A Project of the PWG IPPFAX Working Group

IPP Fax Protocol

IEEE-ISTO Printer Working Group
Draft Standard D0.5

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ftp://ftp.pwg.org/pub/pwg/QUALDOCS/ifx-spec-05.pdf, .doc, .rtf

20 ISSUES are highlighted like this.

Abstract

This standard specifies the IPP Fax (IPPFAX) protocol. The IPPFAX requirements [15] are derived from the requirements for Internet Fax [1].

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 [2] and [3] that uses the SMTP mail protocol as a transport.

The IPPFAX protocol uses an extended version of IPP/1.1 [4], [5] and REQUIRES that the IPPFAX Receiver support at least the Universal Interchange Format (UIF) [14] document format.

This document is a draft of an IEEE-ISTO PWG Proposed Standard and is in full conformance with all provisions of the PWG Process (see: ftp//ftp.pwg.org/pub/pwg/general/pwg-process.pdf). PWG Proposed Standards are working documents of the IEEE-ISTO PWG and its working groups. The list of current PWG projects and drafts can be obtained at http://www.pwg.org.

When approved as a PWG standard, this document will be available from:
ftp://ftp.pwg.org/pub/pwg/standards/pwg510x.y.pdf, .doc, .rtf

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ISSUE 01: Are these attribute names ok? Check the TOC to see all the names together.

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1 Introduction

This standard specifies the IPP Fax (IPPFAX) protocol. The IPPFAX requirements [15] are derived from the requirements for Internet Fax [1].

IPP Fax (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 comes 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 protocol uses an extended version of IPP/1.1 [4], [5] and REQUIRES that the IPPFAX Receiver support at least the Universal Interchange Format (UIF) [14] document format. Note - It is assumed that the reader is familiar with IPP[4],[5],[6].

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 store and forward fax-like protocol specified in [2] and [3] that uses the SMTP mail protocol as a transport.

1.1 Namespace used

The extension specified in this standard uses the prefix 'ippfax-' for all new IPP attributes defined.

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].

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: -

Sender This is the agent (software, hardware or some combination) that is used to transmit a Document to a Receiver.

Receiver This is the agent (IPP Printer object which can be software, hardware or some combination) that receives the Document sent by the Sender.

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

Sending User The person interacting with the Sender.

Receiving User The intended human recipient of the Document being sent.

Attribute Coloring The changing of attributes and/or values returned in a Get-Printer-Attributes response depending on operation attributes supplied in the request.

Job Creation Operation The IPP operations that creates IPP or IPPFAX Jobs, i.e., the Print-Job, Print-URI, and Create-Job operations (see [4]).

IPP Job A job submitted by a Sender using the IPP Protocol [4, 5] *without* the "ippfax-sender-identity" operation attribute in the Job Creation operation and so it has *not* been properly authenticated according to the IPPFAX rules.

IPPFAX Job An IPP job submitted by a Sender using the IPPFAX Protocol (this document) with the "ippfax-sender-identity" operation attribute in the Job Creation operation and which has been properly authenticated according to the IPPFAX rules.

UIF-only Job A IPP Job submitted by a Sender which uses the UIF document-format.

Universal Image Format (UIF) A document format similar to TIFF/FX, but with higher conformance requirements for improved quality (see [14]).

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 [5], such as **attribute**, **operation**, **request**, **response**, **operation attribute**, **Printer Description attribute**, and **Job Description attribute** is also used in the standard with the same capitalization conventions.

2.3 Required exchange

The Sending User determines the network location of the Receiver (value of the "printer-uri" operation attribute) – see section 5.1. This standard 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.

1. 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 standard, indicates the Receiver's network location and starts the exchange.

2. The Sender determines whether or not the Receiver is a IPPFAX capable device – see section 3. If the Receiver is not configured to accept IPPFAX Jobs, the Sender MUST query the Sending User to determine whether to operate in a so-called Degraded Mode – see section 3.5

3. The following identities are determined and exchanged: Sender, Sending User, Receiver, and Receiving User – see section 4.

4. The Sender decides on the most appropriate data format depending on the Receiver's capabilities. This is described in detail in the UIF specification [14].

5. The Sender SHOULD validate whether or not the Receiver will accept the IPPFAX Job from this Sending User using the Validate-Job operation. See section 5.2. 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 3.6.

7. This Document data is transmitted to the Receiver – see section 5.3.

8. The Sending User receives a confirmation that the Receiver received the Document – see section 5.4.

9. In addition the Sender MAY choose to receive notification that the Document has been successfully Delivered – see section 5.5

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 standard.

2.4 Gateways

The IPPFAX protocol MAY be used as a gateway protocol to or from other image transmission systems. See section 8.

3 IPPFAX Capability detection using the Get-Printer-Attributes operation

This section defines the attributes that the Sender queries in order to determine the capabilities of a potential IPPFAX Receiver.

A Sender MUST determine whether or not the destination URL it has represents:

a) A valid IPPFAX Receiver destination AND

b) The IPPFAX Receiver is currently configured to accept IPPFAX Jobs.

Then the Sender MUST determine the capabilities of the IPPFAX Receiver using the Get-Printer-Attributes operation [4] as defined in the following sections.

