A Project of the PWG IPPFAX Working Group

IPP Fax Protocol

IEEE-ISTO Printer Working Group
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Abstract

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

~~This document proposes that t~~The IPPFAX protocol ~~should~~ 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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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 ~~document~~standard uses the prefix 'ippfax-' for all new IPP ~~elements~~ attributes ~~created~~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 Model

This proposal 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.

IPPFAX Job An IPP job submitted by a Sender.

Delivered The Receiver has either printed the Document or has forwarded it 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 Typical exchange

The Sending User determines the address of the Receiver – see 'Addressing'section 6.1. This documentstandard 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 address and starts the exchange.

? 2. The Sender determines whether or not the Receiver is a IPPFAX capable device – see 'IPPFAX detection'section 3.

? 3. The following identities are determined and exchanged: Sender, Sending User, Receiver and Receiving User – see 'Identity exchange'section 5.

? 4. The Sender and Receiver decide 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 Validate-Job. See section 6.2. ISSUE 01: Ok that I added the Validate-Job step, since Validate-Job is REQUIRED for an IPPFAX Receiver to support?

~~?~~ 6. The Sender either (1) scans the Document and converts it into an acceptable data format or (2) generates the Document representation in an acceptable data format – see ~~'data formats'~~section 4.

~~?~~ 7. This data is transmitted to the Receiver – see ~~'Data Transmission'~~section 6.3.

~~?~~ 8. The Sending User receives a confirmation that the Receiver received the Document – see ~~'Confirmation'~~section 6.4.

9. In addition the Sender MAY choose to receive notification that the Document has been successfully Delivered – see ~~'Notification'~~ section 6.5

~~? Delivered means the Receiver sent it somewhere~~

If the Sender is unable to initiate or complete the exchange then it is assumed that ~~it~~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~~standard.

2.4 Gateways

The IPPFAX protocol MAY be used as a gateway protocol to or from other image transmission systems. See ~~'Gateways to other systems' later~~ section 9.

3 IPPFAX detection

A Sender needs to determine whether or not the destination URL it has represents:~~-~~

a) A valid IPP destination

b) A IPPFAX Receiver (not all IPP destinations are IPPFAX Receivers)

This ~~document~~standard does not specify how to perform the first validation. Refer to the IPP implementer's guide [6].

3.1 ippfax-receiver (integer(0:MAX)) Printer Description attribute

ISSUE 02: Wouldn't "ippfax-version" (integer(0:MAX)) make a better Printer Description attribute name for the "ippfax-receiver (integer(0:MAX)), especially since we already have an "ippfax-receiver-identify (name(MAX)) Printer Description attribute?

The Sender SHOULD read this Printer Description attribute using the Get-Printer-Attributes operation; the Receiver MUST support this Printer Description attribute. This attribute identifies the Printer object as an IPPFAX Receiver. ~~To perform the second validation a Sender SHOULD execute an IPP 'get-printer-attributes' operation to retrieve the 'ippfax-receiver'(Integer) attribute. An IPPFAX Receiver MUST support this printer description attribute.~~ If this attribute is not returned, then the Printer is NOT an IPPFAX Receiver. If the value of this attribute is 0 then the ~~device~~ Printer object is not currently operating as an IPPFAX Receiver. Any other value indicates the version of IPPFAX supported. This specification defines the support REQUIRED for version 1.

ISSUE 03: Why not REQUIRE an IPPFAX Sender to validate that the Receiver is an IPPFAX Receiver? Otherwise, the Sending User isn't guaranteed reliable exchange.

If the IPP printer supports this attribute and returns a value greater than 0, then Sender can be sure that it is an IPPFAX Receiver. If either the attribute is not returned or the value is 0, ~~not~~ then the Sender MAY choose to abandon the exchange or to enter degraded mode (see section 3.2).

ISSUE 04: When the IPP Printer isn't an IPPFAX Printer (either doesn't support the "ippfax-receiver" attribute or returns a 0 value, why not REQUIRE the Sender to query the Sending User as to whether to abandon the exchange or do it in Degraded Mode? Currently, the Sender can do whatever it wants without the Sending User being involved.

ISSUE 05: Can a Receiver support a remote administrator changing the value of the ippfax-receiver (integer(0:MAX)) Printer Description attribute using the Set-Printer-Attributes operation or should we define two OPTIONAL operations to set the level to 0 or back to its supported level?

ISSUE 06: If we want two operations, should they be new operations or a new operation attribute for the existing OPTIONAL Disable-Printer and Enable-Printer operations?

