IEEE-ISTO

Printer Working Group

IPP Fax Project

Standard for IPPFAX/1.0 Protocol

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

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IFX Web Page: http://www.pwg.org/qualdocs
IFX Mailing List: ifx@pwg.org

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1 Introduction

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

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

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

The IPPFAX/1.0 protocol is a specialization of the IPP/1.1 [RFC2911], [RFC2910] protocol supporting a subset of the IPP operations with increased conformance requirements in some cases, some restrictions in other cases, and some additional REQUIRED attributes. The IPPFAX Protocol uses the 'ippfax' URL scheme (instead of the 'ipp' URL scheme) for all operations. Most of the new attributes defined in this document MAY be supported by IPP Printers as OPTIONAL extensions to IPP as well. Only the attributes defined in this document that start with the "ippfax-" prefix MUST NOT be used in the IPP Protocol (see section 1.3). In addition, IPPFAX/1.0 REQUIRES the support of the IPP Event Notification mechanism [ipp-ntfy] using the 'ippget' Pull Delivery Method [ipp-get-method]. See section 1 for a comparison of IPP and IPPFAX.

An IPPFAX Printer object is called a Receiver. A Receiver MUST support at least PDF/is [ifx-pdfis] which is defined for the 'application/pdf' document format MIME type. A Print System MAY be configured to support both the IPPFAX and IPP protocols concurrently for a single output device (or multiple output devices), but each protocol requires separate Printer objects with distinct URLs. Note - It is assumed that the reader is familiar with IPP/1.1 [RFC2911], [RFC2910], [RFC3196], and [ipp-iig-bis]. See section **Error! Reference source not found.**.

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

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

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1.1 Operations Supported

All IPPFax Senders and Receivers MUST support the following operations:

1. Get-Printer-Attributes - If the document-format-version is not PDF/is or the media is not ISO-A4 or NA-letter, then the Sender MUST verify that the Receiver can support the alternate attributes. Rational: Using Get-Printer-Attributes would avoid rejection of the job which is important if the document data is very large.

2. Print-Job - Sender MUST submit the IPPFAX job with a single document (Create-Job, Send-document and Send-URI and Print-URI MUST NOT be supported by Senders or Receivers).

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

4. Job-Cancel – Receivers MUST support this operation but only for authenticated Administrators or Operators.

All IPPFax Senders and Receivers MUST NOT support any other IPP operations including job operations and administrative operation.

1.2 Typical exchange

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

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

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

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

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

5. The Sender MUST validate whether or not the Receiver will accept all of the attributes of the IPPFAX Job from this Sending User using the Validate-Job operation. See section 1. If the Receiver rejects the Validate-Job operation, the Sender can avoid sending the data.

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

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

8. The Sender transmits the Document data to the Receiver – see section **Error! Reference source not found.**.

9. The Sending User receives a confirmation that the Receiver received the Document data – see section 9.3.

10. In addition the Sender MUST support and the Sending User MAY choose to receive an Event Notification that the Document has been successfully Delivered – see sections **Error! Reference source not found.** and **Error! Reference source not found.**.

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

1.3 Namespace used for attributes

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

On the other hand, unless explicitly specified otherwise, all existing IPP attributes, including future IPP extensions, apply to the IPPFAX Protocol as well, including attributes which have an "ipp-" prefix. For example, the IPP/1.1 "ipp-attribute-fidelity" operation attribute (see [RFC2911] section 3.2.1.1 and 3.2.1.2)

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and the IPP/1.1 “ipp-versions-supported” Printer Description attribute (see [RFC2911] section 4.4.14) are also used in the IPPFAX protocol, even though they have the “ipp-” prefix.

2 Terminology

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

2.1 Conformance Terminology

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

2.2 Other Terminology

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

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

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

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

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306 security, authentication, and/or access control implied by the URL. In other words, each URL for a given
307 Printer object is offering the same Print Service.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3 IPPFAX Model

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

3.1 Printer Object Relationships

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

3.2 A Printer object with multiple URLs

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

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

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only be supported if TLS client authentication has been performed and the system administrator role has been confirmed.