3.1 ippfax-semantics (type2 keyword) Operation attribute for the Get-Printer-Attributes operation

A Sender MUST supply this operation attribute in a Get-Printer-Attributes operation; a Receiver MUST support this operation attribute as an extensions to the IPP/1.1 Get-Printer-Attributes operation [4]. If the Sender omits this operation attribute, the Printer returns values as if the 'ipp' value had been supplied, i.e., the Printer behaves as an IPP/1.1 Printer.

Standard keyword values are:

'ipp': return attributes that are supported for IPP Jobs
'ippfax': restrict attributes that are supported for IPPFAX Jobs

Note: The Receiver performs Attribute Coloring depending on the value of the "ippfax-semantics" operation attribute supplied by the Sender, i.e., returns values in the Get-Printer-Attributes response that depend on the value supplied by the Sender. IPP/1.1 defines OPTIONAL Attribute Coloring for the "document-format" operation attribute in a Get-Printer-Attributes operation.

The following sub-sections define how the "ippfax-semantics" operation attribute affects (colors) the Printer attributes returned in a Get-Printer-Attributes response:

3.1.1 "copies-supported" Job Template Printer attribute

The Receiver MUST limit IPPFAX Jobs to a subset of the Job Template attributes and values that it supports for Jobs. For example, the "copies" attribute MUST be limited to the value '1' for IPPFAX Jobs, but is not limited for ordinary IPP Jobs (whether or not printing UIF documents). Therefore, if a Printer supports the "copies" attribute for IPP Jobs and the Sender supplies the "ippfax-semantics" operation attribute with the 'ippfax' value, then the Printer MUST return a '1:1' value for the "copies-supported" (rangeOfInteger (1:MAX)) Printer attribute.

3.1.2 "document-format-supported" Printer Description attribute

As another example, the values of the "document-format-supported" (1setOf mimeMediaType) Printer Description attribute will be limited for IPPFAX Jobs, perhaps, only to the UIF [14] (see section 3.6).

3.1.3 "operations-supported" Printer Description attribute

As a third example, the values of the "operations-supported" (1setOf type2 enum) Printer Description attribute will depend on the value of the "ippfax-semantics" operation attribute supplied by the Sender. For example, if the IPPFAX Receiver does not support the Cancel-Job operation for IPPFAX Jobs (see section 6.1), then the Cancel-Job enum is not returned as the value of the "operations-supported" attribute.

ISSUE 02: Should we add all of the Job Template attributes which MUST be subsetted for IPP FAX?

Conversely, if the Sender supplies the "ippfax-semantics" attribute with either the 'ipp' value or omits the "ippfax-semantics" operation attribute all together, then the Receiver MUST return the union of the attributes for IPP and IPPFAX Jobs in the Get-Printer-Attributes response. This requirement permits the Sender to determine the IPP and IPPFAX capabilities in a single query. However, if the Sender wants to determine which additional document formats the Receiver supports for IPPFAX Jobs (such as PDF), the Sender MUST make a second request and supply the "ippfax-semantics" operation attribute with the 'ippfax-authenticated' value.

ISSUE 03: OK that the Sender needs to make two Get-Printer-Attributes requests in order to determine both the IPP and IPPFAX document formats supported?

3.2 "document-format" operation attribute

The Sender SHOULD supply the IPP/1.1 "document-format" operation attribute in the Get-Printer-Attributes request; the Receiver MUST support this operation attribute. If the document format supplied by the Sender is not supported, the Receiver MUST reject the operation and return the 'client-error-document-format-not-supported' status code. As in IPP/1.1, the Receiver SHOULD perform Attribute Coloring for the attributes indicated in [4] depending on the document-format supplied by the Sender.

3.3 ippfax-versions-supported (1setOf type2 keyword) Printer Description attribute

The Sender MAY read this Printer Description attribute using the Get-Printer-Attributes operation; the Receiver MUST support this Printer Description attribute. 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 implementation meets the conformance requirements.

Standard keyword values are:

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

3.4 ippfax-jobs-supported (1setOf type2 keyword) Printer Description attribute

The Sender MUST read this Printer Description attribute using the Get-Printer-Attributes operation; the Receiver MUST support this Printer Description attribute. This attribute identifies the type(s) of jobs that the Receiver is configured to support. If this attribute is not returned, then the Printer is NOT an IPPFAX Receiver.

Standard keyword values are:

'ipp': The Receiver will accept IPP Jobs, i.e., the Receiver will behave as a normal IPP Printer according to [4].

'ippfax-authenticated': The Receiver will accept IPPFAX Jobs that meet the requirements of this standard (and the UIF standard [14]).

If this attribute contains only the 'ipp' value, then the Printer object is not currently operating as an IPPFAX Receiver and will reject any IPPFAX Jobs. If both values are present, then the Receiver will accept both IPP and IPPFAX Jobs concurrently.

If the Receiver supports this attribute and returns a at least one keyword value starting with 'ippfax-', then the Sender can be sure that it will accept IPPFAX Jobs. If either the attribute is not returned or does not contain the 'ippfax-authenticated' value, then the Sender MUST query the Sending User to inform that person that the Printer is not currently accepting IPPFAX Jobs, so that the Sender has the opportunity to choose to abandon the exchange or to enter degraded mode (see section 3.5).

A Receiver MAY support allowing a remote administrator to configure the value of this attribute using the Set-Printer-Attributes operation [17], in which case this attribute is a READ-WRITE attribute.

