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# The Printer Working Group Standard for IPPFAX/1.0 Protocol

Proposed Standard - Working Draft  
510n.y-P0.15



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**24 March 2003**

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29 The Printer Working Group Standard for  
30 IPPFAX/1.0 Protocol  
31 Proposed Standard - Working Draft  
32 510n.y-P0.13

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35 **Abstract:** This document specifies the IPPFAX/1.0 protocol. The IPPFAX requirements [ifx-req] are  
36 derived from the requirements for Internet Fax [RFC2542].

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

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

48 An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least the PDF/is as specified  
49 in [ifx-pdfis] which is defined for the 'application/pdf' document format MIME type . A Print System MAY be  
50 configured to support both the IPPFAX and IPP protocols concurrently, but each protocol requires separate  
51 Printer objects with distinct URLs.  
52

53 This document is available electronically at:

54  
55 <ftp://pwg.org/pub/pwg/QUALDOCS/pwg-ifx-ippfax-P14-030318.pdf>, .doc

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

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

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116 2) leave the subject line blank

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

118 subscribe ifx

119 end

120

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

123

124	<b>Contents</b>	
125	Introduction .....	9
126	1.1 Operations used .....	10
127	1.2 Typical exchange.....	10
128	1.3 Namespace used for attributes.....	11
129	2 Terminology .....	11
130	2.1 Conformance Terminology .....	12
131	2.2 Other Terminology .....	12
132	3 IPPFAX Model.....	14
133	3.1 Printer Object Relationships.....	14
134	3.2 A Printer object with multiple URLs.....	14
135	3.3 A Print System supporting both IPP and IPPFAX protocols .....	15
136	4 Common IPPFAX Operation Attribute Semantics.....	15
137	4.1 printer-uri (uri) operation attribute ([RFC2911] section 3.1.5).....	15
138	4.2 version-number parameter ([RFC2911] section 3.1.8).....	16
139	4.3 ippfax-version-number (type2 keyword) operation attribute .....	16
140	5 Get-Printer-Attributes operation semantics.....	17
141	5.1 document-format (mimeType) operation attribute ([RFC2911] section 3.2.5.1) .....	18
142	5.2 pdf-format (type2 keyword) operation attribute.....	18
143	6 IPPFAX Printer Description Attributes.....	18
144	6.1 printer-uri-supported (1setOf uri) ([RFC 2911] section 4.4.1) .....	21
145	6.2 ipp-versions-supported (1setOf type2 keyword) ([RFC2911] section 4.4.14).....	21
146	6.3 ippfax-versions-supported (1setOf type2 keyword).....	22
147	6.4 printer-is-accepting-jobs (boolean) ([RFC 2911] section 4.4.23) .....	22
148	6.5 operations-supported (1setOf type2 enum) ([RFC 2911] section 4.4.15).....	23
149	6.6 document-format-supported (1setOf mimeType) ([RFC 2911] section 4.4.22) .....	23
150	6.7 pdf-format-supported (1setOf type2 keyword) .....	23
151	6.8 digital-signatures-supported (1setOf type2 keyword).....	24
152	7 Sender Validation of the Receiver's Capabilities.....	24
153	7.1 Sender Validates the target Printer as a Receiver and determines its basic capabilities.....	24
154	7.2 Validating the Printer's IPPFAX capabilities using the Validate-Job operation .....	25
155	8 Identity exchange.....	26
156	8.1 sending-user-vcard (text(MAX)) operation/Job Description attribute.....	26
157	8.2 receiving-user-vcard (text(MAX)) operation/Job Description attribute .....	27

158	8.3 sender-uri (uri) operation/Job Description attribute.....	27
159	8.4 printer-uri-supported (1setOf uri) Printer Description attribute ([RFC2911] section 4.4.1) .....	28
160	9 Transmission using the Print-Job or Create-Job/Send-Document operations.....	28
161	9.1 IPP/1.1 Validate-Job and Job Creation operation attributes.....	28
162	9.1.1 ipp-attribute-fidelity operation attribute ([RFC2911] section 3.2.1.1).....	29
163	9.1.2 document-format (mimeType) operation attribute ([RFC2911] section 3.2.1.1) .....	30
164	9.1.3 document-format (mimeType) operation attribute ([RFC2911] section 3.2.1.1) .....	30
165	9.2 Job Template Attributes (for Validate-Job and Job Creation operations).....	30
166	9.2.1 media (type2 keyword   name(MAX)) Job Template attribute ([RFC2911] section 4.2.11) .....	33
167	9.2.2 printer-resolution (resolution) Job Template attribute ([RFC2911] section 4.2.12).....	34
168	9.3 Subscription Template Attributes Conformance Requirements.....	35
169	9.3.1 notify-pull-method (type2 keyword) Subscription Template attribute [ipp-ntfy].....	36
170	9.3.2 Notification Event Conformance Requirements .....	37
171	9.4 Confirmation using the Document Creation response.....	38
172	9.5 <b>Originator identifier image</b> .....	39
173	9.6 Get-Notifications operation to get Event Notifications.....	39
174	10 IPPFAX Implementation of other IPP operations .....	39
175	10.1 Operation Conformance Requirements .....	40
176	10.2 Cancel-Job operation ([RFC2911] section 3.3.3).....	42
177	10.3 Get-Job-Attributes and Get-Jobs operations ([RFC2911] sections 3.3.4 and 3.2.6).....	43
178	10.4 Enable-Printer and Disable-Printer operations [RFC3380].....	43
179	10.5 Set-Printer-Attributes and Get-Printer-Supported-Values operations [ipp-set-ops] .....	44
180	11 Security considerations.....	44
181	11.1 Privacy.....	44
182	11.2 uri-authentication-supported (1setOf type2 keyword) ([RFC2911] section 4.4.2) .....	45
183	11.3 uri-security-supported (1setOf type2 keyword) ([RFC2911] section 4.4.3) .....	46
184	11.4 Using IPPFAX with TLS.....	47
185	11.5 Access control .....	48
186	11.6 Reduced feature set.....	48
187	12 Gateways to other systems .....	49
188	12.1 Off-Ramps .....	49
189	12.2 On-Ramps.....	49
190	13 Attribute Syntaxes .....	49
191	14 Status codes .....	49
192	14.1 client-error-bad-request (0x0400) [RFC2911 section 13.1.4.1].....	49
193	14.2 document-format-not-supported (0x040A) [RFC2911 section 13.1.4.11].....	50

194	15 Conformance Requirements .....	50
195	16 IPPFAX URL Scheme.....	51
196	16.1 IPPFAX URL Scheme Applicability and Intended Usage.....	51
197	16.2 IPPFAX URL Scheme Associated IPPFAX Port.....	51
198	16.3 IPPFAX URL Scheme Associated MIME Type .....	51
199	16.4 IPPFAX URL Scheme Character Encoding.....	52
200	16.5 IPPFAX URL Scheme Syntax in ABNF .....	52
201	16.6 IPPFAX URL Examples.....	53
202	16.7 IPPFAX URL Comparisons .....	53
203	17 IANA Considerations .....	54
204	18 References .....	54
205	19 Authors' addresses.....	58
206	20 Appendix A: Comparison of IPP/1.1 and IPPFAX/1.0 (Informative) .....	59
207	21 Appendix B: vCard Example.....	63
208	22 Appendix C: Generic Directory Schema for an IPPFAX Receiver .....	63
209	23 Appendix D: Summary of other IPP documents .....	65
210	24 Appendix E: Description of the IEEE Industry Standards and Technology (ISTO).....	66
211	25 Appendix F: Description of the IEEE-ISTO PWG .....	66
212	26 Revision History (to be removed when standard is approved) .....	66

213  
214

### **Table of Tables**

215	Table 1 - Printer Description attributes conformance requirements .....	19
216	Table 2 - Additional Printer Description attributes conformance requirements .....	20
217	Table 6 - Receiver Attributes that the Sender validates with Get-Printer-Attributes.....	25
218	Table 7 - Summary of Identify Exchange attributes .....	26
219	Table 8 - IPP/1.1 Validate-Job and Job Creation operation attributes .....	29
220	Table 9 - IPPFAX Semantics for Job Template Attributes .....	32
221	Table 10 - Subscription Template attributes conformance requirements.....	36
222	Table 11 - Notification Events conformance requirements.....	38
223	Table 12 - Conformance for Printer Operations.....	41

224 Table 13 - Conformance for Job and Subscription Operations ..... 42  
225 Table 14 - Authentication Requirements..... 45  
226 Table 15 - Digest Authentication Conformance Requirements ..... 46  
227 Table 16 - Security (Integrity and Privacy) Requirements..... 46  
228 Table 17 - Transport Layer Security (TLS) Conformance Requirements..... 47  
229 Table 18 - Generic Schema Directory Entries..... 65  
  
230



## 231 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 comes 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.