3.2 Degraded Mode

IPPFAX describes a variation of IPP – it is perfectly possible for a complete ippfax-like exchange to take place between a IPPFAX client and an IPP printer.

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

4 Data formats

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 UIF[14~~xx~~]. The UIF format is identified using the MIME type: 'application/vnd.pwg-UIF' (ISSUE 07: Or use 'image/tiff; application=uif' or 'image/tiff; application=faxbw or 'image/tiff; application=faxcolor' instead?).

A Receiver MAY support other formats.

Note that a Sender MAY use any means it chooses to determine what format to send. It MAY have a-priori knowledge of the Receiver, it MAY read the IPP ~~printer-description attribute~~ "document-format-supported" Printer Description attribute or determine that it can support other data formats using some other mechanism (for example it can read the Receiver's manufacturer and model and therefore determine the formats supported). The Sender SHOULD NOT send any data format that the Receiver does not support. If it does so the Receiver will reject it (IPP conformance).

The Sender 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.

The Sender MUST specify the data format being sent by including the ~~(optional in IPP)~~ "document-format" operation attribute in the Print-Job request (OPTIONAL for a client to supply in IPP/1.1).~~job attribute 'document-format'~~

5 Identity exchange

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

5.1 ippfax-sending-user-identity (text(MAX)) operation/Job Description attribute~~Sending user~~

The Sender SHOULD send this operation attribute in the Print-Job operation~~Sending User identity SHOULD be sent to the Receiver~~; a Receiver MUST support this Print-Job and Validate-Job operation attribute. This attribute identifies ~~The identity~~ the Sending User in MIME vCard [10] format. For a sample vCard see ~~Appendix B: Vcard Example~~section 13. ~~is specified in a new IPP job attribute – ippfax-sending-user-identity'(octetString32k(MAX)). This attribute is a job description attribute and an operation attribute for the print-job and validate-job commands.~~ If the ~~client~~ Sender supplies the attribute, then the Receiver MUST use its value ~~of the attribute is used~~ to populate the Job object's "ippfax-sending-user-identity" Job Description attribute of the same name.

ISSUE 08: 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?

5.2 ippfax-receiving-user-identity (text(MAX)) operation/Job Description attributeReceiving User

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 identity of the intended Receiving User in MIME vCard format[10]SHOULD be included in a request. For a sample vCard see section 13. The identity is specified in a new IPP job attribute, 'ippfax-receiving-user-identity'(octetString32k(MAX)). This attribute is a job description attribute and an operation attribute for the print-job and validate-job commands. This is .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: 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?

5.3 ippfax-sender-identity (name(255)) operation/Job Description attributeSender

The Sender MUST send this operation attribute in a Print-Job operation; a Receiver MUST support this Print-Job operation attribute. This attribute identifies the Sender MUST have an identity in the same way that a fax machine has a sending station ID. The Receiver MUST use its value to populate the Job object's "ippfax-sender-identity" Job Description attribute of the same name. The Sender's identity MUST be sent to the Receiver using a new IPP job description attribute and operation attribute for the print-job and validate-job commands, 'ippfax-sender-identity'(name(255)). A Receiver MUST support this attribute. The presence of the attribute also marks the job as an IPPFAX Job.

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.

5.4 ippfax-receiver-identity (name(255)) Printer Description attributeReceiver

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 Receiver MUST have an identity that the Sender MAY read. The Receiver MUST make this available via a new IPP printer description attribute, 'ippfax-receiver-identity'(name(255)).

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.

6 Data Exchange

6.1 Addressing

In each operation, the IPP Target, i.e., the “printer-uri” (uri) operation attribute, MUST be ~~T~~the Receiver's address which MUST be an IPP/1.1 URL using the 'ipp' scheme. See [12].

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

~~See [draft-ietf-ipp-url-scheme-02.txt] ipp url scheme~~

6.2 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. 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.

6.3 Transmission using the Print-Job operation

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

The Sender MAY include any valid operation attributes or Job Template attributes.

ISSUE 10: We need to define which Print-Job operation attributes and Job Template attributes are required for the Receiver to support.

6.4 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 can then inform the Sending User.

ISSUE 11: MUST the Sender inform the Sending User that the Document as been received successfully?

The Sender SHOULD use the successful end of the print-job operation as an indication that the Receiver has received the Document.

6.5 Notification using the "notification-recipient-uri" operation attribute and the Get-Notifications operation

A Sender MAY use Notification to determine when the Document has been Delivered; An IPPFAX Receiver MUST support the IPP Notification specification [16] and the 'ippget' notification delivery method mechanism[draft-ietf-ipp-notify-get-02.txt11]. The Receiver and MUST support the 'job-progress' events (which is OPTIONAL in [16]) and the 'job-completed' event (which is a subset of the required events in [16]). 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.