In IPP/1.1 [4], the "printer-is-accepting-jobs" Printer attribute is a READ-ONLY attribute and cannot be changed by the Set-Printer-Attributes operation. The Enable-Printer and Disable-Printer operations change the value of the "printer-is-accepting-jobs" Printer attribute. The Enable-Printer and Disable-Printer operations apply to IPPFAX Jobs, as well as Jobs.

3.5 Degraded Mode

IPPFAX Receiver that is configured to support the 'ipp' value of its "ippfax-jobs-supported" attribute, but is not configured to support the 'ippfax-authenticated' value or the Sender does not wish to send an IPPFAX Job, only IPP Jobs will be accepted. From the viewpoint of IPPFAX this is a degraded mode of operation. The main features that will be missing are:

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

- Identity exchange: IPP does not provide the definitive identity exchange that IPPFAX does. In many cases however this is acceptable.

- Authentication of the Sender, Sending User, and Receiver.

3.6 document-format-supported (1setOf mimeMediaType) Printer Description attribute

A Sender MUST query this Printer Description attribute using the Get-Printer-Attributes request; a Receiver MUST support this attribute. The values of this attribute indicate whether or not the Receiver supports the Universal Image Format (UIF)[14].

Standard mimeMediaType values are:

'image/tiff; application=uifbw':	black and white UIF [14]
'image/tiff; application=uifcolor':	color UIF [14]

In order to usefully exchange Documents between arbitrary IPPFAX end points there MUST be some agreement on what formats are used to represent the data. To this end an IPPFAX Receiver MUST support either (1) black and white UIF[14] or (2) both black and white and color UIF[14], i.e., MUST either be configured to include either (1) the 'image/tiff; application=uifbw' value or (2) both the 'image/tiff; application=uifbw' and 'image/tiff; application=uifcolor' values.

A Receiver MAY support other document formats.

The Sender is not restricted to sending UIF formats and MAY send any supported format to the Receiver. It is the Sender's choice; the Receiver has no way of indicating preferred formats from amongst the formats that the Receiver supports.

3.7 printer-uif-profiles-supported (1setOf type2 keyword) Printer Description attribute

A Sender MUST query this Printer Description attribute using the Get-Printer-Attributes request; a Receiver MUST support this attribute. The values of this attribute indicate which black/white and color UIF profiles the Receiver supports. See [14] for the definition of each of these UIF profiles and the inter-dependency requirements for profile support. The values of this attribute MUST conform to the inter-dependency requirements in [14] for profile support (for example, UIF Profile S MUST be supported and UIF Profile C MUST be supported if UIF Profile L is supported).

Standard keyword values are:

'uif-s':	UIF Profile S
'uif-f':	UIF Profile F

'uif-j': UIF Profile J
'uif-c': UIF Profile C
'uif-l': UIF Profile L
'uif-m': UIF Profile M
'uif-t': UIF Profile T [21]

ISSUE 04: OK to add UIF Profile T (JBIG2) which is only an I-D?

3.8 printer-uif-profile-capabilities (octetString32k(MAX)) Printer Description attribute

The Sender MAY query the value of this Printer Description attribute using the Get-Printer-Attributes request; a Receiver MUST support this attribute. The value of this attribute is a CONNEG capability string as defined in [14]. The value MUST conform to the minimum value in [14], plus any additional capabilities that the Receiver supports. Thus a Sender can determine additional capabilities above the minimum for the UIF Profiles that the Receiver supports (see section 3.7).

ISSUE 05: Should we change the attribute syntax of the "printer-uif-profile-capabilities" (octetString32k) Printer Description attribute to be multi-valued text, i.e., 1setOf text(MAX)? At the last IPP FAX telecon on May 30, this issue was re-raised. From reading the CONNEG RFCs, the same *white space* rules are used between tokens as for email. Thus, we could represent CONNEG strings as 1setOf text, where each text value contains one or more CONNEG tokens. When combining a 1setOf text into a CONNEG string, the parser would insert some *white space" between each value.

Note: each token doesn't have to be a separate text value (though it can be).

Alternatively, we could just simply chunk the CONNEG value at arbitrary places between each text value.

The advantage of using existing IPP data types, instead of inventing a new data type, is that existing gateways can be used. Remember that a number of initial IPP implementations were just gateways to existing printing systems.

3.9 "xxx-supported" Job Template Printer attributes

A Sender SHOULD query each "xxx-supported" Job Template Printer attribute with the Get-Printer-Attributes operation for which it is supplying an "xxx" Job Template attribute on the IPPFAX Job. Then the Sender can avoid sending a Job Template attribute value that the Receiver does not support.

3.9.1 "media-supported" and "media-ready" Job Template Printer attributes

For example, the Sender SHOULD query the values of the "media-supported" and "media-ready" attributes. The "media-ready" attribute indicates which media are currently loaded and will not require human intervention in order to be used.

3.9.2 "printer-resolution-supported" Job Template Printer attribute

As another example, if the Sender is using a resolution for a UIF profile that is not one of the REQUIRED resolutions for the UIF profile being used, then the Sender SHOULD query the "printer-resolution-supported" Printer attribute. The "printer-resolution-supported" (1setOf resolution) Printer attribute is the union of the resolutions supported for any UIF Profiles and the UIF Profile S MUST support all of them. This attribute allows the Sender to determine the additional resolutions supported above and beyond the resolutions required for support of each of the UIF Profiles without having to interpret the CONNEG expression values of the "printer-uif-profile-capabilities" Printer Description attribute (see section 3.8). Warning: the "printer-resolution-supported" attribute contains all of the resolutions for UIF Profile S, but other UIF Profiles NEED NOT support all of those values, but MUST NOT support any other resolutions.