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 mid range imagining 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.

## 265 **1.1 Operations used**

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

- 268 1. Get-Printer-Attributes - Sender MUST verify that the Printer object is an (IPPFAX) Receiver  
269 and MUST determine the Receiver's basic capabilities.
- 270 2. Validate-Job - Sender MUST verify that the Receiver can support the Job attributes that the  
271 Sender will send in the IPPFAX Job.
- 272 3. Print-Job - Sender MUST submit the IPPFAX job with a single document (or MAY send  
273 Create-Job & one or more Send-Document operations if the Receiver also supports these  
274 operations)
- 275 4. Get-Notifications - The Sender MUST support and MUST use this operation to check for  
276 successful job completion unless the Sending User wishes otherwise.

## 277 **1.2 Typical exchange**

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

- 280 1. The Sending User determines the network location of the Receiver (value of the "printer-uri"  
281 operation attribute) – see section 4.1. This document does not specify how the Sending User does  
282 this. Possible methods include directory lookup, search engines, business cards, network  
283 enumeration protocols such as SLP, etc. See section 22 for the Generic Directory Schema for  
284 IPPFAX.
- 285 2. The Sending User either (1) loads the Document into the Sender or (2) causes the Sender to  
286 generate the Document data by means outside the scope of this document, indicates the Receiver's  
287 network location and starts the exchange.
- 288 3. The Sender MUST validate whether or not the Receiver is an IPPFAX-capable Printer and  
289 SHOULD determine the basic capabilities of the Receiver, including document format – see  
290 section 7.1.
- 291 4. The Sender decides on the most appropriate data format depending on the Receiver's basic  
292 capabilities. The PDF/is data format is described in detail in the "PDF Image-Streamable (PDF/is)"  
293 specification [ifx-pdfis].

- 294 5. The Sender MUST validate whether or not the Receiver will accept all of the attributes of the  
295 IPPFAX Job from this Sending User using the Validate-Job operation. See section 7.2. If the  
296 Receiver rejects the Validate-Job operation, the Sender can avoid sending the data.
- 297 6. The Sender either (1) scans the Document and converts it into an acceptable data format or (2)  
298 generates or forwards the Document representation in an acceptable data format – see section 6.6.
- 299 7. As part of the Validation and Job Creation, the following identities are determined and exchanged:  
300 Sender, Sending User, Receiver, and Receiving User – see section 8.
- 301 8. The Sender transmits the Document data to the Receiver – see section 9.
- 302 9. The Sending User receives a confirmation that the Receiver received the Document data – see  
303 section 9.4.
- 304 10. In addition the Sender MUST support and the Sending User MAY choose to receive an Event  
305 Notification that the Document has been successfully Delivered – see sections 9.3 and 9.6
- 306 If the Sender is unable to initiate or complete the exchange then it is assumed that the Sender will perform  
307 some form of retry. The mechanisms used and the user-visible behavior in this case is an implementer’s  
308 choice and beyond the scope of this document.

### 309 **1.3 Namespace used for attributes**

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

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

## 321 **2 Terminology**

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

## 323 2.1 Conformance Terminology

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

## 331 2.2 Other Terminology

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

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

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

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

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

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

- 355 **IPP Printer object** A Printer object that supports the IPP Protocol and offers the IPP Print Service (by  
356 definition).
- 357 **Receiver** The Printer object that accepts IPPFAX protocol operations and receives the Document sent by  
358 the Sender. A Receiver offers the IPPFAX Print Service (by definition).
- 359 **Print System** All of the Printer objects on a single managed host network node. A Print System MAY  
360 support IPP and IPPFAX protocols concurrently (see section 3.3) for a single output device (or multiple  
361 output devices), but each protocol requires separate Printer objects with distinct URLs.
- 362 **client** A hardware and/or software entity that initiates protocol operation requests and accepts responses.  
363 A client MAY be: (1) an IPP client, (2) an IPPFAX client, or (3) both. However, this document uses the  
364 term “Sender”, instead of “IPPFAX client”. This document uses the term “client” when the statement is  
365 intended to apply to a client that MAY support the IPP Protocol, the IPPFAX protocol, or both protocols.
- 366 **IPP client** A client that uses the IPP Protocol to interact with an IPP Printer object.
- 367 **Sender** A client that uses the IPPFAX Protocol to query a Receiver and transmit a Document to that  
368 Receiver.
- 369 **Document** The electronic representation of a set of one or more pages that the Sender sends to the  
370 Receiver.
- 371 **Sending User** The person interacting with the Sender.
- 372 **Receiving User** The intended human recipient of the Document being sent by the Sender to the Receiver.
- 373 **Attribute Coloring** The changing of attributes and/or values returned by a single Printer object in a Get-  
374 Printer-Attributes response depending on operation attributes supplied in the request, specifically the  
375 “document-format” (see section 5.1 and [RFC2911] section 3.2.5.1)” operation attribute.
- 376 **Job Creation Operation** The IPP or IPPFAX operations that creates IPP or IPPFAX Jobs, respectively,  
377 i.e., the Print-Job, Print-URI, and Create-Job operations (see [RFC2911]).
- 378 **IPP Job** A job submitted by an IPP client to an IPP Printer object using the IPP Protocol.
- 379 **IPPFAX Job** A job submitted by a Sender to a Receiver using the IPPFAX Protocol.
- 380 **PDF/is** The file format defined by [ifx-pdfis].
- 381 **Delivered** The Receiver has either printed the Document and delivered the last sheet to the output bin or  
382 has forwarded the Document to some other system.

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

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

### 391 **3 IPPFAX Model**

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

#### 393 **3.1 Printer Object Relationships**

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

#### 399 **3.2 A Printer object with multiple URLs**

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

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

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

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

### 416 **3.3 A Print System supporting both IPP and IPPFAX protocols**

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

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

## 429 **4 Common IPPFAX Operation Attribute Semantics**

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

### 434 **4.1 printer-uri (uri) operation attribute ([RFC2911] section 3.1.5)**

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

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

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

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

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

#### 455 **4.2 version-number parameter ([RFC2911] section 3.1.8)**

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

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

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

#### 470 **4.3 ippfax-version-number (type2 keyword) operation attribute**

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



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

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

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

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

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

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

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

## 503 **5 Get-Printer-Attributes operation semantics**

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

## 506 **5.1 document-format (mimeMediaType) operation attribute ([RFC2911] section 3.2.5.1)**

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

- 510 1. The Sender SHOULD supply the “document-format” operation attribute (IPP client may).
- 511 2. Standard mimeType values are defined in section 6.6.

## 512 **5.2 pdf-format (type2 keyword) operation attribute**

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

- 516 1. The Sender SHOULD supply the “pdf-format” operation attribute.
- 517 2. Standard keyword values are defined in section 6.7.

## 518 **6 IPPFAX Printer Description Attributes**

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

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

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

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

531

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

Attribute Name (attribute syntax)	IPP Printer support	Receiver support	Receiver Attribute Coloring	Section
printer-uri-supported (1setOf uri) *	must	MUST	MUST NOT	6.1, 8.4
ipp-versions-supported (1setOf type2 keyword) *	must	MUST**	MUST NOT	6.2
ippfax-versions-supported (1setOf type2 keyword)	MUST NOT	MUST**	MUST NOT	6.3
printer-is-accepting-jobs (boolean) *	must	MUST	MUST NOT	6.4
operations-supported (1setOf type2 enum) *	must	MUST	MUST NOT	6.5
document-format-supported (1setOf mimeType) *	must	MUST	MUST NOT	6.6
pdf-format-supported(1setOf type2 keyword)	may	MUST	MAY	6.7
digital-signatures-supported(1setOf type2 keyword)	may	MUST	MAY	6.8

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

534 \*\* A Printer object that supports IPPFAX MUST NOT support IPP as well, but MUST support the “ipp-  
535 versions-supported” attribute to indicate the version(s) of IPP that are supported *as part of IPPFAX*  
536 *operations*. A Print System that supports both IPP and IPPFAX MUST support them as separate  
537 Printer objects (see section 3.3).  
538 .

