Subj: IPP Bake Off 2 Issues
From: Peter Zehler, Tom Hastings, and Bob Herriot
File: Issues-raised-at-Bake-Off2.doc
Version: 1.8~~4~~
Date: 5/10~~4/12~~/1999

This version incorporates the discussion on the mailing list and three telecons held 3/24/99, 3/31/99, and 4/7/99 and the New Orleans meeting, 4/14-4/15 and the 4/21/99, 4/28/99, and 5/5/99 telecons on resolving the IPP/1.1 issues raised at Bake Off 2. The revision marks show changes since the 4/12/1999 version. In the suggested text, the revision marks show changes from the existing text in the IPP/1.0 Model and Semantics document (RFC 2566).

~~NOTE: Since the Model and Semantics document and the Encoding and Transport documents are going to cover both IPP/1.0 and IPP/1.1, as agreed at the March IETF meeting, any issue that does not mention IPP/1.0 or IPP/1.1 explicitly means that the resolution applies to BOTH IPP/1.0 and IPP/1.1 in the same way. Only if IPP/1.0 and/or IPP/1.1 is mentioned explicitly is there to be a difference explicitly stated in the resulting IPP/1.1 standards track document that covers both IPP/1.0 (non-standards track) and IPP/1.1 (standards track).~~We've taken the issues that Peter published in the Bake Off 2 Summary and started a separate file. We've add some additional information that we gathered at the Bake Off with the people raising the issues. We've also added to each issue, either a list of "possible alternatives" or a "suggested clarification", "suggested change", or "suggested addition" for the discussion, so that we can reach agreement as soon as possible. Finally, we've added "suggested text" with proposed resolutions. This text is what has been published in the May 10 Internet Draft. Please feel free to add additional alternatives or disagree with our suggested clarifications or additions or suggested text via e-mail so that the group may have the widest possible set of alternatives to choose from. ~~All the additional material is indicated with revision marks from the issues list that Peter Zehler published March 19, 1999.~~

Status of Issues and Summary

This section lists the status of each issue and a brief summary. The next section is the detailed description of the issue and the resolution~~ or alternatives, if the issue is still OPEN~~. Please review this status and the detailed issues to see if you agree or disagree with the status so far. Silence will be interpreted as agreement.

~~Note: These are issues that are to be resolved in the IPP/1.1 documents before forwarding them to the IESG for publication as proposed standards. The IPP/1.0 documents have already been forwarded to the RFC Editor after approval by the IESG for publication as Informational RFCs, so these issues and their resolution will not affect the IPP/1.0 documents.~~

Status codes:

AGREED - agreement ~~on the telecon~~ on the suggested clarification, suggested change, or suggested. Subsequence silence on the DL will be interpreted as agreement. If you disagree, please indicate this to the ipp@pwg.org DL with the subject line containing: "MOD - Issue nn ...", where nn is the Issue number, and ... is the brief description of the issue.

OPEN - ~~still being discussed at future telecons and on the DL~~All 36 issues have been closed.

OPEN issues remaining: ~~2, 17, 30, 31, 32, and 33none~~none.

1) ISSUE: Is 'application/octet-stream REQUIRED?

Suggested change: AGREED - no, change 1.1 back to agree with 1.0.

2) ISSUE: How can client force identified (authenticated) mode?

Possible alternatives: ~~OPEN~~ AGREED - Add a "uri-authentication-supported (1setOf type2 keyword)" REQUIRED Printer Description attribute that identifies the authentication mechanism associated with each URI listed in the "printer-uri-supported" attribute. Also add this attribute as a RECOMMENDED directory schema attribute in the Directory Appendix E.

IIG: Add examples that show using suffixes to the URL to make multiple URLs, when distinct URLs are needed.~~alternatives being discussed: new operation, two URLs, its not a problem. Also relationship to SLP template~~.

3) ISSUE: How reject down stream auto-sensed unsupported PDL?

Suggested addition (similar addition for "compression" in Issue 6): AGREED - add 'unsupported-document-format' and 'document-format-error' job state reasons.

IIG: Add an example showing a PostScript Level 3 job being aborted by a PostScript Level 2 printer.

4) ISSUE: Client (desktop or server) closes slow channel

Suggested clarification (same as Issues 5 and 20): AGREED that client ~~MUST~~ SHOULD NOT close channel, unless ~~user indicates or policy~~the layer that initiated the submission does the close. ~~RAISE on DL explicitly to verify AGREEMENT.~~

IIG: Suggest that a client implementer avoid using synchronous writes, since they automatically close the channel. Use asynchronous writes instead, so that the lower layer doesn't time out the channel.

5) ISSUE: Client (desktop or server) closes stopped device

Suggested clarification (same as Issues 4 and 20): AGREED that client ~~MUST~~ SHOULD NOT close channel, unless user indicates or policy. ~~RAISE on DL explicitly to verify AGREEMENT~~.

IIG: Add examples.

6) ISSUE: What error if wrong compressed data supplied?

Suggested addition (similar addition for document-format in Issue 3; see related Issue 28): AGREED - add 'client-error-compression-error' status code and 'compression-error' and 'unsupported-compression' job state reasons.

7) ISSUE: Please implement Manufacturer make and model printer attribute and send the .INF file model name of the printer.

AGREED - Leave the description of "make" ambiguous in the Model.

Suggested clarification for the IIG: Document what Microsoft does with "printer-make-and-model". Document what any other platform does with this or similar attributes as suggested by participants. ~~OPEN - Recommend that the value contain the vendor name and the model in that order.~~

8) ISSUE: In ~~IPP/1.0~~ Model and Semantics 3.2.6.1, the definition for "limit", "which-jobs" and "my-jobs" is contradicting each other.

Suggested clarification: AGREED - clarify the "limit" limits the number so that the other two don't have to return ALL.

9) ISSUE: Customers become very unhappy when they go to the printer to pick up their job and a ream of PostScript source code is sitting in the output bin.

Suggested clarification: AGREED - clarify that application/octet-stream (auto-sense) can happen at submit time and/or processing time, depending on implementation. If auto-sense detects an unsupported document format at submit time, it returns the 'client-error-document-format-not-supported' error status code and rejects the create request.

10) ISSUE: How distinguish between submit vs processing auto-sense?

Suggested clarification in [ipp-mod] and [ipp-iig]: AGREED - clarify in [ipp-mod] that auto-sense MAY happen at either submit-time and/or processing-time. In IIG explain that with compression, it is much harder to auto-sense at submit time, since some compression methods require processing the entire file. Do NOT add a way for the client to determine whether auto-sensing happens at submit time or processing time.

11) ISSUE: Return what attributes with 'client-error-document-format-not-supported'?

Suggested clarification (see also Issues 18 and 23): AGREED - IPP/1.1 ~~MUST~~ NEED NOT return "document-format=xxx" in Unsupported Attribute Group even though a special error status code, to make this error consistent with the rules for unsupported attributes. ~~Propose to DL explicitly, since not~~

~~many implementations did return the attribute. In IPP/1.1 document say that IPP/1.0 MAY, but NEED NOT.~~

12) ISSUE: length fields for the "UNSUPPORTED" tag

Suggested clarification (same as Issue 15): AGREED - clarify [ipp-mod] to agree with [ipp-pro] that the length MUST be 0 and no value is returned.

13) ISSUE: What job-state value should be returned in the Create-Job response?

Suggested clarification: AGREED - can be 'pending-held', 'pending', or 'processing' (the latter for a non-spooling printer that doesn't implement the 'pending' job state). Add 'job-data-insufficient' job-state-reason for use in any of the three job states if actual ripping or marking cannot begin until sufficient data has arrived.

Suggested clarification to IIG: AGREED - Explain the difference between the two job state reasons 'job-incoming' and 'job-data-insufficient', since both are likely to be meaningful for a spooling server.

14) ISSUE: Job-state for a forwarding server that can't get status from the device or system?

Suggested clarified and addition: AGREED - 'completed' is ok, but also add 'queued-in-device' job state reason which MUST be supported. ~~Bring out on the DL explicitly for confirmation.~~

15) ISSUE: 'unknown' and 'unsupported' Out of band values.

Suggested clarification (same clarification as Issue 12): AGREED - clarify [ipp-mod] to agree with [ipp-pro] that the length MUST be 0 and no value is returned.