4 Identity exchange

This section defines the attributes used by the Sender and the Recipient to identify the other.

4.1 ippfax-sending-user-identity (text(MAX)) operation/Job Description attribute

The Sender SHOULD send this operation attribute in the Print-Job operation; a Receiver MUST support this Print-Job and Validate-Job operation attribute. This attribute identifies the Sending User in MIME vCard [10, 19, 20] format. For a sample vCard see section 12. If the Sender supplies the attribute, then the Receiver MUST use its value to populate the Job object's "ippfax-sending-user-identity" Job Description attribute of the same name.

ISSUE 06: The use of "identity" meaning vCard in the "ippfax-sending-user-identity" attribute name is quite different from its use in Kerberos and other network single login technologies. Should we change the name to something like "ippfax-sending-user-vcard"?

ISSUE 07: Ok to change the attribute syntax of the "ippfax-sending-user-identity" operation attribute from octetString32k(MAX) to text(MAX), since the value is a vCard string and 1023 characters seem plenty? Then this attribute would get through IPP/1.1 Gateways.

ISSUE 08: Or should we make the attribute syntax of the "ippfax-sending-user-identity" operation attribute be multi-valued, i.e., 1setOf text(MAX)? Then this attribute would get through IPP/1.1 Gateways and not be limited to length.

4.2 ippfax-receiving-user-identity (text(MAX)) operation/Job Description attribute

The Sender SHOULD send this operation attribute in a Print-Job operation; a Receiver MUST support this Print-Job operation attribute. This attribute identifies the intended Receiving User in MIME vCard

format[10, 19, 20]. For a sample vCard see section 12. If the Sender supplies the attribute, then the Receiver MUST use its value to populate the Job object's "ippfax-sending-user-identity" Job Description attribute of the same name.

ISSUE 09: The use of “identity” meaning vCard in the “ippfax-receiving-user-identity” attribute name is quite different from its use in Kerberos and other network single login technologies. Should we change the name to something like “ippfax-receiving-user-vcard”?

ISSUE 10: Ok to change the attribute syntax of the “ippfax-receiving-user-identity” operation attribute from octetString32k(MAX) to text(MAX), since the value is a vCard string and 1023 characters seem plenty? Then this attribute would get through IPP/1.1 Gateways.

ISSUE 11: Or should we make the attribute syntax of the “ippfax-receiving-user-identity” operation attribute be multi-valued, i.e., 1setOf text(MAX)? Then this attribute would get through IPP/1.1 Gateways and not be limited to length.

4.3 ippfax-sender-identity (name(MAX)) operation/Job Description attribute

The Sender MUST send this operation attribute in a Print-Job operation in order to indicate that this is an IPPFAX Job; a Receiver MUST support this Print-Job operation attribute. This attribute identifies the Sender in a similar manner to the way a Sending Station ID is used in a GSTN fax device. The Receiver MUST use its value to populate the Job object's "ippfax-sender-identity" Job Description attribute of the same name. The presence of the attribute also marks the job as an IPPFAX Job.

If a Receiver is configured to accept IPP Jobs as well (see section 3.3), then the absence of this operation attribute on a Validate-Job or Print-Job request indicates that the job is an IPP Job. An IPP Job is a UIF-only Job if the supplied “document-format” is UIF (see section 5.3.1.1).

If a Receiver is not configured to accept IPP Jobs, then the Receiver MUST reject any Job Creation operation for which the “ippfax-sender-identify” is omitted and return the ‘client-error-forbidden’ status code.

ISSUE 12: Is ‘client-error-forbidden’ status code the proper status code to return for an IPP Job submitted to a Receiver that is configured only to accept IPPFAX Jobs, i.e., the value of the Receiver’s “ippfax-jobs-supported” contains only the ‘ippfax-authenticated’ value?

If the Sender is submitting a UIF document but doesn’t want the guarantees and restrictions of an IPPFAX Job, the Sender MUST omit this operation attribute. The “document-format” operation attribute with the UIF MIME media type identifies the job as a UIF-only Job.

The value of this identity is not specified but MUST uniquely identify the Sender device. A value derived from the MAC address would be a reasonable starting point but it MUST be human readable text.

ISSUE 13: SHOULD be using a client URL by preference and NOT a MAC address (generally totally unknown to an IPP client application). In any case the IEEE and IETF don't approve the use of MAC address for identifiers anymore except in EUI-64 format (an IEEE standard), which is the basis for canonical IPv6 self-configured global addresses. Ira will look up the RFC references later, if you want EUI-64

4.4 ippfax-receiver-identity (name(MAX)) Printer Description attribute

The Sender MAY read this Printer Description attribute using the Get-Printer-Attributes operation; the Receiver MUST support this Printer Description attribute. This attribute identifies the Receiver.

The value of this identity is not specified but MUST uniquely identify the device. A value derived from the MAC address would be a reasonable starting point but it MUST be human readable text.