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

3.3 A Print System supporting both IPP and IPPFAX protocols

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

Note: it is possible to support IPP and IPPFAX Printer objects with a single piece of code in a Print System with conditional branching to handle the differences in conformance requirements between IPP and IPPFAX. For example, such conditional branching could depend on the "printer-uri" operation attribute supplied by the client in each request to the Print System. See section 1 for a comparison of IPP/1.1 and IPPFAX/1.0.

4 Common IPPFAX Operation Attribute Semantics

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

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

This operation attribute specifies the transfer path to the Receiver for the operation. As in IPP/1.1, the client MUST supply the "printer-uri" operation attribute in every IPPFAX request (see [RFC2911] section

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3.1.5). For IPPFAX, the attribute value MUST be a URL using the 'ippfax' scheme (see section 15) specifying the Receiver's network location.

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

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

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

As in IPP/1.1 [RFC2911] for each operation, the Receiver NEED NOT validate that the "printer-uri" operation attribute is present and that the value supplied by the Sender matches one of the Receiver's "printer-uri-supported" Printer Description attribute (see section 6.1). For URI matching rules see section 15.7. If the Receiver does validate the "printer-uri" operation attribute and the URI value supplied does not match any value of the Receiver's "printer-uri-supported" Printer Description attribute, the Receiver MUST reject the request, return the 'client-error-attributes-or-values-not-supported' status code, and return the attribute and value in the Unsupported Attributes Group.

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

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

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

If the Receiver does not support the supplied IPP major version *as part of the IPPFAX protocol*, the Receiver MUST respond as specified in [RFC2911] section 3.1.8 with the 'server-error-version-not-supported' status code. As in IPP/1.1, if the major version number is supported, but the minor version number is not, the Receiver SHOULD accept and attempt to perform the request (or reject the request if the operation is not supported), else the Receiver MUST reject the request and returns the 'server-error-version-not-supported' status code. In all cases as in IPP/1.1, the Receiver MUST return the "version-

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number" parameter with the value that it supports that is closest to the version number supplied by the client in the "version-number" parameter in the request.

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

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

If the Sender does not supply this attribute, the Receiver MUST reject the operation, MUST return the 'client-error-bad-request' status code, and SHOULD return the 'ippfax-version-number' attribute name keyword in the Unsupported Attributes Group (see section **Error! Reference source not found.**).

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

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

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

There is no version negotiation per se. However, if after receiving a 'server-error-version-not-supported' status code from a Receiver, a Sender SHOULD try again with a different version number. A Sender MAY also determine the versions supported either from a directory (see section **Error! Reference source not found.**) or by querying the Printer object's "ipp-versions-supported" (see section 6.2) and "ippfax-

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versions-supported" attributes (see section 6.3) to determine which IPP and IPPFAX versions are supported, respectively, as part of IPPFAX.

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

5 Get-Printer-Attributes operation semantics

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

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

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

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

6 IPPFAX Printer Description Attributes

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

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

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

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

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Table 1 - Printer Description attributes conformance requirements

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

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

** These attributes are defined in [?JobX extensions?], but have enhanced or constrained semantics defined in this document.

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

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

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

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

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

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

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

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

Standard keyword values are (from [RFC2911]):

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

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

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

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

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

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

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

Standard keyword values are:

'1.0': Meets the conformance requirements of IPPFAX version 1.0 as specified in this document.

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

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

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

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

The list of operations is restricted! This section should list all the operations that we allow/disallow

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

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

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

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

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

CHANGE: Reference the "Job X extensions" Specification.

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

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

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

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

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

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

6.8 pdl-override-supported (type2 keyword)

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

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

NOTE: RFC2911 only requires that the attribute be supported but the supported may be not-attempted

7 Sender Validation of the Receiver's Capabilities

This section describes how a Sender MUST first validate the target Printer as a Receiver and determines its basic capabilities (section 7.1) and then validate the IPPFAX Job (section 1).