16) ISSUE: Get-Printer-Attributes Polling

Suggested clarification in the IIG: AGREED - Add to IIG that clients SHOULD request only the attributes needed, rather than always asking for all.

17) ISSUE: ~~OPEN -~~ Client display of absolute time for job attributes?

Suggested change: Change "time-at-processing (integer(0:MAX))", "time-at-processing (integer(0:MAX))", and "time-at-processing (integer(0:MAX))" Job Description attributes from OPTIONAL to REQUIRED. Change their range from 0:MAX to MIN:MAX so that negative times (or 0) MAY be used to indicate job events that happened before the most recent power-up. REQUIRE the

Printer to reset its "printer-up-time" to 1 on power-up and change all persistent job time attributes to 0 or negative, eliminating the option to keep the uptime monotonically increasing across restarts so that the job attribute event times did not need to be changed. Also add the 'dateTime' as a second attribute syntax that MAY be supported in version 1.1 requests and responses only.

~~Suggested change: AGREED - Change the ranges from (0:MAX) to (MIN:MAX) for the three attributes:~~

~~"time-at-creation (integer(MIN:MAX))"~~
~~"time-at-processing (integer(MIN:MAX))"~~
~~"time-at-completion (integer(MIN:MAX))"~~

~~and clarify that the value can be negative for jobs that are retained across a system reboot, indicating some time in the past.~~

~~Suggested addition: AGREED - Add three OPTIONAL Job Description attributes:~~

~~"date-time-at-creation (dateTime)"~~
~~"date-time-at-processing (dateTime)"~~
~~"date-time-at-completion (dateTime)"~~

~~Possible alternatives: OPEN - carry on discussion on DL to add three new date/time job attributes or add dateTime attribute syntax to the existing job attributes:~~

IIG: Indicate how ~~ISSUE: Make the time job attributes REQUIRED for IPP/1.1?~~ any network printer can get time from NTP Time server. See RFC 1305. Also DHCP option 32 in RFC 2132 returns the IP address of the NTP server.

18) ISSUE: Return all Job Template errors on Print-Job fidelity=true

Suggested clarification (same clarification as Issue 27): AGREED - all unsupported Job Template attributes MUST be returned, not just the first, to agree with June IPP/1.0 draft. (In the November draft this requirement was moved to the IIG, which seems to have been a mistake).

19) ISSUE: User Performing the Send-Document Operation

Suggested clarification: AGREED - same user MUST do Send-Document as did Create-Job. Same security level or higher for subsequent operations on the job. Introduce the terms: "job owner" and "authenticated user".

20) ISSUE: Non-spooling printers accept/reject additional jobs

Suggested clarification (same as Issues 4 and 5): AGREED that IPP object MAY accept an implementation-defined number of subsequent create operations, including NONE. ~~RAISE on DL explicitly to verify AGREEMENT.~~

IIG: Add warning to clients that an IPP Printer MAY either reject subsequent jobs and/or may accept some, but flow control them down.

21) ISSUE: Does 'none' "uri-security-supported" mean Basic/Digest?

Suggested clarification: AGREED - "uri-security-supported" does not cover this kind of HTTP authentication. Also add a note to refer to [ipp-pro] for authentication since some authentication is transport-dependent. And the new "uri-authentication-supported" attribute covers authentication. See Issue 2.

22) ISSUE: Status code on variable-length attributes that are 'too short'

Suggested clarification in the IIG: AGREED - clarify in IIG that no special processing is needed if a client supplied a keyword with 0 length, since the keyword will not match any "xxx-supported" keywords.

23) ISSUE: There seems to be some misunderstanding about the unsupported-attributes group.

Suggested clarification (related to Issues 11 and 18): AGREED - clarify that the IPP object MUST return only requested attributes that are unsupported.

24) ISSUE What status does Get-Jobs return when no jobs?

Suggested clarification: AGREED - MUST return 'successful-ok'.

25) ISSUE - MAY an IPP object return more Operation attributes?

Suggested clarification: AGREED - client MUST process or ignore additional operation attributes returned.

26) ISSUE: MAY an IPP object return additional groups?

Suggested clarification: AGREED - Yes, and a client MUST process or ignore additional attribute groups returned in any order.

27) ISSUE: Return first or all unsupported Job Template attributes in Unsupported Group?

Suggested clarification (same clarification as Issue 18): AGREED - all unsupported Job Template attributes MUST be returned, not just the first, to agree with June IPP/1.0 draft. (In the November draft this requirement was moved to the IIG, which seems to have been a mistake).

28) ISSUE: What if compression is supplied but not supported?

Suggested IPP/1.1 Change (related to Issues 3 and 6): AGREED - ~~CLOSED - propose to the DL explicitly that~~ "compression" and "compression-supported" is REQUIRED for IPP/1.1 (with at least the 'none' value), even though it is OPTIONAL for IPP/1.0. Add the 'client-error-document-format-error' for error detected at request time with a supported document format, such as PostScript Level 3 not supported by a PostScript level 2 printer. Describe the priority between 'client-error-document-format-not-supported', 'client-error-compression-not-supported', 'client-error-document-format-error', and 'client-error-compression-error' status codes. Also add "compression-supported" to the Appendix E on directory schema as a RECOMMENDED attribute.

IIG only: IPP/1.0 implementations SHOULD at least check for the "compression" attribute being present and reject the create request, if they don't support "compression". Not checking is a bug, since the data will be unintelligible.

It was brought up that we need to check what compression HTTP supports and whether that would allow us to drop the "compression" attribute in IPP altogether (or use it only in Print-URI and Send-URI). The HTTP compression would have to work on POST.

29) ISSUE: Should "queued-job-count" be REQUIRED?

Suggested change: ~~CLOSED - propose to the DL explicitly that~~ AGREED - The "queued-job-count" ~~be~~ is REQUIRED for IPP/1.1~~;~~, ~~even though~~ it is a SHOULD ~~for~~ in the IPP/1.0 document.

30) ISSUE: Should "job-state-reasons" and "printer-state-reasons" be REQUIRED ~~in~~ for an IPP/1.1 Printer?

Suggested change: AGREED - The "job-state-reasons" and "printer-state-reasons" will be REQUIRED for IPP/1.1; OPTIONAL in IPP/1.0.~~OPEN - Considering that we tend to put more and more information into the currently OPTIONAL 'job-state-reason' and 'printer-state-reason' attributes, should we make them a MUST for the IPP/1.1 version? Raise on DL explicitly to see if there is agreement. (Discussion in 990324 phone conference).~~

31) ISSUE: How indicate a ripped job that is waiting for the marker?

Suggested addition: ~~OPEN - Three alternatives being pursued~~AGREED - An implementation MAY use any of the following: job stays in 'processing', job moves to 'pending', job moves to 'pending-held' job states. Any of the alternatives MAY use a new '~~interpreted-waiting-to-print~~queued-for-marker' job state

reason to indicate that the job has been ripped but is waiting for the marker in a high end system. The 'pending-held' state is used by systems where the Operator explicitly does a Release-Job to schedule the next job to be marked, while the 'pending' or 'processing' state is used by systems that choose the next job to mark automatically. The 'processing' state is typically used by systems that tend not to have much time between ripping and marking.

Also need to clarify that more than one job can be in the 'processing' state at the same time when some are being ripped while one is being marked.

32) ISSUE: Is Digest REQUIRED for an IPP client and an IPP Printer to support?

Suggested change to Encoding and Transport document: ~~OPEN~~ AGREED -

1) Require an IPP Printer to at least implement either or both of:

a) HTTP Basic over a TLS secured channel (implementing TLS authentication is NOT REQUIRED), OR,
b) the client authentication part of HTTP Digest

2) Require clients to implement at least both of the above.

~~Ask the Area Director whether Digest MUST be supported by an IPP Printer or not.~~

33) ~~OPEN –~~ISSUE: ~~Ok to i~~Include the IPP/1.0 conformance requirements in the IPP/1.1 document?

Suggested change: AGREED - No. The IPP/1.1 Model and Semantics document and the IPP/1.1 Encoding and Transport document will only cover IPP/1.1. They will NOT obsolete the experimental RFC that describes IPP/1.0.

The IPP/1.1 documents will say that for interoperability with IPP/1.0 clients, that an IPP Printer SHOULD accept IPP/1.0 requests and respond with IPP/1.0 responses.

