Template attribute for an IPPFAX Job, but
778   MUST support only the indicated value. Note: Each such single value has been selected as the value for
779   the attribute that would correspond to the *expected behavior* if the attribute were not supported at all. If
780   these attributes are supplied in an IPPFAX Job with any other value, the Receiver MUST reject the Job
781   Creation operation (since the value isn't supported and "ipp-attribute-fidelity" MUST be 'true'). If the
782   Receiver supports this attribute, the Receiver MUST return only the indicated value in the Get-Printer-
783   Attributes response for the corresponding "xxx-supported" and "xxx-default" Printer attributes. Note:
784   These are attributes which might degrade the appearance of the document or provide a significantly non-
785   FAX feature if the non-default value were supplied and supported, such as "number-up" = 2 or "job-
786   priority" = 100, respectively.

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

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Table 5 - IPPFAX Semantics for Job Template Attributes

Job Template attribute	Sender supply *	Receiver support *	Reference
copies (integer(1:MAX))	MAY	MAY	[RFC2911]
cover-back (collection)	MAY	MAY	[ipp-prod-print]
cover-front (collection)	MAY	MAY	[ipp-prod-print]
document-overrides (collection)	MAY	MAY	[ipp-coll]
finishings (1setOf type2 enum)	MAY	MAY	[RFC2911]
finishings-col (collection)	MAY	MAY	[ipp-prod-print]
force-front-side (1setOf integer(1:MAX))	MAY	MAY	[ipp-prod-print]
imposition-template (type2 keyword	name(MAX))	'none'	'none'	[ipp-prod-print]
insert-sheet (1setOf collection)	'insert-count' = 0	'insert-count' = 0	[ipp-prod-print]
job-account-id (name(MAX))	MAY	MAY	[ipp-prod-print]
job-accounting-sheets (collection)	MAY	MAY	[ipp-prod-print]
job-accounting-user-id (name(MAX))	MAY	MAY	[ipp-prod-print]
job-error-sheet (collection)	MAY	MAY	[ipp-prod-print]
job-hold-until (type3 keyword	name(MAX))	'no-hold'	'no-hold'	[RFC2911]
job-message-to-operator (text(MAX))	MAY	MAY	[ipp-prod-print]
job-priority (integer(1:100)	50	50	[RFC2911]
job-sheet-message (text(MAX))	MAY	MAY	[ipp-prod-print]
job-sheets (type3 keyword	name(MAX))	MAY	MAY	[RFC2911]
job-sheets-col (collection)	MAY	MAY	[ipp-prod-print]
media (type3 keyword	name(MAX))	MUST (see section 9.2.1)	MUST (see section 9.2.1)	[RFC2911]
media-supported (DMC-We shouldn't put "xxx–supported" attrs in this table. Otherwise, have to put all of them.)	MAY	MUST	[RFC2911]
media-col (collection)	MAY	MAY	[ipp-prod-print]
media-input-tray-check (type3 keyword	name(MAX))	MUST NOT	MUST NOT	[ipp-prod-print]
multiple-document-handling (type2 keyword)	MAY	MAY	[RFC2911]
number-up (integer(1:MAX)	1	1	[RFC2911]
orientation-requested (type2 enum)	'portrait'	'portrait'	[RFC2911]
output-bin (type2 keyword	name(MAX))	MUST NOT	MUST NOT	[ipp-output-bin]
page-delivery (type2 keyword)	'system-specified'	'system-specified'	[ipp-prod-print]
page-order-received (type2 keyword)	'1-to-n-order'	'1-to-n-order'	[ipp-prod-print]

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

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

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

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

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

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

812 PDF Crop boxes SHOULD be used when the Sender knows that the imageable region is less than the
813 media size. If the crop box is the union of the lesser size of Letter and A4 minus ¼ of an inch, then the
814 Sender can be sure that the majority of Receivers can print the complete image without loss of data.
815 However, this does mean that there is the possibility that data may lost.
816

817 Standard keyword values are defined in section 9.2.1.1.

818 **9.2.1.1 media-supported and media-ready Job Template Printer attributes**

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

823 New Media name pwg_letter-or-A4 which will represent both (Needs to be registered) MUST be
824   supported. If specified in the *media* attribute then indicates that either'na_letter_8.5x11in' or
825   'iso_a4_210x297mm' would be acceptable.
826

827 The following standard keywords MUST be supported if the corresponding media sizes are supported.
828 Any other paper sizes supported MUST use the self-describing names as defined in ([5101.1]):

829 'na_letter_8.5x11in'
830 'iso_a4_210x297mm'

831 **9.2.2 printer-resolution (resolution) Job Template attribute ([RFC2911] section 4.2.12)**

832 This Job Template attribute ([RFC2911] section 4.2.12) identifies the cross-feed and feed direction
833 resolutions that the Printer uses for the Job. The Sender MUST NOT supply the "printer-resolution" Job
834 Template attribute in the Validate-Job and Job Creation requests and the Receiver MUST NOT support it.
835 However, the Receiver MUST support the "printer-resolution-default", and "printer-resolution-supported"
836 attributes.