NOTE: This WHOLE section needs revision and possible wholesale deletion

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

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

Table 2 - Receiver Attributes that the Sender validates with Get-Printer-Attributes

Attribute	Ref.	Sender action
Operation attributes:		
printer-uri	4.1	Sender MUST validate whether or not the Get-Printer-Attributes operation with a "printer-uri" target URL using the 'ippfax' scheme locates a valid Receiver destination.
Printer Description attributes:		
ippfax-versions-supported	6.3	Sender MUST check whether the Printer supports the IPPFAX Protocol on the target URL by checking whether or not the Printer supports this attribute, i.e., validate that the Printer is a Receiver.
document-format-version-supported	6.6	If the Sender would like to use a document format other than PDF/is, then the Sender MUST verify that the desired version of PDF is supported by the Receiver..
Job Template Printer attributes:		
media-supported	9.2.1.1	If the Sending user requests a paper size other than A4 or Letter then the Sender MUST verify that the requested paper size is supported by the receiver
printer-resolutions-supported	**Error! Reference source not found.**	Sender SHOULD check which resolutions are supported, so that it can use the highest resolution supported by the Receiver.

Table needs review

8 Identity exchange

Need to move these in with the other operation attributes (section 9)and remove section 8

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599 This section defines the attributes that the Sender and the Receiver can use to identify each to the other and
600 to identify the Sending User and the Receiver User. Table 3 lists these attributes and shows the Sender and
601 Receiver conformance requirements.

602 **Table 3 - Summary of Identify Exchange attributes**

Attribute	Sender supplies *	Receiver supports
sending-user-vcard (text(MAX))	MAY	MUST
receiving-user-vcard (text(MAX))	SHOULD	MUST
sender-uri (uri)	MUST	MUST

603 * Sender supplies in a Print-Job,operation.

604 ### 8.1 sending-user-vcard (text(MAX)) operation/Job
605 ### Description attribute

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

614 For a sample vCard see section 1. If the Sender supplies the attribute, then the Receiver MUST use its
615 value to populate the Job object's corresponding Job Description attribute of the same name.

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

623 ### 8.2 receiving-user-vcard (text(MAX)) operation/Job
624 ### Description attribute

625 This operation attribute identifies the intended Receiving User in MIME vCard format [RFC2426,
626 RFC2425]. The Sender SHOULD send this operation attribute in an IPPFAX Print-Job operation. The
627 Receiver MUST support this Print-Job operation attribute and MUST populate the job's corresponding Job

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Description attribute. The Receiver MUST support MAX (1023) octets of text. However, the Receiver MAY ignore any image, logo, and sound parts, in which case it MUST still accept the Print-Job request and return the 'successful-ok-ignored-or-substituted-attributes' status code (see [RFC2911] section 13.1.2.2), but NEED NOT return the attribute and its ignored values in the Unsupported Attributes Group.

For a sample vCard see section 1. If the Sender supplies the attribute, then the Receiver MUST use its value to populate the Job object's corresponding Job Description attribute of the same name.

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

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

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

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

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

9 Submission using Print-Job

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

9.1 IPP/1.1 Print-Job operation attributes

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

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658 **Table 4 - [RFC 2911] Print-Job operation attributes**

Operation attribute	Section	Sender supplies	IPP/1.1 [RFC 2911]Printer supports	Receiver supports
attributes-charset (charset)		MUST	must	MUST
attributes-natural-language (naturalLanguage)		MUST	must	MUST
printer-uri (uri) *	4.1	MUST	must	MUST
requesting-user-name (name(MAX)) *		SHOULD	must	MUST
job-name (name(MAX))		MAY	must	MUST
ipp-attribute-fidelity (boolean) *	9.1.1	MUST with 'true' value[1]	must	MUST
document-name (name(MAX)) *		MAY	must	MUST
compression (type3 keyword) *		MAY	must	MUST
document-format (mimeMediaType) *	9.1.2	MUST[2]	must	MUST
document-format-version (type2 keyword)	9.1.3	MUST[3]	may	MUST
document-natural-language (naturalLanguage) *		MAY	may	MAY
job-k-octets (integer(0:MAX))		MAY	may	MAY
job-impressions (integer(0:MAX))		MAY	may	MAY
job-media-sheets (integer(0:MAX))		MAY	may	MAY
sending-user-vcard (1setOf text(MAX))	8.1	MAY[3]	may	MUST
receiving-user-vcard (text(MAX))	8.2	SHOULD[3]	may	MUST
sender-uri (name(MAX))	8.3	MUST[3]	may	MUST

659 * As in IPP/1.1, these attributes are NOT Job Description attributes, only Operation attributes.
660

661 ### 9.1.1 ipp-attribute-fidelity operation attribute ([RFC2911] section 3.2.1.1)

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

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

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

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

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

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

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

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

If the Sender does not supply this attribute, the Receiver MUST reject the operation, MUST return the 'client-error-bad-request' status code, and SHOULD return the 'document-format' attribute name keyword in the Unsupported Attributes Group (see section **Error! Reference source not found.**).