539

**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]

540

541 **6.1 printer-uri-supported (1setOf uri) ([RFC 2911] section 4.4.1)**

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

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

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

555 **6.2 ipp-versions-supported (1setOf type2 keyword) ([RFC2911] section 4.4.14)**

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

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

563 ‘1.1’: The “IPP part” of the IPPFAX operations meets the protocol and encoding conformance  
 564 requirements of IPP version 1.1 as specified in [RFC2911], [RFC2910], and IPP extensions.

565  
 566 Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for  
 567 keywords, by starting with an ASCII digit, instead of an ASCII lower case letter.

### 568 **6.3 ippfax-versions-supported (1setOf type2 keyword)**

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

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

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

586 Standard keyword values are:

587 ‘1.0’: Meets the conformance requirements of IPPFAX version 1.0 as specified in this document.

588  
589 Note: As in [RFC2911] section 4.4.14, these version keyword values violate the syntax for  
590 keywords, by starting with an ASCII digit, instead of an ASCII lower case letter. However, for  
591 consistency with IPP, these IPPFAX version keyword values are defined compatibly with the IPP  
592 version keyword values.

### 593 **6.4 printer-is-accepting-jobs (boolean) ([RFC 2911] section 4.4.23)**

594 This attribute indicates whether or not the Receiver is currently accepting (IPPFAX) Job Creation requests.  
595 As in IPP/1.1, the Receiver MUST support this Printer Description attribute (see [RFC2911] section  
596 4.4.23).

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

599 **6.5 operations-supported (1setOf type2 enum) ([RFC 2911] section 4.4.15)**

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

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

609 **6.6 document-format-supported (1setOf mimeType) ([RFC 2911] section 4.4.22)**

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

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

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

616 **6.7 pdf-format-supported (1setOf type2 keyword)**

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

619 Both the Sender and Receiver MUST support MUST support application/pdf., PDF/is-1.0.

620 **TODO: Compile list of Keywords. PDF keywords from PDF reference, section 3.4.1, Third edition.**  
621 **PDF/is-1.0. TomH has the keywords for PDFx ISO standards.**

622

## 625 **6.8 digital-signatures-supported (1setOf type2 keyword)**

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

628 **TODO: Get list of keywords; can be found in "IPP driver install" spec**

630

631

## 632 **7 Sender Validation of the Receiver's Capabilities**

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

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

### 636 **7.1 Sender Validates the target Printer as a Receiver and determines its basic capabilities**

637 The Sender MUST validate that the target Printer is a valid Receiver using the Get-Printer-Attributes  
638 operation as indicated in Table 3. The Sender SHOULD determine the Receiver's basic capabilities before  
639 generating the document data in order to ensure the best rendering the document as intended by the Sender  
640 before submitting an IPPFAX job as indicated in Table 3. The Sender MUST NOT rely solely on the  
641 IPPFAX Validate-Job operation followed by the IPPFAX Job Creation operation, since an IPP/1.1 (or  
642 IPP/1.0) Printer MAY accept both IPPFAX operations (but not perform IPPFAX semantics).

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

647 The order of presentation in Table 3 is the likely order that a Sender would check the values, though the  
648 Sender can request all of the attributes in a single Get-Printer-Attributes operation (and the Receiver MAY  
649 return them in any order as specified in [RFC2911]).



650

**Table 3 - Receiver Attributes that the Sender validates with Get-Printer-Attributes**

Attribute	Ref.	Sender action
Operation attributes:		
printer-uri	4.1	Sender MUST validate whether or not the Get-Printer-Attributes operation with a “printer-uri” target URL using the ‘ippfax’ scheme locates a valid Receiver destination.
Printer Description attributes:		
ippfax-versions-supported	6.3	Sender MUST check whether the Printer supports the IPPFAX Protocol on the target URL by checking whether or not the Printer supports this attribute, i.e., validate that the Printer is a Receiver.
operations-supported	6.5	If the Sender is going to use any operations that are OPTIONAL for a Receiver to support (such as Create-Job, Send-Document), the Sender SHOULD validate that the Receiver supports such operations (though the Printer MUST return an error if the client attempts to use an operation that the Printer doesn’t support).
document-format-supported	6.6	Sender SHOULD** check which document formats the Receiver supports.
pdf-format-supported	6.7	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.

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

## 653 7.2 Validating the Printer’s IPPFAX capabilities using the Validate-Job operation

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

659 The Sender MUST supply the “ipp-attribute-fidelity” operation attribute with a ‘true’ value (see  
660 [RFC2911] section 3.2.1.1 and 15.1) in both the Validate-Job and the Job Creation operations. Then the

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

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

## 673 8 Identity exchange

674 This section defines the attributes that the Sender and the Receiver use to identify each to the other and to  
 675 identify the Sending User and the Receiver User. Table 4 lists these attributes and shows the Sender and  
 676 Receiver conformance requirements.

677 **Table 4 - 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

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

679 \*\* Sender supplies in a Get-Printer-Attributes request.

### 680 8.1 sending-user-vcard (text(MAX)) operation/Job Description attribute

681 This operation attribute identifies the Sending User in MIME vCard v3.0 [RFC2426, RFC2425] format.  
 682 The Sender MAY send this operation attribute in an IPPFAX Job Creation operation. The Receiver MUST  
 683 support this Job Creation and Validate-Job operation attribute according to the vCard v3.0 specification  
 684 and MUST populate the job’s corresponding Job Description attribute. The Receiver MUST support MAX  
 685 (1023) octets of text. However, the Receiver MAY ignore any image, logo, and sound parts, in which case  
 686 it MUST still accept the Job Creation request and return the ‘successful-ok-ignored-or-substituted-

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

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

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

## 698 **8.2 receiving-user-vcard (text(MAX)) operation/Job Description attribute**

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

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

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

## 711 **8.3 sender-uri (uri) operation/Job Description attribute**

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

717 The Sender **MUST** send this operation attribute with the configured value in an IPPFAX Job Creation  
718 operation. The Receiver **MUST** support this Job Creation operation attribute and **MUST** populate the job's  
719 corresponding Job Description attribute.

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

#### 724 **8.4 printer-uri-supported (1setOf uri) Printer Description attribute ([RFC2911] section 4.4.1)**

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

### 730 **9 Transmission using the Print-Job or Create-Job/Send-Document operations**

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

#### 736 **9.1 IPP/1.1 Validate-Job and Job Creation operation attributes**

737 Table 5 lists the operation attributes for Validate-Job and Job Creation operations for Senders, IPP/1.1  
738 Printers, and Receivers. Differences in Sender conformance from IPP/1.1 clients are indicated with  
739 footnotes. Any other IPP operation attributes defined in other documents are **OPTIONAL** for IPPFAX.

740

**Table 5 - 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 <sup>1</sup>	must	MUST
document-name (name(MAX)) *		MAY	must	MUST
compression (type3 keyword) *		MAY	must	MUST
document-format (mimeMediaType) *	9.1.2	MUST <sup>2</sup>	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)	5.2	SHOULD	may	MUST

741 \* As in IPP/1.1, these attributes are NOT Job Description attributes, only Operation attributes for Job  
742 Creation and Validate-Job operations.  
743

### 744 9.1.1 ipp-attribute-fidelity operation attribute ([RFC2911] section 3.2.1.1)

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

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

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

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

### 753 **9.1.2 document-format (mimeMediaType) operation attribute ([RFC2911] section 3.2.1.1)**

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

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

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

764 Standard mimeType values are defined in section 6.6.

### 765 **9.1.3 pdf-format (type2 keyword) operation attribute ([RFC2911] section 3.2.1.1)**

766 This operation attribute identifies the type2 keyword of the pdf document that the Sender is sending. The  
767 Sender SHOULD supply this operation attribute in the Validate-Job and Job Creation operations. A  
768 Receiver MUST validate if attribute is supplied and support this operation attribute.