ISSUE 12: Why not REQUIRE the Sender to support Get-Notifications and subscribing to at least the 'job-complete' event?

ISSUE 13: Ok to allow a Receiver to support a subset ('job-progress' and 'job-complete') of the REQUIRED events that IPP Notification requires?

A Sender MAY use the "notification-recipient" Print-Job operation attribute [16] this 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 commandoperation, 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 them.

ISSUE 14: Ok to allow a Receiver to subset the REQUIRED operations of the IPP Notification specification and not support: Create-Job-Subscriptions, Create-Printer-Subscriptions, Get-Subscription-Attributes, Get-Subscription-Attributes, Renew-Subscription, or Cancel-Subscription, even though the IPP Notification spec requires them?

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.

ISSUE 15: Should we forbid a Receiver to support the additional IPP Notification operations: Create-Job-Subscriptions, Create-Printer-Subscriptions, Get-Subscription-Attributes, Get-Subscription-Attributes, Renew-Subscription, or Cancel-Subscription?

For the purposes of IPPFAX 'printing completejob-completed' event notifications means that the Receiver has delivered the IPPFAX Job it somewhere; either actually printed it or forwarded it to some other system.

6.6 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.)

ISSUE 16: Why are we requiring that the Sender put the identity at top of every page? Isn't that more stringent than PSTN FAX and Internet FAX? I thought that a Sender could do that, but that putting it on the first page was sufficient?

6.7 *ippfax-return-uri (uri) operation and Job Description attribute~~Return address~~*

The Sender MAY include this Print-Job operation attribute; the Printer MUST support this operation attribute. This attribute identifies the IPPFAX URI of ~~its~~the Receiver component in every request. ~~It does this with a new IPP print-job and validate-job operation attribute, 'ippfax-return-uri'(URI). A Receiver MUST support this attribute (note that this does not mean it necessarily does anything useful with it).~~ If supplied, then Receiver ~~will~~ MUST use this value to populate the Job's "ippfax-return-uri" (uri) Job Description attribute of the same name.

ISSUE 17: Why do we have this ippfax-return-uri which is the URI of the Receiver? Any IPP client MUST always put this same URI into the "printer-uri" (uri) operation attribute of the Print-Job operation which the IPP/1.1 Printer MUST copy to the "job-printer-uri" Job Description attribute. So I suggest we delete the "ippfax-return-uri" (uri) operation and Job Description attribute.

7 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 ~~'security considerations'~~section 8.

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 ~~commands~~ Cancel-Job, Get-Job-Attributes, and Get-Jobs operations. In a strict IPPFAX implementation, all other IPP/1.1 ~~commands~~ operations are forbidden except if the issuer of the ~~command~~ 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 ~~document~~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~~notifications~~, etc., then it MUST provide a method of restricting available operations for non-authorized clients to the operations specified herein.

7.1 Canceling jobs

It is inappropriate for a Sender to transmit a Document, 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 reject cancel job operations not issued by an administrator targeted at IPPFAX Jobs. (The Receiver can determine that this is an IPPFAX Job by the presence of the mandatory "ippfax-sender-identity" job attribute). The Cancel-Job operation therefore becomes a privileged operation on all IPPFAX Jobs. This is a change to the IPP behavior.

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

ISSUE 18: MUST a Receiver support this restricted form of the Cancel-Job operation or MAY it omit support all together?

7.2 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 MUST restrict the job attributes that any Sender can request for any IPPFAX Job in a Get-Jobs or a Get-Job-Attributes operation to 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

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.

ISSUE 19: MUST a Receiver support this restricted form of the Get-Job-Attributes operation or MAY it omit support all together?

ISSUE 20: MUST a Receiver support this restricted form of the Get-Jobs operation or MAY it omit support all together?

7.3 Job submission

The Sender MUST send IPPFAX Jobs ~~MUST be sent~~ to the Receiver using the Print-Job operation which ~~.~~ ~~The Print-Job operation~~ MUST include the "ippfax-sender-identity" operation attribute.

8 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.

8.1 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.

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

8.2 *ippfax-sending-user-certificate (octetString32k(MAX)) operation/Job Description attribute* ~~*Spoof-proofing*~~

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). ~~The Sending User MAY supply his certificate in the new operation attribute "ippfax-sending-user-certificate"(octetString32k(MAX)).~~ This operation attribute is only valid on the Print-Job and Validate-Job ~~commands~~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 ~~respond with~~ the ~~operation response "status-code" of~~ '~~"~~client-error-ippfax-user-certificate-required'~~"~~ (see section 11.1). If supplied then this attribute MUST contain the TLS certificate as defined by X.509V3[13].