The IPP/1.1 documents will NOT describe IPP/1.0 at all. However, the IPP/1.1 documents will contain an appendix that summarizes each difference from IPP/1.0 by section number and a brief description (see February 1999 I-Ds).

IIG: The IIG will discuss the advantages of a Printer supporting both IPP/1.0 and IPP/1.1 to maximize interoperability with clients. Also discuss the advantage of a client supporting both IPP/1.0 and IPP/1.1 to maximize interoperability with IPP Printers.~~Most conformance requirements are the same for IPP/1.0 and IPP/1.1. For those make no special indication in the document. For those for which the conformance is REQUIRED for IPP/1.1, but OPTIONAL for IPP/1.0, state: "IPP/1.1 xxx MUST ...; OPTIONAL in IPP/1.0", where xxx is either clients or Printers.~~

34) ~~OPEN~~ ISSUE: Ok to REQUIRE "multiple-document-handling if Create-Job is supported?

Suggested change: Allow Create-Job and Send-Document to be supported even when only one document jobs are supported. Add a new "multiple-document-jobs-supported (boolean) Printer Description attribute to indicate whether or not multiple documents are supported.

35) ~~OPEN~~ ISSUE: What error code to return on Print-URI or Send-URI if document not accessible?

Suggested addition: Add both a new 'client-error-document-access-error' status code and a 'document-access-error' value for "job-state-reasons", just like we have done for compression and document format errors for Issue 3, 6, and 28.

36) ISSUE: Don't require 1.0 support and add REQUIRED "version-numbers-supported" attribute

Suggested addition: RECOMMEND, rather than REQUIRE, conforming IPP/1.1 clients and the IPP/1.1 Printers to support IPP/1.0 requests and responses. Therefore, add an "ipp-versions-supported" Printer Description attribute. Also add this attribute as RECOMMENDED in the directory schema list in the Appendix.

Detailed Descriptions of Issues and Resolutions or Alternatives.

1) ISSUE: Is 'application/octet-stream REQUIRED?

Is application/octet-stream REQUIRED. IPP/1.0 appears not to require it, while IPP/1.1 indicates "REQUIRED".

Suggested change:

Change IPP/1.1 Model and Semantics document back to agree with IPP/1.0 not to require support of the 'application/octet-stream' document format.

2) ~~OPEN -~~ ISSUE: How can client force identified mode?

If an IPP Printer supports both authenticated and unauthenticated access, there is no way for a client to force itself to be authenticated, i.e., be in identified mode, since it is the server that forces authentication by issuing a challenge to the client. It is very useful for a client to be able to get into identified mode as soon as possible. Today you have to wait to be challenged by the server, which may never happen – or happens at an unpredictable time. The security conformance requires that the authentication for operations be the same for all operations. So for authenticated Cancel-Job, the Print-Job has to be authenticated as well. We would like to add another operation that forces the server to generate a 401 authentication challenge which the client would submit before submitting the print job in the first place. Unless somebody has a different solution (Microsoft)

Possible alternatives:

1. Add the operation as an OPTIONAL operation to IPP/1.0 and IPP/1.1 that forces the IPP object to issue a challenge to the client.

2. Use two URLs for the same IPP Printer object, one requires authentication and the IPP server always issues a challenge and the other never does. So the client that wants to be authenticated submits requests to the URL that requires authentication. ISSUE: How does the client discover which URL to use, since "uri-security-supported" is about security, not authentication?

3. Use two IPP Printer objects that fan-in to the same device. One IPP Printer object requires authentication and always issues the challenge and the other never does. ISSUE: How does the client discover which IPP Printer to use for authenticated access?

4. Request that the HTTP WG add some kind of header that allows the client to request that the HTTP server issue a challenge. ISSUE: It is unlikely that the HTTP group would do such a thing, since it is not needed for the usual use of HTTP which is to access documents on a server.

5. Some say that it isn't a problem that the client cannot force authentication.

Suggested addition:

Add the following REQUIRED Printer Description attribute (alternative #2 above):

4.4.2 uri-authentication-supported (1setOf type2 keyword)

This REQUIRED Printer attribute MUST have the same cardinality (contain the same number of values) as the "printer-uri-supported" attribute. This attribute identifies the authentication mechanism associated with each URI listed in the "printer-uri-supported" attribute. The Printer object uses the specified mechanism to identify the authenticated user. The "i th" value in "uri-authentication-supported" corresponds to the "i th" value in "printer-uri-supported" and it describes the authentication mechanisms associated with the URI. See [IPP-PRO] for more details on Client Authentication.

The following standard keyword values are defined:

'none': There is no authentication mechanism associated with the URI. The Printer object assumes that the authenticated user is "anonymous".

'requesting-user-name': When a client performs an operation whose target is the associated URI, The Printer object assumes that the authenticated user is specified by the "requesting-user-name" Operation attribute. If this attribute is absent, the Printer object assumes that the authenticated user is "anonymous".

'basic': When a client performs an operation whose target is the associated URI, the Printer object challenges the client with HTTP basic authentication. The Printer object assumes that the authenticated user is the name received via the basic authentication mechanism. ~~This authentication mechanism SHOULD be used with a secure channel, that is, the corresponding value of "uri-security-supported" SHOULD NOT be 'none'.~~

'digest': When a client performs an operation whose target is the associated URI, the Printer object challenges the client with HTTP digest authentication. The Printer object assumes that the authenticated user is the name received via the digest authentication mechanism.

'certificate': When a client performs an operation whose target is the associated URI, the Printer object expects the client to provide a certificate. The Printer object assumes that the authenticated user is the textual name contained within the certificate.

3) ISSUE: How reject down stream auto-sensed unsupported PDL?

If auto-sensing happens AFTER the job is accepted (as opposed to auto-sensing at submit time before returning the response), what does the implementation do?

Presumably, it is similar to encountering a mal-formed PDL. So the implementation aborts the job, puts the job in the 'aborted' state and sets the 'aborted-by-system' value in the job's "job-state-reasons"~~, if supported~~. ~~If the "job-state-reasons" attribute is supported,~~ The 'aborted-by-system' value seems appropriate, but it would be good to have a more specific reason to indicate the reason that the job was aborted by the system.

Suggested addition (similar addition for "compression" in Issue 6):

Add 'unsupported-document-format' as a "job-state-reasons" value for use when the job is aborted because the document format that is auto-sensed is not a supported document format. Also add a 'document-format-error' as a "job-state-reasons" value for use when the job is aborted because any kind of PDL error is encountered while processing the document.

Suggested text:

'unsupported-document-format': The job was aborted by the system because the document-data's document-format is not among those supported by the Printer. If the client specifies the document-format as 'application/octet-stream', the printer MAY abort the job and post this reason even though the format is a member of the "document-format-supported" printer attribute, but not among the auto-sensed document-formats.

'document-format-error': The job was aborted by the system because the Printer encountered an error in the document-data while processing it. If the Printer posts this reason, the document-data has already passed any tests that would have led to the 'unsupported-document-format' job-state-reason.

4) ISSUE: Client (desktop or server) closes slow channel

Some IPP Printer implementations, such as forwarding servers, want to accept an IPP job, even though the down stream channel is being used at the moment by another job stream that the device supports. Rejecting the job would mean that an IPP job might never get in, since these other protocols queue the request.

However, some clients close the channel when it is flowed controlled off for too long a time?

Suggested clarification (same as Issues 5 and 20):

Clarify the IPP/1.1 Model and Semantics document that Clients (desktop or server) ~~MUST~~ SHOULD NOT close the channel when flowed controlled off, unless the layer that initiated the submission does the close. Clients SHOULD do Get-Printer-Attributes and determine state of the device. Alert user if the printer is stopped. Let user decide whether to abort the job transmission or not.

IIG: Suggest that a client implementer avoid using synchronous writes, since they automatically close the channel. Use asynchronous writes instead, so that the lower layer doesn't time out the channel.

Also clarify the IPP/1.1 Model and Semantics document that the following actions are conforming for non-spooling IPP Printer objects: After accepting a create job operation, a non-spooling IPP Printer MAY either:

1. Reject any subsequent create job operations while it is busy transferring and/or processing an accepted job request and return the 'server-error-busy (0x0507).

2. Accept up to some implementation-defined subsequent create job operations and flow control them to prevent buffer overflow. When the implementation-defined number of jobs is exceeded, the IPP Printer MUST return the 'server-error-busy' status code and reject the create job request as in 1 above.