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

772 Standard keywords values are defined in section 6.7.

773

## 774 **9.2 Job Template Attributes (for Validate-Job and Job Creation operations)**

775 Table 6 lists all of the Job Template attributes defined in other IPP documents for use in Validate-Job and  
776 Job Creation operations and shows their conformance for IPPFAX Jobs. As in [RFC2911], the term “Job  
777 Template attribute” is actually up to four attributes: the “xxx” Job attribute, and the “xxx-default”, “xxx-

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

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

783 In Table 6, if the “Sender supply” and “Receiver support” columns contain an explicit single value, the  
784 Sender MAY send and the Receiver MAY support the Job Template attribute for an IPPFAX Job, but  
785 MUST support only the indicated value. Note: Each such single value has been selected as the value for  
786 the attribute that would correspond to the *expected behavior* if the attribute were not supported at all. If  
787 these attributes are supplied in an IPPFAX Job with any other value, the Receiver MUST reject the Job  
788 Creation operation (since the value isn’t supported and “ipp-attribute-fidelity” MUST be ‘true’). If the  
789 Receiver supports this attribute, the Receiver MUST return only the indicated value in the Get-Printer-  
790 Attributes response for the corresponding “xxx-supported”, “xxx-default” Printer attributes. Note: These  
791 are attributes which might degrade the appearance of the document or provide a significantly non-FAX  
792 feature if the non-default value were supplied and supported, such as “number-up” = 2 or “job-priority” =  
793 100, respectively.

794 In Table 6, if the “Sender supply” and “Receiver support” columns contain “MUST NOT”, the Sender  
795 MUST NOT supply and the Receiver MUST NOT support the Job Template attribute for an IPPFAX Job.  
796 If these attributes are supplied in an IPPFAX Job, the Receiver MUST reject the Job Creation operation  
797 (since the attribute isn’t supported and “ipp-attribute-fidelity” MUST be ‘true’). When querying the  
798 Receiver with the Get-Printer-Attributes operation, the corresponding “xxx-default” and “xxx-supported”  
799 MUST NOT be returned. Note: These are attributes which might degrade the appearance of the document  
800 or provide a significantly non-FAX feature and do not have an obvious value which corresponds to the  
801 behavior when the attribute is not supported at all, such as media-input-tray-check (type3 keyword |  
802 name(MAX)) or output-bin (type2 keyword | name(MAX)).

803 In Table 6, the “Receiver Attribute Coloring” column indicates the Receiver conformance requirements for  
804 Attribute Coloring in the Get-Printer-Attributes response that depends on the “document-format” operation  
805 attribute value supplied by the Sender. The ‘n/a’ value indicates not applicable, since the attribute either  
806 MUST NOT be supported or MUST have only the indicated single value.

807

**Table 6 - IPPFAX Semantics for Job Template Attributes**

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



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

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

811 **9.2.1 media (type2 keyword | name(MAX)) Job Template attribute ([RFC2911] section**  
812 **4.2.11)**

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

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

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

822 PDF Crop boxes SHOULD be used when the Sender knows that the imaginable region is less than media  
823 size. If the crop box is the union of lesser size of Letter and A4 minus ¼ of inch, then the Sender can be  
824 sure that the majority of Receivers can print the complete image without loss of data. However, this does  
825 mean that there is the possibly that data may lost.  
826

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

828 ‘na\_letter\_8.5x11in’  
829 ‘iso\_a4\_210x297mm’

### 830 **9.2.1.1 media-supported and media-ready Job Template Printer attributes**

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

835 Standard keyword values are defined in section 9.2.1.

### 836 **9.2.2 printer-resolution (resolution) Job Template attribute ([RFC2911] section 4.2.12)**

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

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

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

**848 9.2.2.1 printer-resolution-supported Job Template Printer attribute**

849 If the Sender is using a resolution for PDF/is that is not the REQUIRED minimum resolution for PDF/is,  
850 then the Sender SHOULD query the “printer-resolution-supported” Printer attribute. Thus this attribute  
851 allows the Sender to determine the resolution(s) supported in addition to the minimum resolution required.

**852 9.3 Subscription Template Attributes Conformance Requirements**

853 Table 7 lists the conformance requirements for Subscription attributes on the Job Creation and Validate-Job  
854 requests. The attributes in Subscription Objects are shown immediately followed (indented) by their  
855 corresponding Default and Supported Printer Attributes.

856

**Table 7 - 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]

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

858 \*\* The Sender MUST supply at least the “notify-pull-method” attribute for any Pull Delivery Method, such  
859 as the REQUIRED ‘ippget’ Delivery Method.  
860

### 861 9.3.1 notify-pull-method (type2 keyword) Subscription Template attribute [ipp-ntfy]

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

**867 9.3.2 Notification Event Conformance Requirements**

868 Table 8 lists the conformance requirements for notification events.

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

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

879

**Table 8 - 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	

880

#### 881 **9.4 Confirmation using the Document Creation response**

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

## 887 **9.5 Originator identifier image**

888 The Sender **MUST** place an originator identifier, i.e., the value of the “sender-uri” attribute (see section  
889 8.3), along with the date and time, in one of the following places, **DEPENDING ON**  
890 **IMPLEMENTATION**:

- 891 1. On a cover page automatically generated by the Sender that is sent before the rest of the  
892 document.
- 893 2. Merged with the first page of the document.
- 894 3. At the top of every page of the sent Document.

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

## 898 **9.6 Get-Notifications operation to get Event Notifications**

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

## 905 **10 IPPFAX Implementation of other IPP operations**

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

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

912 The Receiver **MUST** fully support the Print-Job, Validate-Job, Get-Printer-Attributes and Get-Notifications  
913 operations, as defined by this document. The following subsections define restrictions and conformance  
914 requirements placed on the Cancel-Job, Get-Job-Attributes, Get-Jobs, Enable-Printer, Disable-Printer, Set-  
915 Printer-Attributes, and Get-Printer-Attributes operations. For a conforming IPPFAX Receiver  
916 implementation, the support for each of the IPP operations is indicated in Table 9 and Table 10.

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

## 921 **10.1 Operation Conformance Requirements**

922 Table 9 lists the conformance requirements for Printer operations for (1) an IPP/1.1 Printer ('ipp' URL), (2)  
923 the non-privileged IPPFAX Sender, (3) an IPPFAX Receiver receiving a request from a non-privileged  
924 User, and (4) an IPPFAX Receiver receiving a request from an authenticated and authorized operator or  
925 administrator, if the Receiver supports operator/administrator authentication and authorization.

926 Table 10 lists the conformance requirements for Job and Subscription operations for (1) an IPP/1.1 Printer  
927 ('ipp') URL, (2) the non-privileged IPPFAX Sender which MUST be on the same URL as the job was  
928 created (the target "printer-uri" MUST match the Job's "job-printer-uri" Job Description attribute), (3) an  
929 IPPFAX Receiver receiving a request from the Job or Subscription Object Owner, (4) from some other  
930 non-privileged user, and (5) if the operation is supported at all - from an authenticated and authorized  
931 operator or administrator.

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

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



938

**Table 9 - 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]

Legend:

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

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

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**Table 10 - 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]

945

Legend:

946

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

947

948

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

949

950

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

951

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

952

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

953

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

954

955

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

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

### 960 **10.3 Get-Job-Attributes and Get-Jobs operations ([RFC2911] sections 3.3.4 and 3.2.6)**

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

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

966           job-id, job-uri  
967           job-k-octets, job-k-octets-completed  
968           job-media-sheets, job-media-sheets-completed,  
969           time-at-creation, time-at-processing  
970           job-state, job-state-reasons  
971           number-of-intervening-jobs

972  
973 The exact choice of Job attributes that a client can query for IPPFAX Jobs, including not returning any,  
974 DEPENDS ON IMPLEMENTATION and the security policy in force and is outside the scope of this  
975 standard (as in IPP/1.1).

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

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

980 An IPP administrator MAY read all attributes.

### 981 **10.4 Enable-Printer and Disable-Printer operations [RFC3380]**

982 The Enable-Printer and Disable-Printer operations [RFC3380] allow a remote operator to change the value  
983 of the Receiver’s “printer-is-accepting-jobs” (boolean) Printer Description attribute (see section 6.4) to  
984 ‘true’ or ‘false’, respectively. These operations are OPTIONAL for a Receiver to support.