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

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

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

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

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

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

Standard keyword values are defined in section 6.6.

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693 ## 9.2 Job Template Attributes (for Print-Job)

694 Table 5 lists all of the Job Template attributes that have enhanced or constrained semantics for IPP Fax.
695 IPP Fax Senders SHOULD NOT supply Job Template attributes except Media[RFC2911].

696 As in [RFC2911], the term "Job Template attribute" is actually up to four attributes: the "xxx" Job
697 attribute, and the "xxx-default", "xxx-supported", and possibly the "xxx-ready" Printer attributes. Any
698 other IPP Job Template attributes defined in other documents are OPTIONAL for IPPFAX.

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

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

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

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

723

724

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

Job Template attribute	Sender supply /Receiver support	IPP Fax behavior	Reference
copies (integer(1:MAX))	MUST NOT	1 copy	[RFC2911]
finishings (1setOf type2 enum)	MUST NOT	Administrator's choice	[RFC2911]
job-hold-until (type3 keyword | name(MAX))	MUST NOT	'no-hold'	[RFC2911]
job-priority (integer(1:100)	MUST NOT	50	[RFC2911]
job-sheets (type3 keyword | name(MAX))	MUST NOT	Administrator's choice	[RFC2911]
media (type3 keyword | name(MAX))	MUST (see section 9.2.1)		[RFC2911]
multiple-document-handling (type2 keyword)	MUST NOT	No multiple document jobs	[RFC2911]
number-up (integer(1:MAX))	MUST NOT	1	[RFC2911]
orientation-requested (type2 enum)	MUST NOT		[RFC2911]

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Job Template attribute	Sender supply /Receiver support	IPP Fax behavior	Reference
page-ranges (1setOf rangeOfInteger(1:MAX))	MUST NOT	1:MAX	[RFC2911]
print-quality (type2 enum)	MUST NOT	Administrator's choice	[RFC2911]
printer-resolution (resolution)	MUST NOT (see section **Error! Reference source not found.**)		[RFC2911]
sides (type2 keyword)	MUST NOT	Administrator's choice	[RFC2911]

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

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

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

NOTE: change references to A4 to 'iso_a4_210x297mm' and Letter to 'na_letter_8.5x11in'

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736

737 At a minimum, an IPPFAX receiver MUST be able to render the sizes 'na_letter_8.5x11in'
738 'iso_a4_210x297mm' and be able to print on at least one of those two sizes. The Receiver MAY
739 scale down at most 10% (PDF/is directives may prohibit this scaling), overflow to another page, or
740 truncate. If the Receiver does truncate then it MUST notify the Receiving User. Any scaling
741 performed MUST be isomorphic.
742 PDF Crop boxes SHOULD be used when the Sender knows that the imageable region is less than the
743 media size. If the crop box is the union of the lesser size of Letter and A4 minus ¼ of an inch, then the
744 Sender can be sure that the majority of Receivers can print the complete image without loss of data.
745 However, this does mean that there is the possibility that data may lost.
746

747 Standard keyword values are defined in section 9.2.1.1.

748 9.2.1.1 media-supported Job Template Printer attributes

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

751 'na_letter_8.5x11in'
752 'iso_a4_210x297mm'
753 'choice_iso_a4_210x297mm_na_letter_8.5x11in' - represents both 'na_letter_8.5x11in' and
754 'iso_a4_210x297mm' and indicates that either is acceptable. See [jobx].

755 9.3 Delivery Confirmation using the Print-job response

756 The Sender knows when the Receiver has successfully received the entire Document when the Receiver
757 returns the 'successful-ok' status code in the Print-Job. The Sender SHOULD then inform the Sending
758 User by means outside the scope of this standard that the document has successfully been received. .