Client (desktop or server) ~~MUST~~ SHOULD NOT close the channel when flow controlled off, unless the layer that initiated the submission does the close. Clients that are rejected with a 'server-error-busy' status code MAY retry periodically, try another IPP Printer, and/or subscribe for a 'ready-for-job' event when we have notification specified.

Clarify that a client may be either in a desktop under control of a user or in a server that accepts some protocol (IPP or other) and uses IPP to controls printers.

Suggested text for section 2.1 IPP Objects:

In this document the term "client" refers to a software entity that sends IPP operation request to an IPP Printer object and accepts IPP operation responses. A client MAY be:

1. contained within software controlled by an end user, e.g. activated by the "Print" menu item in an application and/or

2. a component of a print server that communicates (using IPP operations) with either an output device or another "downstream" print server.

The term "IPP Printer" is a network entity that accepts IPP operation requests and returns IPP operation responses. As such, an IPP object MAY be:

1. (embedded) software that controls a device

2. part of a print server that accepts IPP operation requests and, in turn, sends operation requests using (the IPP or other) protocol to one or more networked device(s).

Suggested text for section 5.1 Client Conformance Requirements:

This section describes the conformance requirements for a client (see section **Error! Reference source not found.**), whether it be:

1. contained within software controlled by an end user, e.g. activated by the "Print" menu item in an application or

2. a component of a print server that communicates (using IPP operations) with either an output device or another "downstream" print server.

While a client is sending data to a printer, it SHOULD do its best to prevent a channel from being closed by a lower layer when the channel is blocked (i.e. flow-controlled off) for whatever reason, e.g. 'out of paper' or 'job ahead hasn't freed up enough memory'. However, the layer that launched the print submission (e.g. an end user) MAY close the channel in order to cancel the job. When a client closes a channel, a Printer MAY print all or part of the received portion of the document. See the "Encoding and Transport" document [IPP-PRO] for more details.

Suggested text for section 5.2 IPP Object Conformance Requirements:

This section specifies the conformance requirements for conforming implementations with respect to objects, operations, and attributes whether they be (1) IPP objects that accept IPP requests and control one or more devices or are embedded in a single device or (2) servers that accept IPP requests and forward them to networked devices (using IPP or other protocol).

5) ISSUE: Client (desktop or server) closes stopped device

When a non-spooling printer is accepting data and putting it on media and runs into a problem, such as paper out or paper jam, what should it do?

Returning an error is not user friendly, if fixing the problem would allow the job to complete normally.

Suggested clarification (same as Issues 4 and 20):

Clarify the IPP/1.1 Model and Semantics document that IPP Printers MUST not return an error status code during a Print-Job operation when a device problem, such as jam or out of paper. Instead, the IPP Printer object flow controls the data off. Otherwise, only a partial job will be produced, when a whole job would be produced when the problem is attended to.

Clients (desktop or server) ~~MUST not~~SHOULD NOT close the channel when flow controlled off, unless the layer that initiated the submission does the close. Clients SHOULD do Get-Printer-Attributes and determine state of the device. Alert user if the printer is stopped. Let user decide whether to abort the job transmission or not.

IIG: Add examples.

Suggested text for section 5.1 Client Conformance Requirements:

While a client is sending data to a printer, it SHOULD do its best to prevent a channel from being closed by a lower layer when the channel is blocked (i.e. flow-controlled off) for whatever reason, e.g. 'out of paper' or 'job ahead hasn't freed up enough memory'. However, the layer that launched the print submission (e.g. an end user) MAY close the channel in order to cancel the job. When a client closes a channel, a Printer MAY print all or part of the received portion of the document. See the "Encoding and Transport" document [IPP-PRO] for more details.

6) ISSUE: What error if wrong compressed data supplied?

Problem: IPP server supports 'deflate' and 'gzip'. If client sets "compression attribute" = 'deflate' but sends gziped data, what error does IPP server return to client? Cannot use the existing 'client-error-attributes-or-values-not-supported' (0x040B). But returning the operation attribute with the value that was sent ('deflate') would be incorrect, because 'deflate' is supported!

Suggested addition (similar addition for document-format in Issue 3; see related Issue 28):

Add a new error status code: 'client-error-compression-error' that the IPP object can return if the compression error is detected before the create job response is returned. Also add 'compression-error' as a "job-state-reason" value for use when the job is aborted because any kind of compression error is detected while decompressing the data after the create job response has been returned to the client.

The new 'client-error-compression-error' (0x0410) status code definition is:

The IPP object is refusing to service the request because the document data cannot be decompressed when using the algorithm specified by the "compression" operation attribute. This error is returned independent of the client-supplied "ipp-attribute-fidelity". The Printer object MUST return this status code, even if there are other attributes that are not supported as well, since this error is a bigger problem than with Job Template attributes.

The suggested new job state reason definitions are:

'unsupported-compression': The job was aborted by the system because the Printer determined while attempting to decompress the document-data's that the compression is actually not among those supported by the Printer.

'compression-error': The job was aborted by the system because the Printer encountered an error in the document-data while decompressing it. If the Printer posts this reason, the document-data has already passed any tests that would have led to the 'document-access-error' or 'unsupported-compression' job-state-reasons.

7) ISSUE: Please implement Manufacturer make and model printer attribute and send the .INF file model name of the printer.

If you do this we will automatically install the correct driver (if we have it) (Microsoft)

Suggested clarification for the IIG:

At the front of the Implementer's Guide, indicate that implementation considerations that relate to particular operating system and NOS will be incorporated as they become known. Add recommendation to the IPP/1.1 Implementer's Guide that printer vendors are encouraged to configure the IPP Printer's "printer-make-and-model" attribute with the make and model name that matches the .INF file on Microsoft platforms. When so configured, the Microsoft driver install program will skip asking the user for the make and model of the printer being installed and use the value of the "printer-make-and-model" attribute.

~~Recommend that the~~ "~~printer-make-and-model~~" ~~value contain the vendor name and the model in that order.~~Do not attempt to clarify the "printer-make-and-model" attribute as to whether it includes a vendor name or not.

8) ISSUE: In IPP/1.0 Model and semantics 3.2.6.1, the definition for "limit", "which-jobs" and "my-jobs" is contradicting each other.

The problem is that the definition for "which-jobs" and "my-jobs" states that "all" jobs MUST be returned, while "limit" restricts the number of jobs to be returned. (Stefan Andersson Axis Communication AB)

Suggested clarification:

Clarify IPP/1.1 Model and Semantics "which-jobs" and "my-jobs" operation attributes to indicate that the number of jobs returned is limited by the "limit" attribute if supplied by the client.

Suggested text for section 3.2.6.2 Get-Jobs Response

In the first sentence add the phrase:

up to the number specified by the "limit" attribute

to give:

The Printer object returns all of the Job objects up to the number specified by the "limit" attribute that match the criteria as defined by the attribute values supplied by the client in the request.

9) ISSUE: Customers become very unhappy when they go to the printer to pick up their job and a ream of PostScript source code is sitting in the output bin.

Cause: A PostScript datastream is accidentally sent to a PCL printer.

IPP Issue: IPP needs to clarify the standard in section 3.2.1.1 of the Model and Semantics document. Lines 1219-1221 defining the "document-format" operation attribute state that:

> If the client does not supply the [document format] attribute, the Printer object assumes that the document data is in the format defined by the Printer object's "document-format-default" attribute.

I would like to see the following clarification:

> If the client does not supply the [document format] attribute and the Printer object is not able to auto-sense the document format at print-job request time, the Printer object assumes that the document data is in the format defined by the Printer object's "document-format-default" attribute.

If the Printer object senses that the document format is PostScript, then job should be rejected if it is being sent to a PCL-only printer. The 'application/octet-stream' mechanism discussed in section 4.1.9 does not seem to be helpful in this case, because it appears to assume that the auto-sensing occurs at document processing time. Until the document is actually "ripped", the document format remains unknown. So it seems to me that lines 2453-2476 do not address the problem described above where the wrong document format is submitted. These lines, rather, seem to apply to the case of a printer that handles multiple document formats and assumes that the submitted document is in one of the supported formats.

Suggested clarification:

Add the suggested clarification that auto-sensing MAY be done at either job-submission time and/or job processing time to the IPP/1.1 Model and Semantics documents.