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

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

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

9.2.2.1 printer-resolution-supported Job Template Printer attribute

845 The Receiver MUST support this attribute. If the Sender is using a resolution for PDF/is that is not the
846 REQUIRED minimum resolution for PDF/is, then the Sender SHOULD query the "printer-resolution-
847 supported" Printer attribute. Thus this attribute allows the Sender to determine the resolution(s) supported
848 in addition to the minimum resolution required.

9.3 Subscription Template Attributes Conformance Requirements

850 Table 6 lists the conformance requirements for Subscription attributes on the Job Creation and Validate-Job
851 requests. The attributes in Subscription Objects are shown immediately followed (indented) by their
852 corresponding Default and Supported Printer Attributes.

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

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

Deleted: See section 9.2.2.1.¶

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

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

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

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

854   * The Sender MUST supply at least the "notify-recipient-uri" attribute for any Push Delivery Method.
855   ** The Sender MUST supply at least the "notify-pull-method" attribute for any Pull Delivery Method, such
856   as the REQUIRED 'ippget' Delivery Method.
857

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

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

864 **9.3.2 Notification Event Conformance Requirements**

865 Table 7 lists the conformance requirements for notification events.

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

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

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

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

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

877

878 **9.4 Confirmation using the Document Creation response**

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

884   **9.5 Originator identifier image**

885   The Sender MUST place an originator identifier, i.e., the value of the "sender-uri" attribute (see section
886   8.3), along with the date and time, in one of the following places, DEPENDING ON
887   IMPLEMENTATION:

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

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

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

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

895   **9.6 Get-Notifications operation to get Event Notifications**

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

10 IPPFAX Implementation of other IPP operations

903   Section 5 defined the semantic requirements for the Get-Printer-Attributes operation, section 7 defined the
904   semantic requirements for Validate-Job, and section 9 defined the semantic requirements for Job Creation
905   operations for IPPFAX. This section defines the IPPFAX semantics and conformance requirements for the
906   other IPP operations.

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

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

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

918 **10.1 Operation Conformance Requirements**

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

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

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

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

935   **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]

936   Legend:
937   **MAY*** - If supported, Get-Job-Attributes and Get-Jobs MUST restrict certain attributes, such as "job-name", and "job-
938   originating-user-name". See section 10.3.
939

Deleted: Send-Notifications   ... [5]

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

940   **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]

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

948   **10.2 Cancel-Job operation ([RFC2911] section 3.3.3)**

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

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

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

956   **10.3 Get-Job-Attributes and Get-Jobs operations ([RFC2911] sections 3.3.4 and 3.2.6)**

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

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

962   job-id, job-uri
963   job-k-octets, job-k-octets-completed
964   job-media-sheets, job-media-sheets-completed,
965   time-at-creation, time-at-processing
966   job-state, job-state-reasons
967   number-of-intervening-jobs
968
969   The exact choice of Job attributes that a client can query for IPPFAX Jobs, including not returning any,
970   DEPENDS ON IMPLEMENTATION and the security policy in force and is outside the scope of this
971   standard (as in IPP/1.1).

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

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

976   An IPP administrator MAY read all attributes.

977   **10.4 Enable-Printer and Disable-Printer operations [RFC3380]**

978   The Enable-Printer and Disable-Printer operations [RFC3380] allow a remote operator to change the value
979   of the Receiver's "printer-is-accepting-jobs" (boolean) Printer Description attribute (see section 1.1) to
980   'true' or 'false', respectively. These operations are OPTIONAL for a Receiver to support.

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

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

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

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

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

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

11 Security considerations

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

11.1 Privacy

1000   Any exchange between a Sender and a Receiver MUST be carried using the privacy mechanism specified
1001   in IPP/1.1 namely TLS [RFC2246]. In some cases this will also result in mutual authentication of the
1002   Sender and Receiver (in the case where both sides have certificates).

1003   The Receiver MUST have a TLS certificate.

1004   The Sender MAY have a certificate. A Receiver MAY decide to reject requests that come from Senders
1005   that do not have a certificate and return the 'client-error-not-authenticated' status code.