759 9.4 Originator identifier image

760 The Sender MUST place an originator identifier, i.e., the value of the "sender-uri" attribute (see section
761 8.3), along with the date and time, in one of the following places, DEPENDING ON
762 IMPLEMENTATION:

763 1. On a cover page automatically generated by the Sender that is pre-pended before the first page
764 of user data in the PDF document.

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

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

767 The Sender MAY include additional data (Sending User, Receiver identity, etc.).

768 Reference PDF/is method.

769 10 IPPFAX Implementation of other IPP operations

770 Other IPP operations? I think not!

771 Section 5 defined the semantic requirements for the Get-Printer-Attributes operation, section 7 defined the
772 semantic requirements for Validate-Job, and section 9 defined the semantic requirements for Print-Job
773 operations for IPPFAX. This section defines the IPPFAX semantics and conformance requirements for the
774 other IPP operations.

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

777 The Receiver MUST fully support the Print-Job, and Get-Printer-Attributes operations, as defined by this
778 document. The following subsections define restrictions and conformance requirements placed on the
779 Cancel-Job, Get-Job-Attributes, and Get-Jobs, operations. For a conforming IPPFAX Receiver
780 implementation, the support for each of the IPP operations is indicated in Table 6 and Table 7.

781 An IPPFax receiver MUST NOT support any optional features of IPP unless explicitly stated in this
782 document.

783 10.1 Operation Conformance Requirements

784 Table 6 lists the conformance requirements for Printer operations for (1) an IPP/1.1 Printer ('ipp' URL), (2)
785 the non-privileged IPPFAX Sender, (3) an IPPFAX Receiver receiving a request from a non-privileged
786 User, and (4) an IPPFAX Receiver receiving a request from an authenticated and authorized operator or
787 administrator, if the Receiver supports operator/administrator authentication and authorization.

788 Table 7 lists the conformance requirements for Job and Subscription operations for (1) an IPP/1.1 Printer
789 ('ipp') URL, (2) the non-privileged IPPFAX Sender which MUST be on the same URL as the job was
790 created (the target "printer-uri" MUST match the Job's "job-printer-uri" Job Description attribute), (3) an
791 IPPFAX Receiver receiving a request from the Job or Subscription Object Owner, (4) from some other
792 non-privileged user, and (5) if the operation is supported at all - from an authenticated and authorized
793 operator or administrator.

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

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

Table 6 - 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	Reference
Print-Job	must	MUST	MUST	MUST	section **Error! Reference source not found.**
Get-Jobs	must	MUST NOT	MUST NOT	MUST	section 10.3
Get-Printer-Attributes	must	MUST	MUST	MUST	sections 5, 6

Legend:

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Table 7 - Conformance for Job and Subscription Operations

Operation Name	IPP/1.1[RFC 2911] Printer support	IPPFAX Sender support for a User	IPPFAX Receiver from Owner***	IPPFAX Receiver from none owning User	IPPFAX Receiver from Operator	Reference
Cancel-Job	must	MUST NOT	MUST NOT	MUST NOT	MUST	section 10.2
Get-Job-Attributes	must	MUST	MUST	MAY*	MUST	section 10.3

Legend:

MAY* - Get-Job-Attributes restricts certain. See section 10.3.

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

10.2 Cancel-Job operation

Only Operators/Administrators can cancel IPPFax jobs.

10.3 Get-Job-Attributes and Get-Jobs operations

Separate into two sections! Get-Jobs is Operator/Admin only operation

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

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

job-id, job-uri
job-k-octets, job-k-octets-completed
job-media-sheets, job-media-sheets-completed,
time-at-creation, time-at-processing
job-state, job-state-reasons
number-of-intervening-jobs – NOT!!!!!

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

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

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

An IPP administrator MAY read all attributes.

11 Security considerations

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

11.1 Data Integrity and authentication

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

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

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

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

A Receiver MUST have a TLS certificate, and the Send MUST have the public keys of the top level public key Certificate Authorities (as current browsers do). If a Sender gets a public key from a Receiver that is doesn't recognize, the Sender MUST resolve the unrecognized key or inform the Sending User that data integrity has been lost and MUST abort the job.