Suggested text for a new section 4.1.9.1 Application/octet-stream -- Auto-Sensing the document format:

During auto-sensing, a Printer may determine that the document-data has a format that the Printer doesn't recognize. If the Printer determines this problem before returning an operation response, it rejects the request and returns the 'client-error-document-format-not-supported' status code. If the Printer determines this problem after accepting the request and returning an operation response with one of the successful status codes, the Printer adds the 'unsupported-document-format' value to the job's "job-state-reasons" attribute.

10) ISSUE: How distinguish between submit vs processing auto-sense?

There are two different implementations of auto-sensing:

- at print submit time BEFORE the Print-Job or Send-Document responds
- at document processing (ripping) time AFTER the Print-Job or Send-Document has accepted the job and returned the response.

The description of 'application/octet-stream' doesn't clarify whether one, the other or both is meant. How can a client determine which is supported?

Suggested clarification in [ipp-mod] and [ipp-iig]:

Clarify IPP/1.1 Model and Semantics document that 'application/octet-stream' means either auto-sensing at job submission time and/or job processing time depending on implementation. Do NOT add a way for the client to determine whether auto-sensing happens at submit time or processing time.

Add to Implementer's Guide a discussion about the advantages of auto-sensing at job submit time, rather than waiting until job processing time, so that an IPP Printer can reject an unsupported document format instead of accepting the job and then aborting the job sometime later. Also discuss for print by reference that an IPP Printer may want to examine the file, at least the first few octets, in order to check that the document-format is supported. On the other hand, network delays may make such a strategy take too long. Alternatively, the client may want to supply the "document-format" explicitly when doing print-by-reference either using the file extension as a hint, or actually accessing the first few octets of the data an implementing an auto-sensing in the client.

Suggested text for section 4.1.9 mimeMediaType:

One special type is 'application/octet-stream'. If the Printer object supports this value, the Printer object MUST be capable of auto-sensing the format of the document data, either as part of the create operation and/or at document processing time.

11) ISSUE: Return what attributes with document-format-not-supported?

If a server receives a request with a document format which is not supported, it returns the client-error-document-format-not-supported (0x040A) status code. Is it also necessary to include document format in the unsupported attribute group?

We suggest adding text which says it NEED NOT be supplied in the unsupported group.

Suggested clarification (see also Issues 18 and 23):

Clarify IPP/1.1 Model and Semantics document that when returning the 'client-error-document-format-not-supported' in a create response or a Send-Document response, that IPP/1.1 ~~MUST~~ NEED NOT return "document-format=xxx" in Unsupported Attribute Group ~~even though~~since there is a special error status code~~, to make this error consistent with the rules for unsupported attributes~~. ~~In IPP/1.1 document say that IPP/1.0 MAY, but NEED NOT.~~

Suggested clarification for section 13.1.4.11 client-error-document-format-not-supported

13.1.4.11 client-error-document-format-not-supported (0x040A)

The IPP object is refusing to service the request because the document data is in a format, as specified in the "document-format" operation attribute, that is not supported by the Printer object. This error is returned independent of the client-supplied "ipp-attribute-fidelity". The Printer object MUST return this status code, even if there are other Job Template attributes that are not supported as well, since this error is a bigger problem than with Job Template attributes. See section 0. Issue 11

12) ISSUE: length fields for the "UNSUPPORTED" tag

IPP/1.0: Model and Semantics, 16 Nov 1998, 3.2.1.2, Group 2 (unsupported attributes) -- states that in the case of an unsupported attribute name, the printer object should return a substituted out of band value of "unsupported". This impression is strengthened by the reference to section 4.1, where it gives the legal out of band values, none of which is an empty string.

This appears to conflict with Internet Printing Protocol/1.0: Encoding and Transport, 16 Nov 1998, section 3.10, where it states that the value length must be 0 and the value empty. (Claudio Cordova, Wade Mergenthal Xerox Corp.)

Suggested clarification (same as Issue 15):

Clarify the IPP/1.1 Model and Semantics document so that it does not appear to contradict the Encoding and Transport document. However, whether each of the "out-of-band" values are encoded as distinct attribute syntaxes with no value or as a single attribute syntax with a value that indicates which out-of-band value, is purely an encoding matter and cannot be indicated in the Model and Semantics document. Therefore, indicate in the IPP/1.1 Model and Semantics document that the reader is to refer to the IPP/1.1 Encoding and Transport document for the encoding of the out-of-band values.

Suggested text for section 3.1.7:

This value's syntax type is "out-of-band" and its encoding is defined by special rules for "out-of-band" values in the "Encoding and Transport" specification [IPP-PRO]. Its value indicates no support for the attribute itself (see the beginning of section 4.1).

Suggested text for section 4.1:

In addition, the value of an attribute in a response (but not in a request) MAY be one of the "out-of-band" values whose special encoding rules are defined in the "Encoding and Transport" specification [IPP-PRO].

13) ISSUE: What job-state value should be returned in the Create-Job response?

Pending, pending-held, or either depending on implementation?

The problem with 'pending' is that the job is not a "candidate to start processing" as the definition states. The 'pending-held' state seems more reasonable. Its definition is:

> 'pending-held': The job is not a candidate for processing for any number of reasons but will return to the 'pending' state as soon as the reasons are no longer present. The job's "job-state-reason" attribute MUST indicate why the job is no longer a candidate for processing.

Also there is a "job-state-reason" value 'job-incoming' which states:

> 'job-incoming': The Create-Job operation has been accepted by the Printer, but the Printer is expecting additional Send-Document and/or Send-URI operations and/or is accessing/accepting document data.

~~But "job-state-reasons" is OPTIONAL. Do we mandate it or recommend it if supporting Create-Job?~~

Suggested clarification:

Clarify the IPP/1.1 Model and Semantics document that an IPP Printer MAY put the job into the 'pending', 'pending-held', or 'processing' states after a Create-Job, depending on implementation as follows:

- 'pending' - if the job is a candidate for processing whether all of the document data is present or not. Add the 'waiting-for-data' "job-state-reasons" value to the job as an indication why this 'pending' job is not being processed OR

- 'pending-held' - if the job is not a candidate for processing until the last Send-Document or Send-URI operation has been performed with the "last-document" set to 'true' and the document data transferred. Here the implementation SHOULD ~~support~~ set ~~the~~ "~~job-state-reasons~~" ~~and use~~ the 'job-incoming' value of the "job-state-reasons" attribute until the last data has arrived. The IPP Printer removes the 'job-incoming' value when the last data has arrived, and transitions the job from the 'pending-held' to the 'pending' job state OR

- 'processing' - if the IPP Printer is a non-spooling printer that does not implement the 'pending' state, i.e., it either accepts a job and processes it or rejects the job if it already processing a job. However, if a non-spooling printer does accept additional jobs while processing a job, then the additional jobs MUST NOT be put into the 'processing' state immediately. See Issue 20 resolution for non-spooling printers.

Suggested text addition to section 3.2.4 Create-Job operation:

After the Create-Job operation has completed, the value of the "job-state" attribute is similar to the "job-state" after a Print-Job, even though there is no document-data. A Printer MAY set the 'job-data-insufficient' value of the job's "job-state-reason" attribute to indicate that processing cannot begin until sufficient data has arrived and set the "job-state" to either 'pending' or 'pending-held'. A non-spooling printer that doesn't implement the 'pending' job state MAY even set the "job-state" to 'processing', even though there is not yet any data to process.

Suggested text addition to section 4.3.8 job-state-reasons:

Add the 'job-data-insufficient' value to be used with "job-state-reasons" with the following definition:

'job-data-insufficient': The Create-Job operation has been accepted by the Printer, but the Printer is expecting additional document data before it can move the job into the 'processing' state. If a Printer starts ~~printing~~ processing before it has received all data, the Printer removes the 'job-data-insufficient' reason, but the 'job-incoming' remains. If a Printer starts ~~printing~~ processing after it has received all data, the Printer removes the 'job-data-insufficient' reason and the 'job-incoming' at the same time.

Suggested clarification to IIG: AGREED - Explain the difference between the two job state reasons 'job-incoming' and 'job-data-insufficient', since both are likely to be meaningful for a spooling server.