1006   A Sender can either use its own certificate or it can use one associated with the Sending User.

1007   Senders and Receivers SHOULD do what current browsers do, namely, be deployed with the public keys
1008   of a number of the top Certificate Authorities. If a Sender gets a public key from a Receiver that it doesn't
1009   recognize, the Sender MUST query the Sending User to see if the Sending User trusts the Receiver before
1010   sending the IPPFAX job to the Receiver.

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Deleted: If a Receiver supports these operations, then the "document-format" operation attributes MUST be supported for these operations as well so that the administrator can set values that require Attribute Coloring (by document format). See the description of the Get-Printer-Attributes operation in section 5 which also REQUIRES these operation attributes to be supported

Deleted: If these operations are supported then they MUST only be executable on a connection on which TLS has authenticated the user and the user has rightes to perform them.

Inserted: If these operations are supported then they MUST only be executable on a connection on which TLS has authenticated the user and the user has rightes to perform them

1011 | The distribution of private keys to Senders or Receivers is outside the scope of this document, but <u>if</u> it is
1012   done over the network, it MUST be over a secure channel. See Internet Key Exchange (IKE) [RFC2409].

1013   **11.2 uri-authentication-supported (1setOf type2 keyword) ([RFC2911] section 4.4.2)**

1014   This attribute (see [RFC2911] section 4.4.2) identifies the Client Authentication mechanism associated
1015   with each URI listed in the "printer-uri-supported" attribute (see section 6.1).

1016   **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

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1017   * TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA mandated by [RFC2246].

1018   Table 11 compares the Digest Authentication requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX
1019   Senders, and IPPFAX Receivers.

1020   **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

1021

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

1023   This attribute (see [RFC2911] section 4.4.3) identifies the security (Integrity and Privacy) mechanisms
1024   used for each URI listed in the "printer-uri-supported" attribute (see section 6.1).

1025   **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

1026

1027 Table 13 compares the TLS conformance requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX
1028 Senders, and IPPFAX Receivers.

1029 **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

1030 * The 'certificate' keyword value for the "uri-authentication-supported" attribute [RFC2911].

1031 ** The Sender MUST query the Sending User before omitting the Data Privacy encryption.

1032 Senders and Receivers MUST support the TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite as
1033 mandated by RFC 2246 [RFC2246]. All stronger cipher suites are OPTIONAL; weaker cipher suites
1034 MUST NOT be supported or used by Senders or Receivers.

1035 A Receiver MAY support Basic Authentication (described in HTTP/1.1 [RFC2617]) for Client
1036 Authentication if the TLS channel is secured with Data Privacy. TLS with the above mandated cipher suite
1037 or stronger can provide such a secure channel.

1038 **11.4 Using IPPFAX with TLS**

1039 The Sender MUST use only TLS for all IPPFAX operations on the IPPFAX URL. The client MUST start
1040 the transaction in TLS, rather than using HTTP upgrade requests. The following paragraph of [RFC2818]
1041 further explains:

1042 The agent acting as the HTTP client should also act as the TLS client. It should initiate a
1043 connection to the server on the appropriate port and then send the TLS ClientHello to begin the TLS
1044 handshake. When the TLS handshake has finished. The client may then initiate the first HTTP
1045 request. All HTTP data MUST be sent as TLS "application data". Normal HTTP behavior,
1046 including retained connections should be followed.

1047 Contrast this IPPFAX requirement with the IPP requirement in section 8.2 of [RFC2910]. The following
1048 client actions compare IPP with IPPFAX from a client's point of view:

1049   IPP/1.1 sequence:
1050   1. Start TCP connection
1051   2. Zero or more HTTP/IPP requests
1052   3. HTTP/IPP request with Upgrade to TLS header
1053   4. TLS handshake
1054   5. Finish the HTTP/IPP request securely

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1055   6. Send more HTTP/IPP requests securely ...
1056
1057   IPPFAX sequence:
1058   1. Start TCP connection
1059   2. Send TLS ClientHello
1060   3. Rest of TLS handshake

> **Deleted:** r

1061   4. Send HTTP/IPPFAX requests securely ... (which usually will be a Get-Printer-Attributes,
1062   followed by Validate-Job and Print-Job operations).
1063

11.5 Access control

1065   It is expected that the majority of IPPFAX Receivers will operate in a public mode when operating on the
1066   Internet, so that anonymous users can send documents without requiring client authentication
1067   (corresponding to the 'none' value for the "uri-authentication-supported" attribute - see section 11.2).
1068   However a Receiver MAY protect itself using any Client Authentication method specified in [RFC2911]
1069   (digest authentication [RFC2069] for example) to restrict access to any or all of its functionality.

1070   However, the primary intent of IPPFAX is to create a controlled public access mode. It therefore does not
1071   really make much sense to combine IPPFAX and user authentication; they are achieving the same thing.