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

11.2 Data Privacy (encryption)

A Sender MAY chose use data privacy (encryption) as defined in TLS/1.0 [RFC2246].

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11.3 uri-authentication-supported (1setOf type2 keyword) ([RFC2911] section 4.4.2)

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

Table 8 - 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

* TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA mandated by [RFC2246].

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Table 9 compares the Digest Authentication requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX Senders, and IPPFAX Receivers.

Table 9 - 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

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

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

Table 10 - 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

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869 Table 11 compares the TLS conformance requirements for IPP/1.1 clients, IPP/1.1 Printers, IPPFAX
870 Senders, and IPPFAX Receivers.

871 **Table 11 - 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

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

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

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

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

880 ## 11.5 Using IPPFAX with TLS

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

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

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

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IPP/1.1 sequence:

1. Start TCP connection
2. Zero or more HTTP/IPP requests
3. HTTP/IPP request with Upgrade to TLS header
4. TLS handshake
5. Finish the HTTP/IPP request securely
6. Send more HTTP/IPP requests securely ...

IPPFAX sequence:

1. Start TCP connection
2. Send TLS ClientHello
3. Rest of TLS handshake
4. Send HTTP/IPPFAX requests securely ... (which usually will be a Get-Printer-Attributes, followed by the Print-Job operation).

11.6 Access control

Needs re-writting

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

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

11.7 Reduced feature set

Needs re-writting

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

A Receiver that is operating in this mode MUST do so by rejecting any non-IPPFAX request and return a 'client-error-attributes-or-values-not-supported' error status code as indicated in section 4.1 for an unsupported value of the "printer-uri" operation attribute. For job operations attempted on IPPFAX Jobs,

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923 the Receiver MUST return the 'client-error-not-authorized' error status code, unless the Sender is
924 authenticated as the system administrator and the Receiver supports such access.

925 12 Attribute Syntaxes

926 No new attribute syntaxes are defined.

927 13 Status codes

928 No new Status codes are defined and semantics for existing status codes have not been modified.

929 .

930 14 Conformance Requirements

931 Need to be re-worked.

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

934 1. A Sender and Receiver MUST observe the attribute name space conventions specified in section
935 1.3.

936 2. The Sender MUST supply and the Receiver MUST support (1) the "printer-uri" operation attribute
937 with the 'ippfax' scheme, (2) the "version-number" parameter with the IPP/1.1 '1.1' (or higher
938 minor version) value, and (3) the "ippfax-version-number" operation attribute with the IPPFAX/1.0
939 '1.0' keyword value in all operations to get the IPPFAX semantics as described in section 4.

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

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

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

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

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

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

9. The Sender and Receiver MUST support the IPP Notification for Print-Job/Create-Job operations, the 'ippget' Delivery Method, and the Get-Notifications operation for the events indicated in sections **Error! Reference source not found.**, **Error! Reference source not found.**, and **Error! Reference source not found.**, respectively.

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

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

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

15 IPPFAX URL Scheme

Need to be re-worked to be consistent RFC 3510

Need to register a port with IANA for IPPFax.

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

15.1 IPPFAX URL Scheme Applicability and Intended Usage

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

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

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

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975 ### 15.2 IPPFAX URL Scheme Associated IPPFAX Port

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

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

979 ### 15.3 IPPFAX URL Scheme Associated MIME Type

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

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

984 ### 15.4 IPPFAX URL Scheme Character Encoding

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

991 ### 15.5 IPPFAX URL Scheme Syntax in ABNF

992 The IPP protocol places a limit of 1023 octets (NOT characters) on the length of a URI (see section 4.1.5
993 'uri' in [RFC2911]). An IPPFAX Receiver MUST return 'client-error-request-value-too-long' (see section
994 13.1.4.10 in [RFC2911]) when a URI received in a request is too long.

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

997 IPPFAX URLs MUST be represented in absolute form. Absolute URLs always begin with a scheme name
998 followed by a colon. For definitive information on URL syntax and semantics, see "Uniform Resource
999 Identifiers (URI): Generic Syntax and Semantics" [RFC2396]. This specification adopts the definitions of
1000 "port", "host", "abs_path", and "query" from [RFC2396], as updated by [RFC2732] and [RFC2373] (for
1001 IPv6 addresses in URLs).