ISSUE 14: The ippfax-receiver-identity (name(MAX)) Printer Description attribute is bad design. The "printer-uri-supported" is EXACTLY what "ippfax-receiver-identity" is supposed to be without all this unsuitable discussion about MAC addresses. So can we get rid of the ippfax-receiver-identity (name(MAX)) Printer Description attribute and REQUIRE the Sender to query the "printer-uri-supported" Printer Description attribute instead?

5 Data Exchange

5.1 Network Address of Target Receiver - "printer-uri" operation attribute

In each operation, the IPP Target, i.e., the "printer-uri" (uri) operation attribute, MUST be the Receiver's network location which MUST be an IPP/1.1 URL using the 'ipp' scheme. See [12].

Example: <ipp://www.acme.com/ipp/print5>

ISSUE 15: OK that we are using the 'ipp:' scheme for both IPP and IPPFAX protocols?

ISSUE 16: OK that we are forced to use the same default port for IPPFAX as for IPP? So if a Receiver is configured to only receive IPPFAX Jobs from outside its firewall, but receive IPP Jobs from inside its firewall, one or the other will be forced to supply an explicit (different) port?

5.2 Validating the Job using the Validate-Job operation

The Sender SHOULD validate the job attributes using the Validate-Job operation (that doesn't include any Document data) before sending the IPPFAX Job with the same attributes using the Print-Job operation that includes the Document data. For meaningful and complete job validation, the Sender SHOULD supply all the same operation and Job Template attributes in the Validate-Job request as it will supply in the Print-Job request (see section 5.3).

5.3 Transmission using the Print-Job operation

Documents MUST be sent using the IPP Print-Job operation. There is no requirement for an IPPFAX Receiver to support any other IPP job submission operations.

5.3.1 IPP/1.1 Validate-Job and Print-Job operation attributes

Table 1 indicates which IPP/1.1 [4] operation attributes a Sender MUST or MAY supply in a Validate-Job and Print-Job request and a Receiver MUST or MAY support. Differences in conformance from IPP/1.1 are indicated with footnotes.

Table 1 - IPP/1.1 Validate-Job and Print-Job operation attributes

Operation attribute	Sender supplies	Receiver supports
attributes-charset (charset)	MUST	MUST
attributes-natural-language (naturalLanguage)	MUST	MUST
printer-uri (uri)	MUST	MUST
requesting-user-name (name(MAX))	SHOULD	MUST
job-name (name(MAX))	MAY	MUST
ipp-attribute-fidelity (boolean) with 'true' value	MUST[1]	MUST
document-name (name(MAX))	MAY	MUST
compression (type3 keyword)	MAY	MUST
document-format (mimeMediaType)	MUST[2]	MUST
document-natural-language (naturalLanguage)	MAY	MAY
job-k-octets (integer(0:MAX))	MAY	MAY
job-impressions (integer(0:MAX))	MAY	MAY
job-media-sheets (integer(0:MAX))	MAY	MAY

5.3.1.1 document-format (mimeMediaType) operation attribute

The Sender MUST send this operation attribute in the Validate-Job and Print-Job operations; a Receiver MUST validate and support this operation attribute. If the Sender does not supply this attribute, the Receiver MUST reject the operation and return the 'client-error-bad-request' status code. Note: [RFC2911] does not REQUIRE the IPP Client to supply this operation attribute. If the Sender supplies a value that the Receive does not support, the Receiver MUST reject the operation and return the 'client-error-document-format-not-supported' status code (IPP conformance).

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

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

Standard mimeMediaType values are:

'image/tiff; application=uifbw': black and white UIF [14]
'image/tiff; application=uifcolor': color UIF [14]

5.3.2 IPP/1.1 Validate-Job and Print-Job Job Template attributes

Table 2 indicates which IPP/1.1 [4] Job Template attributes a Sender MUST supply in a Validate-Job and Print-Job request and a Receiver MUST support (including the corresponding xxx-default, "xxx-ready" and xxx-supported Printer attribute). The Sender MAY supply and a Receiver MAY support any additional valid Job Template attributes.

Table 2 - IPP/1.1 Job Template attributes

Job Template attribute	Sender supplies	Receiver supports
media (type3 keyword | name(MAX))	MUST	MUST
printer-resolution (resolution)	MAY	MUST

5.3.2.1 media (type2 keyword | name(MAX)) Job Template attribute

The Sender MUST supply the "media" Job Template attribute in the Validate-Job and Print-Job requests and the Receiver MUST support it, along with the "media-default", "media-ready", and "media-supported" Printer attributes. The UIF standard [14] requires that both the Sender and the Receiver be able to determine the dimensions from the keyword value. Therefore, the keyword values MUST be Media Size Self Describing names defined in the PWG Standardized Name standard [18].

Standard keyword values (see [18]) include:

'na_letter_8.5x11in'
'iso_a4_210x297mm'

5.3.2.2 printer-resolution (resolution) Job Template attribute

The Sender MAY supply the "printer-resolution" Job Template attribute in the Validate-Job and Print-Job requests and the Receiver MUST support it, along with the "printer-resolution-default", and "printer-resolution-supported" Printer attributes.

If the Sender supplies the "resolution" (resolution) Job Template attribute, the value MUST agree with the resolution of each of the pages of the UIF document. If the supplied value disagrees with the resolution of any of the pages of the UIF document, the Receiver MUST obey the resolution in the UIF document, on a page by page basis.

Note: The main purpose of requiring the Receiver to support the "printer-resolution" Job Template attribute is so that the Sender can query the corresponding "printer-resolution-supported" (1setOf

resolution) Printer attribute to see what resolutions are supported in addition to the ones REQUIRED for the UIF profiles supported.