8.3 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.

8.4 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 features). 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 with a '401 not authorized' error code.

ISSUE 21: Which IPP/1.1 status code to use when the IPP Printer is configured to only accept IPPFAX operations and reject other IPP operations: client-error-forbidden (0x0401) or client-error-not-authorized (0x0403)? Here are their IPP/1.1 descriptions:

13.1.4.2 client-error-forbidden (0x0401)

The IPP object understood the request, but is refusing to fulfill it. Additional authentication information or authorization credentials will not help and the request SHOULD NOT be repeated. This status code is commonly used when the IPP object does not wish to reveal exactly why the request has been refused or when no other response is applicable.

13.1.4.4 client-error-not-authorized (0x0403)

The requester is not authorized to perform the request. Additional authentication information or authorization credentials will not help and the request SHOULD NOT be repeated. This status code is used when the IPP object wishes to reveal that the authentication information is understandable, however, the requester is explicitly not authorized to perform the request. This status codes reveals more information than "client-error-forbidden" and "client-error-not-authenticated".

9 Gateways to other systems

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

9.1 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. PSTN FAX.

9.1.1 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. ~~In order that the intermediate gateway SHOULD know where to send the Document the Sender needs to tell the gateway where to send the Document. The Sender SHOULD request the printer description attribute "ippfax-destination-scheme-supported"(1setOf type2 keyword) in order to obtain~~ This attribute identifies the list of ~~Receiver supported~~ URI destination scheme names that the Receiver supports for forwarding Documents to final Destinations. ~~If the Receiver is an Off-ramp then it MUST support this attribute.~~ If ~~this attribute is empty then~~ 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.

9.1.2 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 ~~supplied~~attribute, the Receiver MUST use its value ~~this attribute is used~~ to populate the Job object's "ippfax-destination-uri" (uri) Job Description attribute of the same name. ~~If the Receiver is an Off-ramp then it MUST support "ippfax-destination-uri~~

9.2 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 ~~its final destination~~an IPPFAX Receiver which MAY be either a final destination or an Off-Ramp. IPPFAX has no specific support for on-ramps.

10 Attribute Syntax

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

10.1 '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.

11 New status codes

11.1 'client-error-ippfax-user-certificate-required' (0x00TBD)

The policy of the Receiver is to require that the Sender supply the "ippfax-sending-user-certificate" operation attribute with a valid certificate in the Print-Job and Validate-Job operations, but the client omitted it. This status code MUST be supported if the Receiver requires the Sender to supply a certificate.

ISSUE 22: Why not use the existing IPP/1.1 status code: client-error-not-authenticated (0x0402) for when the client doesn't include a certificate? Here is the complete IPP/1.1 description:

13.1.4.3 client-error-not-authenticated (0x0402)

The request requires user authentication. The IPP client may repeat the request with suitable authentication information. If the request already included authentication information, then this status code indicates that authorization has been refused for those credentials. If this response contains the same challenge as the prior response, and the user agent has already attempted authentication at least once, then the response message may contain relevant diagnostic information. This status codes reveals more information than "client-error-forbidden".

12 Conformance Requirements~~Appendix A: New Attribute Summary~~

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

ISSUE 23: Do the conformance tables look ok?

12.1 Operation Requirements

Table 1 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 1 - Operation Requirements

Operation	IPP/1.1 Printer	IPPFAX Sender	IPPFAX Receiver	Section
Print-Job	MUST	MUST	MUST	6.3
Validate-Job	MUST	MUST??	MUST	6.2
Cancel-Job	MUST	MAY	MUST??	7.1
Get-Job-Attributes	MUST	MAY	MUST??	7.2
Get-Jobs	MUST	MAY	MUST??	7.2
Get-Printer-Attributes	MUST	MUST	MUST	5
Get-Notifications	MAY	MAY	MUST	6.5

Table 2 lists the conformance requirements for ~~The following attributes are~~ Operation attributes on the Print-Job and Validate-Job operations and ~~are also~~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 2 - Print-Job/Validate-Job operation attributes and Job Description attributes

Attribute Name (attribute syntax)	~~Client~~ Sender Conformance in Print-Job	~~Server~~ Receiver Conformance	Section
document-format (mimeMediaType) *	MUST	MUST	See [4]
notification-recipients	MAY	MUST	6.5
ippfax-sending-user-identity (~~octetString32k~~text(MAX))	SHOULD	MUST	5.1
ippfax-receiving-user-identity (~~octetString32k~~text(MAX))	SHOULD	MUST	5.2
ippfax-sending-user-certificate octetString32k(MAX) *	MAY	MUST	8.2
ippfax-sender-identity (name(~~255~~MAX))	MUST	MUST	5.3
ippfax-destination-uri (uri)	MAY	MUST **	9.1.2
ippfax-return-uri (uri)	MAY	MUST	6.7

*This attribute is NOT a Job Description attribute, only an Operation attribute for the Print-Job and Validate-Job operations.