1002 The IPPFAX URL scheme syntax in ABNF is as follows:

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

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

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

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

15.6 IPPFAX URL Examples

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

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

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

The following literal IPv4 addresses:

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

are represented in the following example IPPFAX URLs:

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

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

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

are represented in the following example IPPFAX URLs:

```
ippfax://[::192.9.5.5]/listener
```

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

15.7 IPPFAX URL Comparisons

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

- A port that is empty or not given MUST be treated as equivalent to the port as defined in section 15.2 for that IPPFAX URL;

16 IANA Considerations

IANA shall register the ippfax URL scheme as defined in section 15 according to the procedures of [RFC2717] and assign a well known port.

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

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

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

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

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1. Appendix A:

19 Appendix B: vCard Example

Update the example

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

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

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

Revision	Date	Author	Notes
1	1/16/01	Paul Moore, Netreon	Initial version
2	2/27/01	Paul Moore, Gail Songer, Netreon	Specify TLS as MUST Removed Cover page and combined device Added need for big text types
3	4/11/01	Gail Songer, Netreon	Move attribute definition to first reference
4	5/24/01	Tom Hastings	Editorially updated the document to follow the style of the IPP standard documents. Added 23 issues to be reviewed. Capitalized the special terms throughout without showing revisions in order to make the document with revisions more readable.
5	5/21/01	Tom Hastings, John	Updated from the 6/6/01 telecon agreements on most

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		Pulera, Ira McDonald	of the 23 issues. There are 20 issues remaining, mostly new.
6	7/27/01	Tom Hastings, Ira McDonald	Updated from the 6/29/01 telecon. There are 41 issues remaining, mostly new.
7	10/8/01	Tom Hastings, Ira McDonald	Updated with all the resolutions to the 41 ISSUES from the August 1, 2001 IPPFAX WG meeting in Toronto, and the subsequent telecons: August, 9, 14, and 17, 2001. There are 4 (new) issues remaining.
8	11/17/01	Tom Hastings	Updated with the agreements from the IPPFAX WG meeting, 10/24/01, Texas. See minutes. There are 5 issues remaining.
9	12/31/01	Tom Hastings	Updated with the agreements reached at the 12/14/01 telecon.
10	2/19/02	Tom Hastings	Updated with the agreements reached as the 2/5/02 IPPFAX WG meeting. There are no remaining issues.
11	9/20/02	Tom Hastings	Replaced all occurrences of UIF with PDFax and uif with PDFax.
12	10/16/02 10/24/02	Rick Seeler Gail Songer	Updated to reflect PDF/is as file format. Replace CONNEG with UPDF. Attributes for OPTIONAL PDF/is functionality.
13	11/22/02	Rick Seeler	Replaced 'PDFax' with 'PDF/is' or 'pdfis'. Updated spec to match 0.3 PDF/is specification.
14	03/18/03	Gail Songer	Removed pdfis-profile-requested and pdfis-profile-supported and pdfis-profiles; all image formats are required Removed pdfis-cache-size-k-octets (now fixed value) Removed pdfis-banding-direction-supported Started to split references into two sections, "normative" and "informative" and update descriptions to references Other editorial changes
15	03/24/03	Gail Songer	Added digital-signatures-supported. Added pdf-format and pdf-format supported. Put "coloring" back to optional. Removed PDF data encryption (leave for a future version of PDF/is and IPPFax)
16		Gail Songer Dennis Carney	Remove all references to coloring Changed pdf-format to document-format-version Remove the requirement that [set-ops] supports

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			document-format coloring (we only allow document-format==PDF) ALL admin operations require TLS to have authenticated the user and the user has admin rights Other editorial changes
17	05/21/03 05/28/03	Dennis Carney Tom Hastings	Editorial updates Added new 'choice_iso_a4_210x297mm_na_letter_8.5x11in' value for "media" and a reference to [jobx]. Fixed conformance for "media-ready".
18	10/03 11/03	Gail Songer	Reviewed in light of the Requirements specification. Noted lots of places in which the document MUST be changed.

1201

1202

1203 Allow Cancel-job for Administrators.

1204 Remove Notifications

1205 Make sure that A4 and Letter are use the complete name

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