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

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

## 990 **10.5 Set-Printer-Attributes and Get-Printer-Supported-Values operations [ipp-set-ops]**

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

## 997 **11 Security considerations**

998 IPPFAX presents an interesting challenge of balancing security and openness. Many of the envisaged uses  
999 of IPPFAX require confidentiality of the data – at the same time the Receiver typically has no prior  
1000 knowledge of the Sender or the Sending User. This last point will normally rule out all user-based  
1001 authentication and access control. This is the reason for the restriction placed on querying and canceling  
1002 IPPFAX Jobs.

### 1003 **11.1 Privacy**

1004 Any exchange between a Sender and a Receiver MUST be carried using the privacy mechanism specified  
1005 in IPP/1.1 namely TLS [RFC2246]. In some cases this will also result in mutual authentication of the  
1006 Sender and Receiver (in the case where both sides have certificates).

1007 The Receiver MUST have a TLS certificate.

1008 The Sender MAY have a certificate. A Receiver MAY decide to reject requests that come from Senders  
1009 that do not have a certificate and return the 'client-error-not-authenticated' status code.

1010 A Sender can either use its own certificate or it can use one associated with the Sending User.

1011 Senders and Receivers SHOULD do what current browsers do, namely, be deployed with the public keys  
1012 of a number of the top Certificate Authorities. If a Sender gets a public key from a Receiver that it doesn't  
1013 recognize, the Sender MUST query the Sending User to see if the Sending User trusts the Receiver before  
1014 sending the IPPFAX job to the Receiver.

1015 The distribution of private keys to Senders or Receivers is outside the scope of this document, but it is done  
1016 over the network, it MUST be over a secure channel. See Internet Key Exchange (IKE) [RFC2409].

1017 **11.2 uri-authentication-supported (1setOf type2 keyword) ([RFC2911] section 4.4.2)**

1018 This attribute (see [RFC2911] section 4.4.2) identifies the Client Authentication mechanism associated  
1019 with each URI listed in the “printer-uri-supported” attribute (see section 6.1).

1020 **Table 11 - 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.

1021 \* TLS\_DHE\_DSS\_WITH\_3DES\_EDE\_CBC\_SHA mandated by [RFC2246].

1022 Table 12 compares the Digest Authentication requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX  
 1023 Senders, and IPPFAX Receivers.

1024 **Table 12 - 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

1025

1026 **11.3 uri-security-supported (1setOf type2 keyword) ([RFC2911] section 4.4.3)**

1027 This attribute (see [RFC2911] section 4.4.3) identifies the security (Integrity and Privacy) mechanisms  
 1028 used for each URI listed in the “printer-uri-supported” attribute (see section 6.1).

1029 **Table 13 - 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

1030

1031 Table 14 compares the TLS conformance requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX  
1032 Senders, and IPPFAX Receivers.

1033 **Table 14 - 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

1034 \* The 'certificate' keyword value for the "uri-authentication-supported" attribute [RFC2911].

1035 \*\* The Sender MUST query the Sending User before omitting the Data Privacy encryption.

1036 Senders and Receivers MUST support the TLS\_DHE\_DSS\_WITH\_3DES\_EDE\_CBC\_SHA cipher suite as  
1037 mandated by RFC 2246 [RFC2246]. All stronger cipher suites are OPTIONAL; weaker cipher suites  
1038 MUST NOT be supported or used by Senders or Receivers.

1039 A Receiver MAY support Basic Authentication (described in HTTP/1.1 [RFC2617]) for Client  
1040 Authentication if the TLS channel is secured with Data Privacy. TLS with the above mandated cipher suite  
1041 or stronger can provide such a secure channel.

#### 1042 **11.4 Using IPPFAX with TLS**

1043 The Sender MUST use only TLS for all IPPFAX operations on the IPPFAX URL. The client MUST start  
1044 the transaction in TLS, rather than using HTTP upgrade requests. The following paragraph of [RFC2818]  
1045 further explains:

1046 The agent acting as the HTTP client should also act as the TLS client. It should initiate a  
1047 connection to the server on the appropriate port and then send the TLS ClientHello to begin the TLS  
1048 handshake. When the TLS handshake has finished. The client may then initiate the first HTTP  
1049 request. All HTTP data MUST be sent as TLS "application data". Normal HTTP behavior,  
1050 including retained connections should be followed.

1051 Contrast this IPPFAX requirement with the IPP requirement in section 8.2 of [RFC2910]. The following  
1052 client actions compare IPP with IPPFAX from a client's point of view:

- 1053 IPP/1.1 sequence:
- 1054 1. Start TCP connection
  - 1055 2. Zero or more HTTP/IPP requests
  - 1056 3. HTTP/IPP request with Upgrade to TLS header
  - 1057 4. TLS handshake
  - 1058 5. finish the HTTP/IPP request securely
  - 1059 6. Send more HTTP/IPP requests securely ...

- 1060
- 1061 IPPFAX sequence:
- 1062 1. Start TCP connection
  - 1063 2. Send TLS ClientHello
  - 1064 3. rest of TLS handshake
  - 1065 4. Send HTTP/IPPFAX requests securely ... (which usually will be a Get-Printer-Attributes,
  - 1066 followed by Validate-Job and Print-Job operations).
  - 1067

## 1068 **11.5 Access control**

1069 It is expected that the majority of IPPFAX Receivers will operate in a public mode when operating on the  
1070 Internet, so that anonymous users can send documents without requiring client authentication  
1071 (corresponding to the 'none' value for the "uri-authentication-supported" attribute - see section 11.2).  
1072 However a Receiver MAY protect itself using any Client Authentication method specified in [RFC2911]  
1073 (digest authentication [RFC2069] for example) to restrict access to any or all of its functionality.

1074 However, the primary intent of IPPFAX is to create a controlled public access mode. It therefore does not  
1075 really make much sense to combine IPPFAX and user authentication; they are achieving the same thing.

## 1076 **11.6 Reduced feature set**

1077 An administrator or device implementer MAY choose to setup up a Print Service so that it only works as a  
1078 IPPFAX Receiver (i.e., offers no 'native' IPP operations and does not accept IPP Jobs). In this mode it  
1079 offers a restricted set of features and MAY be more safely connected to the Internet.

1080 A Receiver that is operating in this mode MUST do so by rejecting any non-IPPFAX request and return a  
1081 'client-error-attributes-or-values-not-supported' error status code as indicated in section 4.1 for an  
1082 unsupported value of the "printer-uri" operation attribute. For job operations attempted on IPPFAX Jobs,  
1083 the Receiver MUST return the 'client-error-not-authorized' error status code, unless the Sender is  
1084 authenticated as the system administrator and the Receiver supports such access.



## 1085 **12 Gateways to other systems**

1086 A common scenario will be where IPPFAX acts as an on-ramp or off-ramp to other Document transmission  
1087 systems.

### 1088 **12.1 Off-Ramps**

1089 In the IPPFAX 'Off-ramp' scenario the user with a Document to send uses an IPPFAX Sender to transmit a  
1090 Document to an IPPFAX Receiver within a gateway that in turn transmits it to some other destination, i.e.  
1091 GSTN FAX. Handling Off-ramps is beyond the scope of this document, but may be a future IPPFAX  
1092 extensions building on the Off-ramp work of the Internet FAX WG.

### 1093 **12.2 On-Ramps**

1094 In the IPPFAX On-Ramp scenario the user originally sent the Document using some other mechanism to  
1095 some intermediate agent. The intermediate agent, acting as an IPPFAX Sender, then uses the IPPFAX  
1096 Protocol to transmit the Document to an Receiver which MAY be either a final destination or an Off-Ramp.  
1097 IPPFAX has no specific support for on-ramps.

## 1098 **13 Attribute Syntaxes**

1099 No new attribute syntaxes are defined.

## 1100 **14 Status codes**

1101 In addition to the semantics of the status codes defined in [RFC2911] and [ipp-get-method], the following  
1102 additional semantics are defined for [RFC2911] status codes:

### 1103 **14.1 client-error-bad-request (0x0400) [RFC2911 section 13.1.4.1]**

1104 The client has failed to supply one or more attributes in a request which are REQUIRED to be supplied.  
1105 The requirement can be because of the Printer's current configuration or because of some other attributes  
1106 that the client supplied. The Printer MUST reject the request, MUST return the 'client-error-bad-request'  
1107 status code, and SHOULD return the keyword attribute name(s) (but not the values) of the missing  
1108 attribute(s) in the Unsupported Attributes Group in the response.