Note: Change the Bake Off 2 bo38.test script so that the 'pending-held', the 'pending', or 'processing' job state is expected after a Create-Job operation.

14) ISSUE: Job-state for a forwarding server?

What job-state value should be returned in the Print-Job response for an IPP object that forwards the data over a one-way interface, such as a parallel port or LPD? pending, processing, completed, or unknown?

Unknown is the strict interpretation of section 4.3.7 "job-state", but it isn't very user friendly. The "job-state" SHOULD reflect the actual job state, but these implementations have no idea when the job actually starts or finishes.

How about a new "job-state-reasons" value: 'queued-in-device' (from PWG Job Monitoring MIB)?

Suggested addition:

Add to the IPP/1.1 Model and Semantics document the 'queued-in-device' value for use with the "job-state-reasons" attribute. REQUIRE that an IPP/1.1 implementation that forwards jobs, but does not have any means to query the state of the down stream job, MUST support the "~~job-state-reasons~~" ~~attribute and~~ the new 'queued-in-device' value of the REQUIRED "job-state-reasons" attribute when returning the job in the 'completed' state. ~~IPP/1.0 implementations of forwarding servers NEED NOT support "job-state-reasons" with the 'queued-in-device' value.~~

Suggested text for section 4.3.7 job-state:

Add the following qualification to the "job-state" description:

Note: As with all other IPP attributes, if the implementation can not determine the correct value for this attribute, it SHOULD respond with the out-of-band value 'unknown' (see section 4.1) rather than try to guess at some possibly incorrect value and give the end user the wrong impression about the state of the Job object. For example, if the implementation is just a gateway into some printing system from which it can normally get status, but temporarily is unable, then the implementation should return the 'unknown' value. However, if the implementation is a gateway to a printing system that never ~~does not~~ provides detailed status about the print job, the implementation MAY set the IPP Job object's state to

'completed', provided that it also sets the 'queued-in-device' value in the job's "job-state-reasons" attribute (see section 4.3.8)~~might literally be 'unknown'~~.

Suggested text for section 4.3.8 job-state-reasons:

'queued-in-device': The job has been forwarded to a device or print system that is unable to send back status. The Printer sets the job's "job-state " attribute to 'completed' and adds the 'queued-in-device' value to the job's "job-state-reasons" attribute to indicate that the Printer has no additional information about the job and never will have any better information.

15) ISSUE: 'unknown' and 'unsupported' Out of band values.

It is very unclear from the spec as to whether or not you should use the word 'unknown' (or unsupported in that case) as the value for attributes that are unknown.

You can read it that you set the length equal to zero and set the type to 'unknown'. You can also read it as saying you set the value to the string 'unknown'.

This is not helped by the Transport and Encoding spec saying – you must set the length to zero and then telling a client what to do with a non-zero length. (Microsoft)

Suggested clarification (same clarification as Issue 12):

Clarify the IPP/1.1 Model and Semantics document so that it does not appear to contradict the Encoding and Transport document. However, whether each of the "out-of-band" values are encoded as distinct attribute syntaxes with no value or as a single attribute syntax with a value that indicates which out-of-band value, is purely an encoding matter and cannot be indicated in the Model and Semantics document. Therefore, indicate in the IPP/1.1 Model and Semantics document that the reader is to refer to the IPP/1.1 Encoding and Transport document for the encoding of the out-of-band values.

Suggested text for section 3.1.7:

This value's syntax type is "out-of-band" and its encoding is defined by special rules for "out-of-band" values in the "Encoding and Transport" specification [IPP-PRO]. Its value indicates no support for the attribute itself (see the beginning of section 4.1).

Suggested text for section 4.1:

In addition, the value of an attribute in a response (but not in a request) MAY be one of the "out-of-band" values whose special encoding rules are defined in the "Encoding and Transport" specification [IPP-PRO].

16) ISSUE: Get-Printer-Attributes Polling

Some client polls printer periodically by Get-Printer-Attributes without specifying "requested-attributes". So printer has to reply all attributes. It consumes printer resource.

Suggested clarification in the IIG:

RECOMMEND in the IPP/1.1 Implementer's Guide that Clients should specify "requested-attributes", if it wants to get just the printer status.

17) ~~OPEN -~~ ISSUE: Client display of absolute time for job attributes?

What are clients doing with printers that don't support absolute time? How can client display an absolute time that a job was submitted, started processing, and completed (which is what is useful for a user)?

Possible Solution

Get Uptime from printer ("printer-up-time" - time system has been up in seconds)

Get Job(s)

Calculate Display time = job tick time ("time-at-xxx" - in seconds that system has been up) – uptime ("printer-up-time") + local client absolute date and time. The down side is that the client has to get the "printer-up-time" every time with a separate Get-Printer-Attributes operation.

Alternatively: Add OPTIONAL job attributes: "date-time-at-creation (dateTime)", "date-time-at-processing (dateTime)", and "date-time-at-completion (dateTime)"

(Microsoft)

Possible alternatives:

~~Clarify that the "time-at-xxx" attributes can be negative if an IPP Printer is re-booted while jobs remain.~~One of the following alternatives:

1. Allow the job time attributes of jobs that persist across power-ups to be negative, so that they could represent the time of an event that happened before the most recent power up: "time-at-creation (integer(MIN:MAX))", "time-at-processing (integer(MIN:MAX))", and "time-at-completion ((MIN:MAX))"

2. Add to the IPP/1.1 Model and Semantics document OPTIONAL job description attributes: "date-time-at-creation (dateTime)", "date-time-at-processing (dateTime)", and "date-time-at-completion (dateTime)".

3. Add to the IPP/1.1 Model and Semantics document OPTIONAL job description attributes: "date-time-at-creation (integer | dateTime)", "date-time-at-processing (integer | dateTime)", and "date-time-at-completion (integer | dateTime)".

4. Instead of adding new job attributes, just add the dateTime attribute syntax as a second choice for the existing job attributes changing them to:

   "time-at-creation (integer | dateTime)", "time-at-processing (integer | dateTime)", and "time-at-completion (integer | dateTime)"

5. Same as 1, but make the job attributes be REQUIRED for IPP/1.1.

6. Same as 2, but make the job attributes be REQUIRED for IPP/1.1, but keep support of the dateTime OPTIONAL.

7. Same as 2, but make the job attributes be REQUIRED for IPP/1.1, and REQUIRE a Printer implementation attempt to get the dateTime from somewhere (person or the network) at startup time. The implementation MUST use the integer form when the date cannot be obtained from a person or the network at startup time.

8. Same as 3~~2~~, but make support of the dateTime REQUIRED for IPP/1.1.

9. Add three new "delta-time-at-xxx(integer)" where the value is the number of seconds in the past that the event occurred. In other words, the server does the subtract of:

    job tick time ("time-at-xxx" - in seconds that system has been up) – uptime ("printer-up-time")

    at query time, so that the client doesn't have to also query the Printer Description "printer-up-time" at all. Then the client just subtracts the value from the client's current local absolute date and time.

10. Return "printer-up-time" (in seconds) as an operation attribute in Get-Jobs and Get-Job-Attributes response.

11. Make the "printer-up-time" Printer Description attribute also be a Job Description attribute. Clients that request the "time-at-xxx" job attributes should also request the "printer-up-time" job attribute, so that they can avoid requesting it using a separate Get-Printer-Attributes request.

12. Add a REQUIRED "job-printer-up-time" Job Description attribute which is a copy of the IPP/1.0 REQUIRED "printer-up-time" Printer Description attribute.