5.4 Confirmation using the Print-Job response

The Sender knows when the Receiver has successfully received the entire Document when the Receiver returns the ‘successful-ok’ status code in the Print-Job response; the Sender MUST then inform the Sending User by means outside the scope of this standard.

5.5 Notification using the “notification-recipient-uri” operation attribute and the Get-Notifications operation

A Sender MUST use IPP Notification [16] to determine when the Document has been Delivered; a Receiver MUST support the IPP Notification specification [16] and the ‘ippget’ notification delivery method [11]. The Receiver MUST support the ‘job-progress’ event (which is OPTIONAL in [16]), as well as all of the REQUIRED events in [16] ('none', 'printer-state-change', 'printer-stopped', 'job-state-change', 'job-created', and 'job-completed'). The Receiver MUST support the Get-Notifications operation as defined in [11]. If the Sender subscribes to the ‘job-progress’ event, the Receiver MUST generate an event for every sheet, as moderated by the Printer’s “notify-time-interval” attribute, which the Sender can obtain using the Get-Notifications request.
A Sender MUST use the “notify-recipient-uri” (uri) Print-Job operation attribute [16] to request that the Receiver send it notifications regarding the delivery of the Document. The Receiver MUST support Subscription Creation for the IPP Print-Job operation, 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 [16] 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.

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

5.6 Identity Stamping

The Sender MUST place the Sender’s identity, date and time at the top of every page of the sent Document. The Sender MAY include additional data (Sending User, Receiver identity, etc.)

6 IPP Implementation

IPPFAX restricts the use of IPP in certain cases in order to make attaching a Receiver to the Internet a safe option – see section 7.

The Receiver MUST fully support the Print-Job, Validate-Job, and Get-Printer-Attributes operations, as defined by IPP/1.1 [4] and the Get-Notifications operation as defined in [11]. The following subsections define restrictions placed the IPP/1.1 Cancel-Job, Get-Job-Attributes, and Get-Jobs operations. In a strict IPPFAX implementation, all other IPP/1.1 operations MUST NOT be accepted unless the issuer of the operation can be identified as an administrator. There is no requirement for the Receiver to implement any of the OPTIONAL features of IPP unless explicitly stated elsewhere in this standard. If a Receiver is not a strict IPPFAX implementation and it chooses to allow other IPP operations, for example, IPP operations such as Print-URI, Create-Job, Create-Printer-Subscriptions, etc., then it MUST provide a method of restricting available operations for non-authorized clients to the operations specified herein.

6.1 Canceling jobs

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

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

The Receiver MUST either (1) reject Cancel-Job operations not issued by an administrator targeted at IPPFAX Jobs or (2) reject Cancel-Job operations targeted at IPPFAX Jobs altogether, depending on implementation and/or policy. (The Receiver can distinguish IPPFAX Jobs from IPP Jobs by the presence of the mandatory “ippfax-sender-identity” job attribute - see section 4.3). The Cancel-Job operation therefore becomes a privileged operation on all IPPFAX Jobs or not supported. This behavior is a change to the IPP behavior. Which implementation choice MUST be reflected in the value of the “operations-supported” Printer attribute (see section 3.1.3).

If the issuer of the operation can be identified as an administrator, then the operation MUST behave as defined in [4].

6.2 Querying jobs using Get-Job-Attributes and Get-Jobs operations

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

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, an implementation 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

The exact choice of Job attributes that a client can query for IPPFAX Jobs, including not returning any, depends on implementation and security policy 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 section 8.4 of [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.

6.3 Job submission

The Sender MUST send IPPFAX Jobs to the Receiver using the Print-Job operation which MUST include the “ippfax-sender-identity” operation attribute.

7 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 restriction placed on querying and canceling IPPFAX Jobs.

7.1 Privacy

Any exchange between a Sender and a Receiver MUST be carried using the privacy mechanism specified in IPP/1.1 namely TLS [9]. In some cases this will also result in mutual authentication of the Sender and Receiver (in the case where both sides have certificates).

The Receiver MUST have a TLS certificate.

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

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

7.2 ippfax-sending-user-certificate (octetString32k(MAX)) operation/Job Description attribute

The Sender MAY supply this operation attribute in a Print-Job or Validate-Job operation; the Receiver MUST support this operation attribute. The use of TLS assures the Sender and the Sending User that the Receiver is what it claims to be.

The use of sending side certificates can assure the Receiver that the Sender is who it claims to be (if the Receiver chooses to enforce the requirement that the Sender MUST have a certificate). This operation attribute is only valid on the Print-Job and Validate-Job operations. A Receiver MUST support this attribute and MAY require this attribute so it MAY positively identify the Sender. If REQUIRED but not supplied then the Receiver MUST reject the request and return the 'client-error-not-authenticated' (see [4]). If supplied then this attribute MUST contain the TLS certificate as defined by X.509V3[13].

ISSUE 17: Is this the last use of the new octetString32k attribute syntax? Can we change it to an existing data type or 1setOf octetString(MAX), i.e., chunk the data, so that it can be passed through existing IPP Gateways?

7.3 Access control

It is expected that the majority of IPPFAX Receivers will operate in a public mode. However a Receiver MAY protect itself using any method specified in [4] (digest authentication [9] for example) to restrict access to any or all of its functionality.