**1109 14.2 document-format-not-supported (0x040A) [RFC2911 section 13.1.4.11]**

1110 The concept of a document format is extended to include the PDF/is image compression technologies. This  
1111 status code is returned if the document format is not supported, including unknown pdf-formats as defined  
1112 in 6.7 and unknown PDF/is image compression technologies.

**1113 15 Conformance Requirements**

1114 This section summarizes the conformance requirements for Senders and Receivers that are defined  
1115 elsewhere in this document.

- 1116 1. A Sender and Receiver MUST observe the attribute name space conventions specified in section  
1117 1.3.
- 1118 2. The Sender MUST supply and the Receiver MUST support (1) the “printer-uri” operation attribute  
1119 with the ‘ippfax’ scheme, (2) the “version-number” parameter with the IPP/1.1 ‘1.1’ (or higher  
1120 minor version) value, and (3) the “ippfax-version-number” operation attribute with the IPPFAX/1.0  
1121 ‘1.0’ keyword value in all operations to get the IPPFAX semantics as described in section 4.
- 1122 3. The Receiver MUST support the Get-Printer-Attributes operation as described in sections 5.
- 1123 4. The Receiver MUST support the Printer Description attributes as specified in section 6.
- 1124 5. The Sender MUST validate that the target Printer is IPPFAX-capable using the Get-Printer-  
1125 Attributes operation and validate that the Receiver supports the job using the Validate-Job operation  
1126 as specified in section 7.
- 1127 6. The Sender MUST supply and the Receiver MUST support the operation/Job Description attributes  
1128 for Identify Exchange as described in section 8.
- 1129 7. The Sender MUST support submitting and the Receiver MUST accept IPPFAX Jobs as defined in  
1130 section 9.
- 1131 8. The Sender MUST place the Sender’s identity in the document according to section 9.5.
- 1132 9. The Sender and Receiver MUST support the IPP Notification for Job Creation operations, the  
1133 ‘ippget’ Delivery Method, the Get-Notifications operation for the events indicated in sections 9.6,  
1134 9.3, and 9.3.2, respectively.
- 1135 10. The Sender and Receiver MUST support the operations as indicated in section 10.

1136 11. The Sender and Receiver MUST support the security mechanisms indicated in section 11, including  
1137 TLS.

## 1138 **16 IPPFAX URL Scheme**

1139 This section is intended for use in registering the ‘ippfax’ URL scheme with IANA and fully conforms to  
1140 the requirements in [RFC2717].

### 1141 **16.1 IPPFAX URL Scheme Applicability and Intended Usage**

1142 This document defines the ‘ippfax’ URL (Uniform Resource Locator) scheme for specifying the location of  
1143 an IPPFAX Receiver which implements the IPPFAX Protocol specified in this document.

1144 The ‘ippfax’ URL scheme defined in this document is based on the ABNF for the basic hierarchical URL  
1145 syntax in [RFC2396]; however relative URL forms, parameters, and/or query parts are NOT allowed in an  
1146 IPPFAX URL. The ‘ippfax’ URL scheme is case-insensitive in the host name or host address part;  
1147 however the path part is case-sensitive, as in [RFC2396]. Codepoints outside [US-ASCII] MUST be hex  
1148 escaped by the mechanism defined in [RFC2396].

1149 The intended usage of the ‘ippfax’ URL scheme is COMMON.

### 1150 **16.2 IPPFAX URL Scheme Associated IPPFAX Port**

1151 All IPPFAX URLs which do NOT explicitly specify a port MUST be used over IANA-assigned well-  
1152 known port xxx [TBA by IANA] for the IPPFAX Protocol.

1153 See: IANA Port Numbers Registry [IANA-PORTREG].

### 1154 **16.3 IPPFAX URL Scheme Associated MIME Type**

1155 All IPPFAX protocol operations (requests and responses) MUST be conveyed in an ‘application/ipp’  
1156 MIME media type [RFC2910] as registered in [IANA-MT]. IPPFAX URLs MUST refer to IPPFAX  
1157 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;

1219 **17 IANA Considerations**

1220 IANA shall register the ippfax URL scheme as defined in section 16 according to the procedures of  
1221 [RFC2717] and assign a well known port.

1222 Operation Attributes:

1223 ippfax-version-number (type2 keyword) IEEE-ISTO 510n.y 4.3

1224

1225 Operation/Job Description attributes:

1226 sending-user-vcard (text(MAX)) IEEE-ISTO 510n.y 8.1

1227 receiving-user-vcard (text(MAX)) IEEE-ISTO 510n.y 8.2

1228 sender-uri (uri) IEEE-ISTO 510n.y 8.3

1229

1230 Printer Description Attributes:

1231 ippfax-versions-supported (1setOf type2 keyword) IEEE-ISTO 510n.y 6.3

1232 **18 References**

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1333 **19 Authors' addresses**

<p>Thomas N. Hastings Xerox Corporation 701 Aviation Blvd. El Segundo, CA 90245</p> <p>Phone: +1 310-333-6413 FAX: +1 310-333-5514 email: <a href="mailto:hastings@cp10.es.xerox.com">hastings@cp10.es.xerox.com</a></p>	<p>Ira McDonald High North Inc 221 Ridge Ave Grand Marais, MI 49839</p> <p>Phone: +1 906-494-2434 Email: <a href="mailto:imcdonald@sharplabs.com">imcdonald@sharplabs.com</a></p>
<p>Paul Moore Netreon Seattle, WA</p> <p>Phone: +1 <u>425-462-5852</u> Email: <a href="mailto:pmoore@netreon.com">pmoore@netreon.com</a></p>	<p>Gail Songer Peerless Systems Corp 2381 Rosecrans Ave El Segundo, CA 90245</p> <p>Phone: +1 650-358 8875 Email: <a href="mailto:gsonger@peerless.com">gsonger@peerless.com</a></p>
<p>John Pulera Minolta System Labs 11150 Hope St. Cypress, CA 90630</p> <p>Phone: +1 714) 898-4593 x115 Email: <a href="mailto:jpulera@minolta-mil.com">jpulera@minolta-mil.com</a></p>	<p>Rick Seeler Adobe Systems Incorporated 321 Park Ave. San Jose, CA 95110</p> <p>Phone: +1 408 536-4393 Email: <a href="mailto:rseeler@adobe.com">rseeler@adobe.com</a></p>

1334

1335 Contact Information:

1336

1337 IPP Web Page: <http://www.pwg.org/ipp/>1338 IPP Mailing List: [ipp@pwg.org](mailto:ipp@pwg.org)

1339

1340 To subscribe to the ipp mailing list, send the following email:

1341 1) send it to [majordomo@pwg.org](mailto:majordomo@pwg.org)

1342 2) leave the subject line blank

1343 3) put the following two lines in the message body:

1344 subscribe ipp

1345 end

1346

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

1351  
 1352 Other Participants:

Ron Bergman - Hitachi Koki	Dan Calle - Digital Paper
Jeff Christensen - Novell	Lee Farrell - Canon Info Systems
Satoshi Fujitani - Ricoh	Roelop Hamberg - Océ
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

## 1353 **20 Appendix A: Comparison of IPP/1.1 and IPPFAX/1.0 (Informative)**

1354 This informative appendix compares IPP/1.1 and IPPFAX/1.0 with references to the appropriate sections  
 1355 for details. If this appendix contradicts or omits any differences, it is a mistake and the body of this  
 1356 document still prevails. Most of the differences are in conformance requirements only. Therefore, for  
 1357 most of the differences, it is possible to implement both with the same code (without conditional branches).

1358 Legend:

1359 \*\* Where IPP/1.1 and IPPFAX/1.0 have a real difference, such as IPP/1.1 must and IPPFAX/1.0  
 1360 MUST NOT, (indicated below by leading \*\*), would a conditional branch be needed in the  
 1361 implementation code in order to support both IPP/1.1 and IPPFAX/1.0.