11.6 Reduced feature set

1073   An administrator or device implementer MAY choose to setup up a Print Service so that it only works as an
1074   IPPFAX Receiver (i.e., offers no 'native' IPP operations and does not accept IPP Jobs). In this mode it
1075   offers a restricted set of features and MAY be more safely connected to the Internet.

1076   A Receiver that is operating in this mode MUST do so by rejecting any non-IPPFAX request and return a
1077   'client-error-attributes-or-values-not-supported' error status code as indicated in section 4.1 for an
1078   unsupported value of the "printer-uri" operation attribute. For job operations attempted on IPPFAX Jobs,
1079   the Receiver MUST return the 'client-error-not-authorized' error status code, unless the Sender is
1080   authenticated as the system administrator and the Receiver supports such access.

12 Gateways to other systems

1081

1082 A common scenario will be where IPPFAX acts as an on-ramp or off-ramp to other Document transmission
1083 systems.

12.1 Off-Ramps

1084

1085 In the IPPFAX 'Off-ramp' scenario the user with a Document to send uses an IPPFAX Sender to transmit a
1086 Document to an IPPFAX Receiver within a gateway that in turn transmits it to some other destination, i.e.
1087 GSTN FAX. Handling Off-ramps is beyond the scope of this document, but may be a future IPPFAX
1088 extension building on the Off-ramp work of the Internet FAX WG.

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12.2 On-Ramps

1089

1090 In the IPPFAX On-Ramp scenario the user originally sent the Document using some other mechanism to
1091 some intermediate agent. The intermediate agent, acting as an IPPFAX Sender, then uses the IPPFAX
1092 Protocol to transmit the Document to an Receiver which MAY be either a final destination or an Off-Ramp.
1093 IPPFAX has no specific support for on-ramps.

13 Attribute Syntaxes

1094

1095 No new attribute syntaxes are defined.

14 Status codes

1096

1097 In addition to the semantics of the status codes defined in [RFC2911] and [ipp-get-method], the following
1098 additional semantics are defined for [RFC2911] status codes:

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

1099

1100 The client has failed to supply one or more attributes in a request which are REQUIRED to be supplied.
1101 The requirement can be because of the Printer's current configuration or because of some other attributes
1102 that the client supplied. The Printer MUST reject the request, MUST return the 'client-error-bad-request'
1103 status code, and SHOULD return the keyword attribute name(s) (but not the values) of the missing
1104 attribute(s) in the Unsupported Attributes Group in the response.

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

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

15 Conformance Requirements

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

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

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

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

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

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

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

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

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

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

| Deleted: 9.6, 9.3, and 9.3.2 |

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

11. The Sender and Receiver MUST support the security mechanisms indicated in section 11, including ◄ - - - | **Formatted:** Bullets and Numbering
    TLS.

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

16 IPPFAX URL Scheme

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

16.1 IPPFAX URL Scheme Applicability and Intended Usage

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

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

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

16.2 IPPFAX URL Scheme Associated IPPFAX Port

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

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

16.3 IPPFAX URL Scheme Associated MIME Type

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

1158   See: IANA MIME Media Types Registry [IANA-MT].

1159   **16.4 IPPFAX URL Scheme Character Encoding**

1160   The IPPFAX URL scheme defined in this document is based on the ABNF for the HTTP URL scheme
1161   defined in HTTP/1.1 [RFC2616], which is derived from the URI Generic Syntax [RFC2396] and further
1162   updated by [RFC2732] and [RFC2373] (for IPv6 addresses in URLs). The IPPFAX URL scheme is case-
1163   insensitive in the 'scheme' and 'host' (host name or host address) part; however, the 'abs_path' part is
1164   case-sensitive, as in [RFC2396]. Code points outside [US-ASCII] MUST be hex escaped by the
1165   mechanism specified in [RFC2396].

1166   **16.5 IPPFAX URL Scheme Syntax in ABNF**

1167   The IPP protocol places a limit of 1023 octets (NOT characters) on the length of a URI (see section 4.1.5
1168   'uri' in [RFC2911]). An IPPFAX Receiver MUST return 'client-error-request-value-too-long' (see section
1169   13.1.4.10 in [RFC2911]) when a URI received in a request is too long.

1170   Note: IPPFAX Receivers ought to be cautious about depending on URI lengths above 255 bytes, because
1171   some older client or proxy implementations might not properly support these lengths.