Suggested resolution:

1. ~~Keep~~ Change the range on the 3 "time-at-xxx" job time attributes from ~~as~~ 0:MAX as it is in IPP/1.0 to MIN:MAX:

    time-at-creation(integer(MIN~~0~~:MAX))
    time-at-processing(integer(MIN~~0~~:MAX))
    time-at-completed(integer(MIN~~0~~:MAX))

~~There is no need for negative time~~A negative value indicates an event that happened that many seconds before the most recent power-up of the Printer; a 0 value means that the event occurred at some unspecified time before the printer was powered up most recently. Describe the 0 and negative values once in the time-at-xxx section. ~~Add a forward reference to 4.4.26 printer-up-time about a 0 value meaning the event was before the printer was powered up, since many readers missed the point that the restart problem was already handled in IPP/1.0.~~

2. ~~Keep~~ Change the current section 4.4.26 printer-up-time(integer(1:MAX)) ~~as it is in IPP/1.0~~ with respect to restarts. Eliminate the IPP/1.0 Printer option to NOT reset the "printer-up-time" on power-up. REQUIRE IPP/1.1 Printer's to reset the "printer-up-time" to 1 on power-up. Then this attribute tracks the MIB-II sysUpTime attribute and the Printer MIB prtAlertTime (except "printer-up-time" is in seconds, instead of 100th of a second). In order to solve the problem of time attributes for jobs that persist across the power-up, either the implementation MUST:

~~(a) knows that it was restarted and so the value on the restart is greater than it was in the printer's former life or~~(a) return "time-at-xxx" Job time attributes using the dateTime form or

(b) ~~the Printer sets its "printer-up-time" to 1 and~~ reset~~s~~ the "time-at-xxx" Job time attributes for any persistent jobs back to 0 to indicate that the event took place sometime before the most recent power-up or to a negative value that represents the number of seconds before the most recent power-up that the event took place~~.~~

3. Problem: Make it easier for clients to get clock time for job events, make it easier for clients to correlate job events with notifications which need to use date and time (since there may not be intermediate servers to translate relative tick time to absolute date/time), allow the Printer to not have to adjust the time attribute values of all the persistent jobs on power-up, avoid the need for intermediate IPP servers to translate relative tick time as responses are cascaded back to original client.

Solution: add a dateTime attribute syntax choice to the three (now REQUIRED) job time attributes, so that they become:

time-at-creation(integer(MIN~~0~~:MAX) | dateTime)
time-at-processing(integer(MIN~~0~~:MAX) | dateTime)
time-at-completed(integer(MIN~~0~~:MAX) | dateTime)

Thus the value returned is either the value of the Printer's REQUIRED "printer-up-time(integer)" or the Printer's "printer-current-time(dateTime)" when the event occurred, depending on implementation. Now the client simply requests these attributes and deal with which ever value it gets back.

For compatibility with IPP/1.0, indicate that an IPP/1.1 Printer MUST return the integer value if the version number of the request is '1.0'.

Clarify that the date and time does not have to be very accurate. The time does not have to be that precise in order to work in practice.

If an implementation cannot get the dateTime, that it MUST return the integer value that corresponds with its REQUIRED "printer-up-time(integer)", rather than returning the out-of-band 'no-value' value that corresponds to its OPTIONAL "printer-current-time(dateTime)".

4. To solve the problem of the client having to make two trips to the printer when displaying jobs:

first to get the "time-at-xxx" job attributes with Get-Jobs or Get-Job-Attributes, and

second to get the "printer-up-time" with Get-Printer-Attributes,

we'll add a REQUIRED job attribute:

job-printer-up-time(integer(1:MAX))

which is ~~a copy~~an alias of the Printer's "printer-up-time(integer(1:MAX))".

5. To help clients being able to depend on getting time, change the 3 "time-at-xxx(integer)" job time attributes from OPTIONAL to REQUIRED. This shouldn't be a burden, since the corresponding printer attribute: "printer-up-time" is already REQUIRED in IPP/1.0. Also the draft Printer MIB and MIB-II require that a device have a clock tick capability.

6. Clarify that if an implementation supports the OPTIONAL "printer-current-time(dateTime)" attribute by getting the time from some source such as the network or an operator, but was unable to, that it MUST return the out-of-band 'no-value' which means not configured (yet). See the beginning of section 4.1 in the Model.

7. Clarify that the time zone NEED NOT be that used by people in the vicinity of the Printer or device and that clients SHOULD convert dateTime attributes to the time zone of the client before display to the user.

IIG: Describe some of the many ways that implementations can get the date and time:

1. Any network printer can get time from NTP Time server. See RFC 1305. Also DHCP option 32 in RFC 2132 returns the IP address of the NTP server.
2. Get the date and time at startup from a human operator
3. Have an operator set the date and time using a web administrative interface
4. Get the date and time from incoming HTTP requests, though the problems of spoofing need to be considered. Perhaps comparing several HTTP requests could reduce the chances of spoofing.
5. Internal date time clock battery driven.
6. Query "http://tycho.usno.navy.mil/cgi-bin/timer.pl"

~~7.Include a GPS module???~~

Suggested text:

Group the three "time-at-xxx" Job Description time attributes into a single section so that the common semantics can be said once: ~~Add the following sentence to each of the "time-at-xxx" Job Description attributes:~~

4.3.12 Event Time Job Description Attributes

This section defines the Job Description attributes that indicate the time at which certain events occur for a job. The attribute syntax MUST be either 'integer' or 'dateTime' for any response in which the "version-number" parameter is supplied as '1.1', but MUST be an 'integer' for any response in which the "version-number" parameter is supplied as '1.0', for compatibility with IPP/1.0 [RFC2566]. See section **Error! Reference source not found.**.

In order to populate these Event Time Job Description Attributes, the Printer object copies either:

1. the value in its "printer-current-time" attribute for the 'dateTime' value at the time the event occurred if the printer supports the attribute "printer-current-time" and its value is not the out-of-band 'no-value' value,
2. the value in its "printer-up-time" attribute for the 'integer' value at the time the event occurred otherwise

Note: because the time MAY become known to the Printer some time after power-up, a client could receive jobs that contain some Event Time Job Description Attributes that use the 'integer' time tick representation while the later events use the 'dateTime' date/time representation.

If the Printer implementation keeps jobs persistently across power cycles, then an implementation MUST reset its "printer-up-time" attribute to 1 on each power-up. In addition, an implementation that uses the 'integer' form MUST change all of its Event Time Job Description attributes for those persistent jobs either:

1. to 0 to indicate that the event happened before the most recent power up

2. to the negative of the number of seconds before the most recent power-up that the event took place, though the negative number NEED NOT reflect the exact number of seconds~~.~~

An implementation that uses the 'dateTime' form does not change the values of any of its Event Time Job Description Attributes for persistent jobs on power-up.

4.3.12.1 time-at-creation (integer(MIN~~0~~:MAX))

This REQUIRED attribute indicates the ~~point in~~ time at which the Job object was created. ~~In order to populate this attribute, the Printer object uses the value in its "printer-up-time" attribute at the time the Job object is created.~~

4.3.12.2 time-at-processing (integer(MIN~~0~~:MAX))

This REQUIRED attribute indicates the ~~point in~~ time at which the Job object began processing. The out-of-band 'no-value' value is returned if the job has not yet been in the 'processing' state (see the beginning of Section 4.1).~~In order to populate this attribute, the Printer object uses the value in its "printer-up-time" attribute at the time the Job object is moved into the 'processing' state for the first time.~~

4.3.12.3 time-at-completed (integer(MIN~~0~~:MAX))

This REQUIRED attribute indicates the ~~point in~~ time at which the Job object completed (or was cancelled or aborted). The out-of-band 'no-value' value is returned if the job has not yet completed, been canceled, or aborted (see the beginning of Section 4.1).~~In order to populate this attribute, the Printer object uses the value in its "printer-up-time" attribute at the time the Job object is moved into the 'completed' or 'canceled' or 'aborted' state.~~

4.3.12.4 job-printer-up-time(integer(1:MAX))

This REQUIRED Job Description attribute indicates the amount of time (in seconds) that the Printer implementation has been up and running. This attribute is an alias for the "printer-up-time" Printer Description attribute (see Section 4.4.27).

Note: A client MAY request this attribute in a Get-Job-Attributes or Get-Jobs request and use the value returned in combination with other requested Event Time Job Description Attributes in order to display time attributes to a user. The difference between this attribute and the integer value of a "time-at-xxx" attribute is the number of seconds ago that the "time-at-xxx" event occurred. A client can compute the

wall-clock time at which the "time-at-xxx" event occurred by subtracting this difference from the client's wall-clock time.