1362 \* Where IPP/1.1 is a may and IPPFAX/1.0 is a MUST NOT (indicated below by a leading \*),  
1363 would a conditional branch be needed in the implementation code in order to support both IPP/1.1  
1364 and IPPFAX/1.0, *but only if the IPP/1.1 part supports the feature.*

1365 Differences between the IPP/1.1 protocol and the IPPFAX/1.0 protocol:

- 1366 1. \*\* IPP uses the ‘ipp’ URL scheme with a default port of 631, while IPPFAX uses the ‘ippfax’ URL  
1367 scheme with a default port of xxx [TBA by IANA] (section 4.1 and 16).
- 1368 2. \*\* IPP has only one version number parameter, while IPPFAX has two version numbers: the  
1369 “version-number” parameter for IPP (section 4.2) and the “ippfax-version-number” operation  
1370 attribute for IPPFAX (section 4.3).

1371 Differences between an IPP client and a Sender:

- 1372 1. An IPP Client may use any IPP operation, while a Sender MUST use at least Get-Printer-Attributes  
1373 (sections 5 and 7.1), Validate-Job (section 7.2), and Print-Job operations (section 9). A Sender  
1374 MUST use the Get-Notifications operation, unless the Sending User has explicitly indicated  
1375 otherwise (section 9.6).
- 1376 2. In the Get-Printer-Attributes request, an IPP Client may supply the “document-format” operation  
1377 attribute, while a Sender SHOULD (sections 5.1 and 1) in order to get Attribute Coloring.
- 1378 3. \*\* In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the  
1379 “ipp-attribute-fidelity” operation attribute with either the ‘true’ or ‘false’ value or may omit the  
1380 attribute entirely, while the Sender MUST always supply the attribute and with the ‘true’ value  
1381 (sections 7.2 and 9.1.1).
- 1382 4. \* An IPP Client may support any MIME Media Type as the value of the “document-format”  
1383 operation attribute, while the Sender MUST support the ‘application/pdf’ MIME Media Type.
- 1384 5. The Sender and the Receiver MUST support “PDF/is” pdf-format.
- 1385 6. In the Job Creation operations and the Validate-Job operation, an IPP Client may supply the  
1386 “media” Job Template attribute, while the Sender MUST supply it (section 9.2.1).
- 1387 7. \* An IPP Client may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the  
1388 “media” Job Template attribute or the Media Size Self Describing Name keyword values defined  
1389 in the IEEE-ISTO 5101.1 “Media Standardized Names” [pwg-media], while the Sender MUST use  
1390 the keyword values from [pwg-media] (section 9.2.1).

- 1391 8. There are no requirements for an IPP Client to indicate the client or the client user in the document,  
1392 while the Sender MUST supply the “sender-uri” value along with a date and time, on at least the  
1393 cover page (section 9.5).
- 1394 9. An IPP Client need not support Event Notification, while the Sender MUST support at least the  
1395 ‘ippget’ Pull Delivery Method (section 9.3), which REQUIRES using the Get-Notifications  
1396 operation (section 9.6).
- 1397 10. An IPP Client may support any events, while a Sender MUST NOT support the ‘job-config-  
1398 changed’ event and MUST NOT support any Printer events (section 9.3.2).
- 1399 11. An IPP Client may support Client Authentication, while a Sender MUST support at least ‘digest’  
1400 and ‘certificate’ (section 11.2).
- 1401 12. An IPP Client may support Data Integrity and Data Privacy, while a Sender MUST support Data  
1402 Integrity and may use Data Privacy with at least the  
1403 TLS\_DHE\_DSS\_WITH\_3DES\_EDE\_CBC\_SHA cipher suite (section 11.2).
- 1404 Differences between an IPP Printer and a Receiver:
- 1405 1. In the Get-Printer-Attributes response, an IPP Printer may color the attribute values returned  
1406 according to the “document-format” supplied, while a Receiver MUST color the values returned  
1407 according to the “document-format” operation attribute supplied (sections 5 and 6), including the  
1408 “printer-resolutions-supported” attribute (section 9.2.2.1).
- 1409 2. \* An IPP Printer is not required to support any particular document formats, while a Receiver  
1410 MUST support the PDF/is ‘application/pdf’ format with profile pdfis-fax.
- 1411 3. \* An IPP Printer may support ‘application/octet-stream’ (auto-sensing - [RFC2911] 4.1.9.1), while  
1412 a Receiver MUST NOT (section 6.6).
- 1413 4. An IPP Printer may support the IPPFAX attributes: “sending-user-vcard”, “receiving-user-vcard”,  
1414 and “sender-uri”, while a Receiver MUST (sections 1, 6, 8, and 1.1).
- 1415 5. \*\* An IPP Printer MUST NOT support the “ippfax-versions” and “ippfax-versions-supported”  
1416 attributes, while a Receiver MUST (sections 4.3 and 6.3).
- 1417 6. \*\* An IPP Printer must support both values of the “ipp-attribute-fidelity” operation attribute, while  
1418 the Receiver MUST only support the ‘true’ value (section 9.1.1).
- 1419 7. \*\* An IPP Printer must assume a value of ‘false’ if the IPP Client omits the “ipp-attribute-fidelity”  
1420 operation attribute, while the Receiver MUST reject the request with the ‘client-error-bad-request’  
1421 status code (section 9.1.1).

- 1422 8. An IPP Printer is not required to support any particular Job Template attributes, while a Receiver  
1423 MUST support at least the “media” and “printer-resolution” Job Template attributes, including the  
1424 “media-ready” Printer attribute (section 9.2).
- 1425 9. \* An IPP Printer may supply any keyword listed in [RFC2911] section 14 (Appendix C) for the  
1426 “media” Job Template attribute or the Media Size Self Describing Name keyword values defined  
1427 in the IEEE-ISTO 5101.1 “Media Standardized Names” [pwg-media], while the Receiver MUST  
1428 support a subset of the keyword values from [pwg-media] (section 9.2.1).
- 1429 10. \* An IPP Printer may support any Job Template attribute values, while a Receiver is restricted to a  
1430 single value for many Job Template attributes for which other values would alter the appearance of  
1431 the document or provide a non-FAX-like feature (section 9.2).
- 1432 11. \* An IPP Printer may support Print-URI and Send-URI operations, while a Receiver MUST NOT  
1433 (section 10.1).
- 1434 12. An IPP Printer must support Get-Jobs and Get-Job-Attributes operations, while a Receiver NEED  
1435 NOT (section 10.1).
- 1436 13. \*\* An IPP Printer must support Cancel-Job operation, while a Receiver MUST NOT (section  
1437 10.2).
- 1438 14. An IPP Printer may support administrative operations without authentication, while a Receiver  
1439 MUST authenticate administrative operations, if administrative operations are supported (section  
1440 10.1).
- 1441 15. \* An IPP Printer may support the following operations from an authenticated operator or  
1442 administrator: Purge-Jobs, Cancel-Current-Job, Cancel-Job, and Schedule-Job-After, while a  
1443 Receiver MUST reject such operations from an authenticated operator or administrator.
- 1444 16. An IPP Printer may support Event Notification, while a Receiver MUST support Event  
1445 Notification (sections 9.3 and 10.1) and at least the ‘ippget’ Delivery Method (section 9.6), which  
1446 REQUIRES support for the Get-Notifications operation.
- 1447 17. If an IPP Printer supports Event Notification, it must support the ‘job-state-changed’ and ‘job-  
1448 created’ events for Per-Job Subscriptions, while a Receiver NEED NOT (section 9.3.2).
- 1449 18. \*\* If an IPP Printer supports Printer Events, then it MUST support them for both Per-Job and Per-  
1450 Printer Subscriptions, while a Receiver MUST NOT support them for Per-Job Subscriptions  
1451 (section 9.3.2).