1172   IPPFAX URLs MUST be represented in absolute form. Absolute URLs always begin with a scheme name
1173   followed by a colon. For definitive information on URL syntax and semantics, see "Uniform Resource
1174   Identifiers (URI): Generic Syntax and Semantics" [RFC2396]. This specification adopts the definitions of
1175   "port", "host", "abs_path", and "query" from [RFC2396], as updated by [RFC2732] and [RFC2373] (for
1176   IPv6 addresses in URLs).

1177   The IPPFAX URL scheme syntax in ABNF is as follows:

1178   `ippfax_URL = "ippfax:" "//" host [ ":" port ] [ abs_path [ "?" query ]]`
1179
1180   If the port is empty or not given, the IANA-assigned port as defined in section 16.2 is assumed. The
1181   semantics are that the identified resource (see section 5.1.2 of [RFC2616]) is located at the IPPFAX
1182   Notification Recipient listening for HTTP connections on that port of that host, and the Request-URI for
1183   the identified resource is 'abs_path'.

1184   Note: The use of IP addresses in URLs SHOULD be avoided whenever possible (see [RFC1900]).

1185   If the 'abs_path' is not present in the URL, it MUST be given as "/" when used as a Request-URI for a
1186   resource (see section 5.1.2 of [RFC2616]). If a proxy receives a host name which is not a fully qualified
1187   domain name, it MAY add its domain to the host name it received. If a proxy receives a fully qualified
1188   domain name, the proxy MUST NOT change the host name.

1189 **16.6 IPPFAX URL Examples**

1190 The following are examples of valid IPPFAX URLs for Notification Recipient objects (using DNS host
1191 names):

1192 `ippfax://abc.com`
1193 `ippfax://abc.com/listener`
1194
1195 Note: The use of IP addresses in URLs SHOULD be avoided whenever possible (see [RFC1900]).

1196 The following literal IPv4 addresses:

1197 `192.9.5.5                    ; IPv4 address in IPv4 style`
1198 `186.7.8.9                    ; IPv4 address in IPv4 style`
1199
1200 are represented in the following example IPPFAX URLs:

1201 `ippfax://192.9.5.5/listener`
1202 `ippfax://186.7.8.9/listeners/tom`
1203
1204 The following literal IPv6 addresses (conformant to [RFC2373]):

1205 `::192.9.5.5                  ; IPv4 address in IPv6 style`
1206 `::FFFF:129.144.52.38         ; IPv4 address in IPv6 style`
1207 `2010:836B:4179::836B:4179    ; IPv6 address per RFC 2373`
1208
1209 are represented in the following example IPPFAX URLs:

1210 `ippfax://[::192.9.5.5]/listener`
1211 `ippfax://[::FFFF:129.144.52.38]/listener`
1212 `ippfax://[2010:836B:4179::836B:4179]/listeners/tom`
1213

1214 **16.7 IPPFAX URL Comparisons**

1215 When comparing two IPPFAX URLs to decide if they match or not, the comparer MUST use the same
1216 rules as those defined for HTTP URI comparisons in [RFC2616], with the sole following exception:

1217 • A port that is empty or not given MUST be treated as equivalent to the port as defined in section
1218   16.2 for that IPPFAX URL;

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

17 IANA Considerations

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

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

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

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

18 References

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1333 **19 Authors' addresses**

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1334
1335   Contact Information:
1336
1337   IPPFAX Web Page: http://www.pwg.org/qualdocs/
1338   IPPFAX Mailing List: ifx@pwg.org
1339
1340   To subscribe to the IPPFAX mailing list, send the following email:

Formatted: Font: (Default) Times New Roman, 12 pt
Formatted: Font: (Default) Times New Roman, 12 pt
Formatted: No underline
Formatted: No underline
Formatted: Font: (Default) Times New Roman, 12 pt
Formatted: Tight
Deleted: ¶
Deleted: ¶
Formatted Table
Deleted:)
Deleted: ipp
Deleted: pp
Deleted: ipp

1341   1) send it to majordomo@pwg.org
1342   2) leave the subject line blank
1343   3) put the following two lines in the message body:
1344   subscribe ifx

`Deleted: pp`

1345   end
1346
1347   Implementers of this specification document are encouraged to join the IPPFAX Mailing List in order
1348   to participate in any discussions of clarification issues and review of registration proposals for
1349   additional attributes and values. In order to reduce spam the mailing list rejects mail from non-
1350   subscribers, so you must subscribe to the mailing list in order to send a question or comment to the
1351   mailing list.
1352
1353   Other Participants:

Ron Bergman - Hitachi Koki	Dan Calle - Digital Paper
Jeff Christensen - Novell	Lee Farrell - Canon Info Systems
Satoshi Fujitani - Ricoh	Roelop Hamberg - Oce
Rich Heckelmann - Panasonic USA	Robert Herriot - Xerox
Koichi "Hurry" Izuhara - Minolta	Charles Kong - Panasonic
Mike Kuindersma - PrinterOn	Marty Joel - Peerless
Harry Lewis - IBM	Toru Maeda - Canon
Carl-Uno Manros - Xerox	Frank Martin - Brother
Lloyd McIntyre - Xerox	Hugo Parra - Novell
Patrick Pidduck - PrinterOn	Stuart Rowley - Kyocera
Yuji Sasaki - JCI	Norbert Schade - Oak Technology
Richard Shockey - Newstar	Howard Sidorski - Netreon
	Geoff Soord - Software 2000
John Thomas - Sharp Labs	Jerry Thrasher - Lexmark
Shinichi Tsuruyama - Epson	Aisushi Uchino - Epson
Shigeru Udea - Canon	Mark VanderWiele - IBM
Bill Wagner - NetSilicon/DPI	Don Wright - Lexmark
Michael Wu - Heidelberg Digital	Peter Zehler - Xerox

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

1355   This informative appendix compares IPP/1.1 and IPPFAX/1.0 with references to the appropriate sections
1356   for details. If this appendix contradicts or omits any differences, it is a mistake and the body of this
1357   document still prevails. Most of the differences are in conformance requirements only. Therefore, for
1358   most of the differences, it is possible to implement both with the same code (without conditional branches).

1359   Legend:

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

1360   ** Where IPP/1.1 and IPPFAX/1.0 have a real difference, such as IPP/1.1 must and IPPFAX/1.0
1361   MUST NOT, (indicated below by leading **), would a conditional branch be needed in the
1362   implementation code in order to support both IPP/1.1 and IPPFAX/1.0.

1363   * Where IPP/1.1 is a may and IPPFAX/1.0 is a MUST NOT (indicated below by a leading *),
1364   would a conditional branch be needed in the implementation code in order to support both IPP/1.1
1365   and IPPFAX/1.0, *but only if the IPP/1.1 part supports the feature*.

1366   Differences between the IPP/1.1 protocol and the IPPFAX/1.0 protocol:

1367   1. ** IPP uses the 'ipp' URL scheme with a default port of 631, while IPPFAX uses the 'ippfax' URL
1368   scheme with a default port of xxx [TBA by IANA] (section 4.1 and 16).

1369   2. ** IPP has only one version number parameter, while IPPFAX has two version numbers: the
1370   "version-number" parameter for IPP (section 4.2) and the "ippfax-version-number" operation
1371   attribute for IPPFAX (section 4.3).

1372   Differences between an IPP client and a Sender:

1373   1. An IPP Client may use any IPP operation, while a Sender MUST use at least Get-Printer-Attributes
1374   (sections 5 and 7.1), Validate-Job (section 7.2), and Print-Job operations (section 9). A Sender
1375   MUST use the Get-Notifications operation, unless the Sending User has explicitly indicated
1376   otherwise (section 9.6).

1377   2. In the Get-Printer-Attributes request, an IPP Client may supply the "document-format" operation
1378   attribute, while a Sender SHOULD (sections 5.1 and **Error! Reference source not found.**)

> **Deleted:** in order to get Attribute Coloring

1379   3. ** In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the
1380   "ipp-attribute-fidelity" operation attribute with either the 'true' or 'false' value or may omit the
1381   attribute entirely, while the Sender MUST always supply the attribute and with the 'true' value
1382   (sections 7.2 and 9.1.1).

1383   4. * An IPP Client may support any MIME Media Type as the value of the "document-format"
1384   operation attribute, while the Sender MUST support the 'application/pdf' MIME Media Type.

1385   5. The Sender and the Receiver MUST support "PDF/is" pdf-format.

1386   6. In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the
1387   "media" Job Template attribute, while the Sender MUST supply it (section 9.2.1).

1388   7. * An IPP Client may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the
1389   "media" Job Template attribute or the Media Size Self Describing Name keyword values defined

1390   in the IEEE-ISTO 5101.1 "Media Standardized Names" [pwg-media], while the Sender MUST use
1391   the keyword values from [pwg-media] (section 9.2.1).

1392   8. There are no requirements for an IPP Client to indicate the client or the client user in the document,
1393   while the Sender MUST supply the "sender-uri" value along with a date and time, on at least the
1394   cover page (section **Error! Reference source not found.**).

1395   9. An IPP Client need not support Event Notification, while the Sender MUST support at least the
1396   'ippget' Pull Delivery Method (section 9.3), which REQUIRES using the Get-Notifications
1397   operation (section 9.6).

1398   10. An IPP Client may support any events, while a Sender MUST NOT support the 'job-config-
1399   changed' event and MUST NOT support any Printer events (section 9.3.2).