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

7.4 Reduced feature set

An administrator or device implementer MAY choose to setup up a device so that it only works as a 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 SHOULD do so by rejecting any non-IPPFAX request and return a 'server-error-operation-not-supported' error status code. For job operations attempted on IPPFAX Jobs, the Receiver SHOULD return the 'client-error-not-authorized' error status code, unless the Sender is authenticated as the system administrator and the Receiver supports such access.

8 Gateways to other systems

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

8.1 Off-Ramps

In the IPPFAX 'Off-ramp' scenario the user with a Document to send uses an IPPFAX Sender to transmit a Document to an IPPFAX Receiver within a gateway that in turn transmits it to some other destination, i.e. GSTN FAX.

8.1.1 ippfax-destination-scheme-supported (1setOf type2 keyword) Printer Description attribute

The Sender SHOULD read this Printer Description attribute using the Get-Printer-Attributes operation if it is going to send the IPPFAX Job to an IPPFAX Receiver acting as an Off-Ramp Gateway; if the Receiver supports acting as an Off-Ramp Gateway, the Receiver MUST support this Printer Description attribute. This attribute identifies the list of URI destination scheme names that the Receiver supports for forwarding Documents to final Destinations. If the Receiver does not act as an Off-Ramp Gateway, then this attribute MUST NOT be supported, i.e., the Receiver does not return this attribute in the Get-Printer-Attributes response.

From the list of supported schemes, the user selects the desired scheme with which it then populates the "ippfax-destination-uri" (uri) operation attribute on Print-Job or Validate-Job requests.

8.1.2 ippfax-destination-uri (uri) operation attribute and Job Description attribute

If the Sender is sending the IPPFAX Job to an Off-Ramp Receiver, the Sender MUST supply this operation attribute; if the Receiver supports acting as an Off-Ramp Gateway, the Receiver MUST support this Print-Job and Validate-Job operation attribute.

If the Sender supplies the attribute, the Receiver MUST use its value to populate the Job object's "ippfax-destination-uri" (uri) Job Description attribute of the same name.

8.2 On-Ramps

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

9 Attribute Syntax

This section defines additional attribute syntaxes defined for use in IPPFAX.

9.1 'octetString32k'

The 'octetString32k' attribute syntax is a sequence of octets encoded in a maximum of 32,767 octets which is indicated in sub-section headers using the notation: octetString32k(MAX). This syntax type is used for opaque data. Both the Sender and Receiver MUST support this attribute syntax.

ISSUE 18: Can we get rid of the new 'octetString32k' attribute syntax and use existing IPP/1.1 attribute syntaxes, so that existing IPP systems can be used as gateways?

10 Status codes

No new status codes are defined. The status codes defined in [4] are to be used.

11 Conformance Requirements

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

ISSUE 19: Do the conformance tables look ok?

11.1 Operation Conformance Requirements

Table 3 lists the conformance requirements for IPP operations for the IPPFAX Sender and IPPFAX Receiver. Any other operations are OPTIONAL for an IPPFAX Sender or an IPPFAX Receiver to support.

Table 3 - Operation Conformance Requirements

Operation	IPP/1.1 Printer	IPPFAX Sender	IPPFAX Receiver	Section
Get-Printer-Attributes	MUST	MUST	MUST	3, 4.4
Set-Printer-Attributes	MAY	MAY	MAY	3.4
Validate-Job	MUST	SHOULD	MUST	5.2
Print-Job	MUST	MUST	MUST	5.3
Get-Notifications	MAY	MAY	MUST	5.5
Cancel-Job	MUST	MAY	MAY	6.1
Get-Job-Attributes	MUST	MAY	MAY	6.2
Get-Jobs	MUST	MAY	MAY	6.2

11.2 Operation Attribute Conformance Requirements

Table 4 lists the IPPFAX conformance requirements for Operation attributes on the Print-Job and Validate-Job requests and the corresponding Job Description attributes. Any other Print-Job and Validate-Job operation attribute has the same conformance as in IPP/1.1 [4].

Table 4 - Print-Job/Validate-Job operation attributes and Job Description attributes conformance requirements

Attribute Name (attribute syntax)	Sender Conformance	Receiver Conformance	Section
document-format (mimeMediaType) *	MUST	MUST	5.3.1.1
ippfax-sending-user-identity (text(MAX))	SHOULD	MUST	4.1
ippfax-receiving-user-identity (text(MAX))	SHOULD	MUST	4.2
ippfax-sender-identity (name(MAX))	MUST	MUST	4.3
notification-recipient-uri (uri)	MAY	MUST	5.5
ippfax-sending-user-certificate (octetString32k(MAX)) *	MAY	MUST	7.2
ippfax-destination-uri (uri)	MAY	MUST **	8.1.2

*These attributes are NOT Job Description attributes, only Operation attributes for the Print-Job and Validate-Job operations.

** Only an Off-Ramp Receiver MUST support this attribute.

Table 5 lists IPPFAX conformance requirements for Operations attributes on the Get-Printer-Attributes request. Any other Get-Printer-Attributes operation attribute has the same conformance as in IPP/1.1 [4].