- 1452 19. If an IPP Printer supports Event Notification, it may support the ‘job-progress’ event, while a  
1453 Receiver MUST for Per-Job Subscriptions (section 9.3.2).
- 1454 20. \* If an IPP Printer supports Event Notification, it may support the ‘job-config-changed’ event,  
1455 while a Receiver MUST NOT (section 9.3.2).
- 1456 21. If an IPP Printer supports the Set-Printer-Attributes operation, then it may support setting the  
1457 Attribute Coloring values according to the “document-format” operation attribute, while the  
1458 Receiver, if it supports the Set-Printer-Attributes operation, MUST support setting the Attribute  
1459 Coloring values according to the “document-format” operation attribute (section 10.5).
- 1460 22. An IPP Printer should support and may use TLS, while a Receiver MUST support and MUST use  
1461 TLS (section 11.3).
- 1462 23. An IPP Printer may support Client Authentication, while a Receiver MUST support at least  
1463 ‘digest’ and ‘certificate’ (section 11.2).
- 1464 24. An IPP Printer may support Data Integrity and Data Privacy and support them with any cipher  
1465 suite, while a Receiver MUST support both Data Integrity and Data Privacy with at least the  
1466 TLS\_DHE\_DSS\_WITH\_3DES\_EDE\_CBC\_SHA cipher suite (section 11.2).

## 1467 **21 Appendix B: vCard Example**

1468 The following ASCII text is a complete vCard v3.0 [RFC2426, RFC2425] example:

```
1469 BEGIN:VCARD
1470 VERSION:3.0
1471 N:Moore;Paul
1472 FN:Paul Moore
1473 ORG:Netreon
1474 TEL;CELL;VOICE:1+206-251-7008
1475 ADR;WORK;;;10900 NE 8th St;Bellvue;WA;98004;United States of America
1476 EMAIL;PREF;INTERNET:pmoore@netreon.com
1477 REV:19991207T215341Z
1478 END:VCARD
1479
```

## 1480 **22 Appendix C: Generic Directory Schema for an IPPFAX Receiver**

1481 This section defines a generic schema for an entry in a directory service. A directory service is a means by  
1482 which service users can locate service providers. In IPPFAX environments, this means that Receivers

1483 (IPPFAX Printers) can be registered (either automatically or with the help of an administrator) as entries of  
1484 type PRINTER in the directory using an IMPLEMENTATION SPECIFIC mechanism such as entry  
1485 attributes, entry type fields, specific branches, etc. Directory clients can search or browse for entries of  
1486 type PRINTER. Clients use the directory service to find entries based on naming, organizational contexts,  
1487 or filtered searches on attribute values of entries. For example, a client can find all printers in the “Local  
1488 Department” context. Authentication and authorization are also often part of a directory service so that an  
1489 administrator can place limits on end users so that they are only allowed to find entries to which they have  
1490 certain access rights. IPPFAX itself does not require any specific directory service protocol or provider.

1491 Note: Some directory implementations allow for the notion of “aliasing”. That is, one directory entry  
1492 object can appear as multiple directory entry objects with different names for each object. In each case,  
1493 each alias refers to the same directory entry object which refers to a single IPPFAX Printer object.

1494 The generic IPPFAX schema is a subset of IPPFAX Job Template and Printer Description attributes (Table  
1495 1, Table 2, and [RFC2911] sections 4.2 and 4.4). These attributes are identified as either  
1496 RECOMMENDED or OPTIONAL for the directory entry itself. This conformance labeling is NOT the  
1497 same conformance labeling applied to the attributes of IPPFAX Printers objects. The conformance labeling  
1498 in this Appendix is intended to apply to directory templates and to Receivers that subscribe by adding one  
1499 or more entries to a directory. RECOMMENDED attributes SHOULD be associated with each directory  
1500 entry. OPTIONAL attributes MAY be associated with the directory entry (if known or supported). In  
1501 addition, all directory entry attributes SHOULD reflect the current attribute values for the corresponding  
1502 IPPFAX Printer object.

1503 The names of attributes in directory schema and entries SHOULD be the same as the IPPFAX Printer  
1504 attribute names as shown, as much as possible.

1505 In order to bridge between the directory service and the IPPFAX Printer object, one of the  
1506 RECOMMENDED directory entry attributes is the Printer object’s “printer-uri-supported” attribute. The  
1507 directory client queries the “printer-uri-supported” attribute (or its equivalent) in the directory entry and  
1508 then the IPPFAX client addresses the IPPFAX Printer object using one of its URIs. The “uri-security-  
1509 supported” attribute identifies the protocol (if any) used to secure a channel. If a Printer object supports  
1510 both IPP and IPPFAX, there should be two separate directory entries in order to represent these two  
1511 services.

1512 Table 15 defines the generic schema for directory entries of abstract type PRINTER. In the future this  
1513 schema could also be directory entries of type FAX. In either case, the concrete type MUST be IPPFAX.  
1514 If a Printer object supports both IPP and IPPFAX, there should be two separate directory entries in order to  
1515 represent these two services, one with concrete type IPP and the other with concrete type IPPFAX,  
1516 respectively.



1517

**Table 15 - 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

1518

## 1519 **23 Appendix D: Summary of other IPP documents**

1520 The full set of IPP documents includes:

- 1521 1. Design Goals for an Internet Printing Protocol [RFC2567]
- 1522 2. Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
- 1523 3. Internet Printing Protocol/1.1: Model and Semantics (this document)
- 1524 4. Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]
- 1525 5. Internet Printing Protocol/1.1: Implementer’s Guide [RFC3196] and [ipp-iig-bis]
- 1526 6. Mapping between LPD and IPP Protocols [RFC2569]

1527

1528 The “Design Goals for an Internet Printing Protocol” document takes a broad look at distributed printing  
1529 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included  
1530 in a printing protocol for the Internet. It identifies requirements for three types of users: end users,  
1531 operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A  
1532 few OPTIONAL operator operations have been added to IPP/1.1.

1533 The “Rationale for the Structure and Model and Protocol for the Internet Printing Protocol” document  
1534 describes IPP from a high level view, defines a roadmap for the various documents that form the suite of  
1535 IPP specification documents, and gives background and rationale for the IETF working group’s major  
1536 decisions.

1537 The “Internet Printing Protocol/1.1: Encoding and Transport” document is a formal mapping of the abstract  
1538 operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the  
1539 encoding rules for a new Internet MIME media type called “application/ipp”. This document also defines  
1540 the rules for transporting over HTTP a message body whose Content-Type is “application/ipp”. This  
1541 document defines a new scheme named ‘ipp’ for identifying IPP printers and jobs.

1542 The “Internet Printing Protocol/1.1: Implementer’s Guide” document gives insight and advice to  
1543 implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of  
1544 the considerations that may assist them in the design of their client and/or IPP object implementations. For  
1545 example, a typical order of processing requests is given, including error checking. Motivation for some of  
1546 the specification decisions is also included.

1547 The “Mapping between LPD and IPP Protocols” document gives some advice to implementers of gateways  
1548 between IPP and LPD (Line Printer Daemon) implementations.

## 1549 **24 Appendix E: Description of the IEEE Industry Standards and Technology** 1550 **(ISTO)**

1551 The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible  
1552 operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards,  
1553 but also to facilitate activities that support the implementation and acceptance of standards in the  
1554 marketplace. The organization is affiliated with the IEEE (<http://www.ieee.org/>) and the IEEE Standards  
1555 Association (<http://standards.ieee.org/>).

1556 For additional information regarding the IEEE-ISTO and its industry programs visit:

1557 <http://www.ieee-isto.org>.

## 1558 **25 Appendix F: Description of the IEEE-ISTO PWG**

1559 The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology  
1560 Organization (ISTO) and is an alliance among printer manufacturers, print server developers, operating  
1561 system providers, network operating systems providers, network connectivity vendors, and print  
1562 management application developers chartered to make printers and the applications and operating systems  
1563 supporting them work together better. All references to the PWG in this document implicitly mean “The  
1564 Printer Working Group, a Program of the IEEE ISTO.” In order to meet this objective, the PWG will  
1565 document the results of their work as open standards that define print related protocols, interfaces,  
1566 procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from  
1567 the interoperability provided by voluntary conformance to these standards.

1568 In general, a PWG standard is a specification that is stable, well understood and is technically competent,  
1569 has multiple, independent and interoperable implementations with substantial operational experience, and  
1570 enjoys significant public support.

1571 For additional information regarding the Printer Working Group visit:

1572 <http://www.pwg.org>

## 1573 **26 Revision History (to be removed when standard is approved)**

Revision	Date	Author	Notes

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

1574