1400   11. An IPP Client may support Client Authentication, while a Sender MUST support at least 'digest'
1401   and 'certificate' (section 11.2).

1402   12. An IPP Client may support Data Integrity and Data Privacy, while a Sender MUST support Data
1403   Integrity and may use Data Privacy with at least the
1404   TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA cipher suite (section 11.2).

1405   Differences between an IPP Printer and a Receiver:

1406   1. In the Get-Printer-Attributes response, an IPP Printer may color the attribute values returned
1407   according to the "document-format" supplied, while a Receiver MUST color the values returned
1408   according to the "document-format" operation attribute supplied (sections 5 and 6), including the
1409   "printer-resolutions-supported" attribute (section 9.2.2.1).

1410   2. * An IPP Printer is not required to support any particular document formats, while a Receiver
1411   MUST support the PDF/is 'application/pdf' format with profile pdfis-fax.

1412   3. * An IPP Printer may support 'application/octet-stream' (auto-sensing - [RFC2911] 4.1.9.1), while
1413   a Receiver MUST NOT (section 6.5).

1414   4. An IPP Printer may support the IPPFAX attributes: "sending-user-vcard", "receiving-user-vcard",
1415   and "sender-uri", while a Receiver MUST (sections **Error! Reference source not found.**, 6, 8,
1416   and **Error! Reference source not found.**).

1417   5. ** An IPP Printer MUST NOT support the "ippfax-versions" and "ippfax-versions-supported"
1418   attributes, while a Receiver MUST (sections 4.3 and 6.3).

1419   6. ** An IPP Printer must support both values of the "ipp-attribute-fidelity" operation attribute, while
1420   the Receiver MUST only support the 'true' value (section 9.1.1).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

> **Deleted:** <#>If an IPP Printer supports the Set-Printer-Attributes operation, then it may support setting the Attribute Coloring values according to the "document-format" operation attribute, while the Receiver, if it supports the Set-Printer-Attributes operation, MUST support setting the Attribute Coloring values according to the "document-format" operation attribute (section 10.5).¶
>
> **Formatted:** Bullets and Numbering

21 Appendix B: vCard Example

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

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

22 Appendix C: Generic Directory Schema for an IPPFAX Receiver

This section defines a generic schema for an entry in a directory service. A directory service is a means by which service users can locate service providers. In IPPFAX environments, this means that Receivers (IPPFAX Printers) can be registered (either automatically or with the help of an administrator) as entries of

1482 type PRINTER in the directory using an IMPLEMENTATION SPECIFIC mechanism such as entry
1483 attributes, entry type fields, specific branches, etc. Directory clients can search or browse for entries of
1484 type PRINTER. Clients use the directory service to find entries based on naming, organizational contexts,
1485 or filtered searches on attribute values of entries. For example, a client can find all printers in the "Local
1486 Department" context. Authentication and authorization are also often part of a directory service so that an
1487 administrator can place limits on end users so that they are only allowed to find entries to which they have
1488 certain access rights. IPPFAX itself does not require any specific directory service protocol or provider.

1489 Note: Some directory implementations allow for the notion of "aliasing". That is, one directory entry
1490 object can appear as multiple directory entry objects with different names for each object. In each case,
1491 each alias refers to the same directory entry object which refers to a single IPPFAX Printer object.

1492 The generic IPPFAX schema is a subset of IPPFAX Job Template and Printer Description attributes (Table
1493 1, and [RFC2911] sections 4.2 and 4.4). These attributes are identified as either RECOMMENDED or
1494 OPTIONAL for the directory entry itself. This conformance labeling is NOT the same conformance
1495 labeling applied to the attributes of IPPFAX Printers objects. The conformance labeling in this Appendix
1496 is intended to apply to directory templates and to Receivers that subscribe by adding one or more entries to
1497 a directory. RECOMMENDED attributes SHOULD be associated with each directory entry. OPTIONAL
1498 attributes MAY be associated with the directory entry (if known or supported). In addition, all directory
1499 entry attributes SHOULD reflect the current attribute values for the corresponding IPPFAX Printer object.

1500 The names of attributes in directory schema and entries SHOULD be the same as the IPPFAX Printer
1501 attribute names as shown, as much as possible.

1502 In order to bridge between the directory service and the IPPFAX Printer object, one of the
1503 RECOMMENDED directory entry attributes is the Printer object's "printer-uri-supported" attribute. The
1504 directory client queries the "printer-uri-supported" attribute (or its equivalent) in the directory entry and
1505 then the IPPFAX client addresses the IPPFAX Printer object using one of its URIs. The "uri-security-
1506 supported" attribute identifies the protocol (if any) used to secure a channel. If a Printer object supports
1507 both IPP and IPPFAX, there should be two separate directory entries in order to represent these two
1508 services.