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

Table 3 lists the conformance requirements for Subscription attributes on the Print-Job and Validate-Job operations.

Table 3 - Subscription Template attributes

Attribute Name (attribute syntax)	Sender Conformance in Print-Job	Receiver Conformance	Section
notify-recipient-uri (uri)	MAY *	MUST	6.5
notify-events (1setOf type2 keyword)	MAY	MUST	6.5
notify-attributes (1setOf type2 keyword)	MAY	MAY	6.5
notify-user-data (octetString(63))	MAY	MUST	6.5
notify-charset (charset)	MAY	MUST	6.5
notify-natural-language (naturalLanguage)	MAY	MUST	6.5
notify-lease-duration (integer(0:67108863))	MAY	MUST	6.5
notify-time-interval (integer(0:MAX))	MAY	MUST	6.5

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

Table 4 lists the conformance requirements for ~~The following attributes are~~ Printer Description attributes. The other Printer Description attributes defined in IPP/1.1 [4] or IPP Notifications [16] have the same conformance requirements for IPPFAX.

Table 4 - Printer Description attributes

Attribute Name (attribute syntax)	Sender Conformance for Get-Printer-Attributes	Receiver Conformance	Section
ippfax-receiver-identity (name(255))	MAY	MUST	5.4
ippfax-destination-scheme-supported (1setOf type2 keyword)	MAY	~~SHOULD~~MUST **	9.1.1
ippfax-receiver (integer(0:MAX))	SHOULD	MUST	3.1

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

Table 5 lists the

Table 5 - Notification Events

Event	Sender Conformance for Print-Job	Receiver Conformance	Section
job-complete	MAY	MUST	6.5
job-progress	MAY	MUST	6.5

13 Appendix B: vCard Example

The following ASCII text is a complete vCard 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
```

14 References

[1] Masinter , "Terminology and Goals for Internet Fax", RFC2542

[2] Toyoda, Ohno, Murai, Wing "A Simple Mode of Facsimile Using Internet Mail" RFC2305

[3] Masinter, Wing, "Extended Facsimile Using Internet Mail", RFC2532

[4] deBry, Hastings, Herriot, Isaacson, Powell, "Internet Printing Protocol/1.1: Model and Semantics", RFC2910

[5] Herriot, Butler , Moore, Turner, Wenn. "Internet Printing Protocol/1.1: Encoding and Transport", RFC2911

[6] Hastings, Manros, ,Kugler, Holst, "Internet Printing Protocol/1.1: Implementer's Guide", draft-ietf-ipp-implementers-guide-v11-00.txt

[7] Dierks, Allen "The TLS Protocol Version 1.0", RFC 2246

[8] Bradner, S., "Key words for use in RFCs to Indicate Requirement Level", RFC2119

[9] Franks, Hallam-Baker, Hostetler, Leach, Luotonen,, Sink, Stewart, "An Extension to HTTP: Digest Access Authentication", RFC2069

[10] Dawson, Howes, "vCard MIME Directory Profile", RFC 2426

[11] Hearriot, Kugler Lewis, “The 'ippget' Delivery Method for Event Notifications” , <draft-ietf-ipp-notify-get-02.txt>, April 2, 2001

[12] Haerriot, McDonald, “IPP URL Scheme”, <draft-ietf-ipp-url-scheme-03.txt>, October 2, 2001

[13] X.509

[14] Moore, Pulera, Songer, “TIFF-FX Use By IPP”, April 11, 2001

[15] Moore, P., “IPP Fax transport requirements”, October 16, 2000, ftp://ftp.pwg.org//pub/pwg/QUALDOCS/requirements/ifx-transport-requirements-01.pdf

[16] Isaacson, S., Martin, J., deBry, R., Hastings, T., Shepherd, M., Bergman, R., "Internet Printing Protocol/1.1: IPP Event Notification Specification", <draft-ietf-ipp-not-spec-06.txt>, January 24, 2001.

1315Revision 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.