Table 5 - Get-Printer-Attributes operation attributes conformance requirements

Attribute Name (attribute syntax)	Sender Conformance	Receiver Conformance	Section
ippfax-semantics (type2 keyword) *	MUST	MUST	3.1
document-format (mimeMediaType) **	SHOULD	MUST	3.2

* Receiver MUST perform Attribute Coloring

** Receiver SHOULD perform Attribute Coloring (same recommendation as in IPP/1.1)

11.3 Subscription Template Attributes Conformance Requirements

Table 6 lists the conformance requirements for Subscription attributes on the Print-Job and Validate-Job requests.

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

Attribute Name (attribute syntax)	Sender Conformance in Print-Job	Receiver Conformance	Section
notify-recipient-uri (uri)	MAY *	MUST	5.5
notify-events (1setOf type2 keyword)	MAY	MUST	5.5
notify-attributes (1setOf type2 keyword)	MAY	MAY	5.5
notify-user-data (octetString(63))	MAY	MUST	5.5
notify-charset (charset)	MAY	MUST	5.5
notify-natural-language (naturalLanguage)	MAY	MUST	5.5
notify-lease-duration (integer(0:67108863))	MAY	MUST	5.5
notify-time-interval (integer(0:MAX))	MAY	MUST	5.5

731 * The Sender MUST supply at least this attribute in order to use Notification.
732

733 *11.4 Printer Description Attribute Conformance Requirements*

734 Table 7 lists the IPPFAX conformance requirements for Printer Description attributes. Any other
735 Printer Description attributes defined in IPP/1.1 [4] or IPP Notifications [16] or elsewhere have the
736 same conformance requirements as in IPP/1.1.

737 **Table 7 - Printer Description attributes conformance requirements in the Get-Printer-Attributes**
738 **operation**

Attribute Name (attribute syntax)	Sender Conformance for Get-Printer-Attributes request	Receiver Conformance for Get-Printer-Attributes response	Section
ippfax-versions-supported (1setOf type2 keyword)	SHOULD	MUST	3.3
ippfax-jobs-supported (1setOf type2 keyword)	MUST	MUST	3.4
document-format-supported (1setOf mimeMediaType)	MUST	MUST	3.6
printer-uif-profiles-supported (1setOf type2 keyword)	MUST	MUST	3.7
printer-uif-profile-capabilities (octetString32k(MAX))	MAY	MUST	3.8
media-supported (1setOf (type3 keyword | name(MAX)))	SHOULD	MUST	3.9.1
media-ready (1setOf (type3 keyword | name(MAX)))	SHOULD	MUST	3.9.1
printer-resolution-supported (1setOf resolution)	SHOULD *	MUST	3.9.2
other “xxx-supported” Job Template Printer attributes	SHOULD *	MAY	3.9
ippfax-receiver-identity (name(MAX))	MAY	MUST	4.4
ippfax-destination-scheme-supported (1setOf type2 keyword)	MAY	MUST **	8.1.1

739 * The Sender SHOULD query, if submitting the corresponding “xxx” Job Template attribute in the
740 Validate-Job or Job Creation operation.
741 ** Only an Off-Ramp Receiver MUST support this attribute.
742

743 *11.5 Notification Event Conformance Requirements*

744 Table 8 lists the conformance requirements for notification events.

745 **Table 8 - Notification Events conformance requirements**

Event	Sender Conformance for Print-Job	Receiver Conformance	Section
none	MAY	MUST	5.5
job-state-changed	MAY	MUST	5.5
job-created	MAY	MUST	5.5
job-completed	MUST	MUST	5.5
job-progress	MAY	MUST *	5.5
printer-state-changed	MAY	MUST	5.5
printer-stopped	MAY	MUST	5.5

746 * The ‘job-progress’ event is OPTIONAL in [16], but is REQUIRED for IPPFAX so that the
747 Sender can give page by page feedback.

11.6 Identify Stamping Conformance Requirements

The Sender MUST place the Sender's identity on every page as required in section 5.6.

11.7 Security Conformance Requirements

The Sender and Receiver MUST support the security mechanisms indicated in section 7, including TLS.

11.8 Attribute Syntax Conformance Requirements

The Sender and Receiver MUST support the octetString32k attribute syntax defined in section 9.1.

12 Appendix B: vCard Example

The following ASCII text is a complete vCard [10, 19, 20] example:

```
BEGIN:VCARD
VERSION:2.1
N:Moore;Paul
FN:Paul Moore
ORG:Peerless Systems Networking
TEL;CELL;VOICE:(206) 251-7008
ADR;WORK:;;10900 NE 8th St;Bellvue;WA;98004;United States of America
EMAIL;PREF;INTERNET:pmoore@peerless.com
REV:19991207T215341Z
END:VCARD
```

ISSUE 20: Is this example accurate? The phone number format seem wrong.

13 References

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

Revision	Date	Author	Notes
1	1/16/01	Paul Moore, Netreon	Initial version
2	2/27/01	Paul Moore, Gail Songer, Netreon	Specify TLS as MUST Removed Cover page and combined device Added need for big text types
3	4/11/01	Gail Songer, Netreon	Move attribute definition to first reference
4	5/24/01	Tom Hastings	Editorially updated the document to follow the style of the IPP standard documents. Added 23 issues to be reviewed. Capitalized the special terms throughout without showing revisions in order to make the document with revisions more readable.
5	5/21/01	Tom Hastings, John Pulera, Ira McDonald	Updated from the 6/6/01 telecon agreements on most of the 23 issues. There are 20 issues remaining, mostly new.