1509 Table 14 defines the generic schema for directory entries of abstract type PRINTER. In the future this
1510 schema could also be directory entries of type FAX. In either case, the concrete type MUST be IPPFAX.
1511 If a Printer object supports both IPP and IPPFAX, there should be two separate directory entries in order to
1512 represent these two services, one with concrete type IPP and the other with concrete type IPPFAX,
1513 respectively.

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1514

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

Deleted: pdfis-profiles-supported (1setOf type2 keyword) ... [6]

1515

23 Appendix D: Summary of other IPP documents

1516

1517   The full set of IPP documents includes:

1518   1. Design Goals for an Internet Printing Protocol [RFC2567]
1519   2. Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
1520   3. Internet Printing Protocol/1.1: Model and Semantics (this document)
1521   4. Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]
1522   5. Internet Printing Protocol/1.1: Implementer's Guide [RFC3196] and [ipp-iig-bis]
1523   6. Mapping between LPD and IPP Protocols [RFC2569]
1524

1525   The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
1526   functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included
1527   in a printing protocol for the Internet. It identifies requirements for three types of users: end users,
1528   operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A
1529   few OPTIONAL operator operations have been added to IPP/1.1.

1530   The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document
1531   describes IPP from a high level view, defines a roadmap for the various documents that form the suite of
1532   IPP specification documents, and gives background and rationale for the IETF working group's major
1533   decisions.

1534   The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the abstract
1535   operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the
1536   encoding rules for a new Internet MIME media type called "application/ipp". This document also defines
1537   the rules for transporting over HTTP a message body whose Content-Type is "application/ipp". This
1538   document defines a new scheme named 'ipp' for identifying IPP printers and jobs.

1539   The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to
1540   implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of
1541   the considerations that may assist them in the design of their client and/or IPP object implementations. For
1542   example, a typical order of processing requests is given, including error checking. Motivation for some of
1543   the specification decisions is also included.

1544   The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of gateways
1545   between IPP and LPD (Line Printer Daemon) implementations.

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

1548   The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible
1549   operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards,
1550   but also to facilitate activities that support the implementation and acceptance of standards in the
1551   marketplace. The organization is affiliated with the IEEE (http://www.ieee.org/) and the IEEE Standards
1552   Association (http://standards.ieee.org/).

1553   For additional information regarding the IEEE-ISTO and its industry programs visit:

1554   http://www.ieee-isto.org.

25 Appendix F: Description of the IEEE-ISTO PWG

1556   The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology
1557   Organization (ISTO) and is an alliance among printer manufacturers, print server developers, operating
1558   system providers, network operating systems providers, network connectivity vendors, and print
1559   management application developers chartered to make printers and the applications and operating systems
1560   supporting them work together better. All references to the PWG in this document implicitly mean "The
1561   Printer Working Group, a Program of the IEEE ISTO." In order to meet this objective, the PWG will
1562   document the results of their work as open standards that define print related protocols, interfaces,
1563   procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from
1564   the interoperability provided by voluntary conformance to these standards.

1565   In general, a PWG standard is a specification that is stable, well understood and is technically competent,   **Formatted:** Left
1566   has multiple, independent and interoperable implementations with substantial operational experience, and
1567   enjoys significant public support.

1568   For additional information regarding the Printer Working Group visit:

1569   http://www.pwg.org

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

Revision	Date	Author	Notes

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

1571

| printer-is-accepting-jobs (boolean) * | must | MUST | 6.4 |

Table 2 - Additional Printer Description attributes conformance requirements

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

Page 21: [3] Deleted   gsonger   4/17/2003 9:07 AM

TODO: Compile list of Keywords. PDF keywords from PDF reference, section 3.4.1, Third edition. **PDF/is-1.0**.   TomH has the keyworks for PDFx ISO standards.
 PDFx-1a:2001
 PDFx-3:2003
 PDF1.4
  PDF1.3

Page 22: [4] Inserted   dcarney   4/18/2003 8:21 AM

DMC ISSUE: We don't want to say that a Receiver can't implement this attribute with the value 'guaranteed', so maybe we shouldn't mandate 'attempted'. Can we simply say that the value cannot be 'not- attempted'?

Page 40: [5] Deleted   gsonger   3/17/2003 10:46 AM

Send-Notifications	may	MUST NOT	MAY **	MAY	[ipp-indp-method]

Page 64: [6] Deleted   gsonger   3/17/2003 10:52 AM

pdfis-profiles-supported (1setOf type2 keyword)	RECOMMENDED	section 6.7