Suggested text for section 4.4.27 printer-current-time

4.4.27 printer-up-time (integer(1:MAX))

This REQUIRED Printer attribute indicates the amount of time (in seconds) that this Printer instance ~~of this Printer implementation~~ has been up and running. The value is a monotonically increasing value starting from 1 when the Printer object is started-up (initialized, booted, etc.). This value or the value of "printer-current-time" is used to populate the Job attributes "time-at-creation", "time-at-processing", and "time-at-completed", depending on implementation (see Section 4.3.12). ~~These time values are all measured in seconds and all have meaning only relative to this attribute, "printer-up-time". The value is a monotonically increasing value starting from 1 when the Printer object is started-up (initialized, booted, etc.).~~

If the Printer object software ceases running~~goes down at some value 'n',~~ and ~~comes back up~~restarts without knowing the last value for "printer-up-time", the implementation ~~MAY~~MUST reset this value to 1. However, if the device or devices that the Printer object is representing are restarted or power cycled, the Printer object MAY continue counting this value or MAY reset this value to 1 depending on implementation. If this value is reset and the implementation has persistent jobs and the Event Time Job Description Attributes are represented using the 'integer' form (instead of the 'dateTime' form), they MUST be reset according to Section 4.3.13~~:~~

~~1. Know how long it has been down, and resume at some value greater than 'n', or~~
~~2. Restart from 1.~~

~~In the first case, the Printer SHOULD not tweak any existing related Job attributes ("time-at-creation", "time-at-processing", and "time-at-completed"). In the second case, the Printer object SHOULD reset those attributes to 0. If a client queries a time-related Job attribute and finds the value to be 0, the client MUST assume that the Job was submitted in some life other than the Printer's current life. An implementation MAY use both cases, depending on warm versus cold start, respectively.~~

Suggested text for section 4.4.28 printer-current-time:

4.4.28 printer-current-time (dateTime)

This Printer attribute indicates the current ~~absolute~~ wall-clock time. This value or the value of "printer-uptime-time" is used to populate the Job attributes "time-at-creation", "time-at-processing", and "time-at-completed", depending on implementation (see Section 4.3.12). ~~If an implementation supports this attribute, then a client could calculate the absolute wall-clock time each Job's "time-at-creation", "time-at-processing", and "time-at-completed" attributes by using both "printer-up-time" and this attribute, "printer-current-time". If an implementation does not support this attribute, a client can only calculate the relative time of certain events based on the REQUIRED "printer-up-time" attribute.~~

The date and time is obtained on a "best efforts basis" and does not have to be that precise in order to work in practice. A Printer implementation sets the value of this attribute by obtaining the date and time

via some implementation-dependent means, such as getting the value from a network time server, initialization at time of manufacture, or setting by an administrator. See [ipp-iig] for examples. If an implementation supports this attribute and the implementation knows that it has not yet been set to a correct value, then the implementation MUST return the value of this attribute using the out-of-band 'no-value' meaning not configured. See the beginning of section 4.1.

The time zone of this attribute NEED NOT be the time zone used by people located near the Printer object or device. The client MUST NOT expect that the time zone of any received 'dateTime' value to be in the time zone of the client or in the time zone of the people located near the printer.

The client SHOULD display any dateTime attributes to the user in client local time by converting the 'dateTime' value returned by the server to the time zone of the client, rather than using the time zone returned by the Printer in attributes that use the 'dateTime' attribute syntax.

18) ISSUE: Return all Job Template errors on Print-Job fidelity=true

If ipp-attributes-fidelity=true, MUST all Job Template attributes that are not supported, be returned, or can just the first error be returned? Section 16.3 and 16.4 of the Model and Semantics document was moved to the Implementer's Guide when creating the November 1998 draft from the June 1998 draft. The following note was contained in section 16.4 that was moved:

Note: whether the request is accepted or rejected is determined by the value of the "ipp-attribute-fidelity" attribute in a subsequent step, so that all Job Template attribute supplied are examined and all unsupported attributes and/or values are copied to the Unsupported Attributes response group.

Suggested clarification (same clarification as Issue 27):

Clarify in the IPP/1.1 Model and Semantics document that all operation attributes and all Job Template attributes MUST be returned in the Unsupported Attributes group, unless there is a specific error status for the unsupported operation attribute, such as: server-error-version-not-supported, server-error-operation-not-supported, client-error-charset-not-supported, client-error-compression-not-supported, client-error-document-format-not-supported, and client-error-uri-scheme-not-supported'~~client-error-document-not-supported~~'.

Suggested text for section 3.1.6 Status Codes and a new section 3.1.7:

If the Printer performs an operation with no errors and it encounters no problems, it MUST return the status code 'successful-ok' in the response. See section 14.

If the client supplies unsupported values for the following parameters or Operation attributes, the Printer object MUST reject the operation, NEED NOT return the unsupported attribute value in the Unsupported Attributes group, and MUST return the indicated status code:

Parameter/Attribute	Status code
version-number	server-error-version-not-supported
operation-id	server-error-operation-not-supported
attributes-charset	client-error-charset-not-supported

compression	client-error-compression-not-supported
document-format	client-error-document-format-not-supported
document-uri	client-error-uri-scheme-not-supported, client-error-document-access-error

If the client supplies unsupported values for other attributes, or unsupported attributes, the Printer returns the status code defined in the next section on Unsupported Attributes.

3.1.7 Unsupported Attributes

The Unsupported Attributes group contains attributes that are not supported by the operation. This group is primarily for the job creation operations, but all operations can return this group.

A Printer object MUST include an Unsupported Attributes group in a response if the status code is one of the following: 'successful-ok-ignored-or-substituted-attributes', 'successful-ok-conflicting-attributes', 'client-error-attributes-or-values-not-supported' or 'client-error-conflicting-attributes'.

If the status code is one of the four specified in the preceding paragraph, the Unsupported Attributes group MUST contain all of those attributes and only those attributes that are:

a) an Operation or Job Template attribute supplied in the request, and

b) unsupported by the printer. See below for details on the three categories "unsupported" attributes. Issues 18, 23, and 27

19) ISSUE: User Performing the Send-Document Operation

The Send-Document and Send-URI commands need the following clarification with regard to the user performing the operation. In the requesting-user-name section of Send-Document add:

> The user performing the Send-Document operation must be the same as for the Create- Job operation that created the job. The printer determines the user performing the operation from the requesting-user-name or the underlying authentication mechanism as described in Section 8.3 of the model document.

The wording in the Send-URI section would imply that the above change applies to Send-URI as well.

Suggested clarification:

Add the suggested clarification to the IPP/1.1 Model and Semantics document. Introduce the terms: "job owner" and "authenticated user". The new text for section 8.3 is:

8.3 URIs for each authentication mechanisms

Each URI has an authentication mechanism associated with it. If the URI is the ith element of "printer-uri-supported", then authentication mechanism is the "i th" element of "uri-authentication-supported". For a list of possible authentication mechanisms, see section 4.4.2.

The Printer object uses an authentication mechanism to determine the name of the user performing an operation. This user is called the "authenticated user". The credibility of authentication depends on the mechanism that the Printer uses to obtain the user's name. When the authentication mechanism is 'none', all authenticated users are "anonymous".

During job creation operations, the Printer initializes the value of the "job-originating-user-name" attribute to be the authenticated user. The authenticated user is this case is called the "job-owner".

If an implementation can be configured to support more than one authentication mechanism, then it MUST implement rules for determining equality of authenticated user names which have been authenticated via different authentication mechanisms. One possible policy is that identical names that are authenticated via different mechanism are different. For example, a user can cancel his job only if he uses the same authentication mechanism for both Cancel-Job and Print-Job. Another policy is that identical names that are authenticated via different mechanism are the same if the authentication mechanism for the later operation is not less strong than the authentication mechanism for the earlier job creation operation. For example, a user can cancel his job only if he uses the same or stronger authentication mechanism for Cancel-Job and Print-Job. With this second policy a job submitted via 'requesting-user-name' authentication could be cancelled via 'digest' authentication. With the first policy, the job could not be cancelled in this way.

A client is able to determine the authentication mechanism used to create a job. It is the ith value of the Printer's "uri-authentication-supported" attribute, where i is the index of the element of the Printer's "uri-printer-supported" attribute equal to the job's "job-printer-uri" attribute.

which replaces the following text:

8.3 The "requesting-user-name" (name(MAX)) Operation attribute

Each operation MUST specify the user who is performing the operation in both of the following two ways:

1) via the REQUIRED "requesting-user-name" operation attribute that a client SHOULD supply in all operations. The client MUST obtain the value for this attribute from an environmental or network login name for the user, rather than allowing the user to supply any value. If the client does not supply a value for "requesting-user-name", the printer MUST assume that the client is supplying some anonymous name, such as "anonymous".
2) via an authentication mechanism of the underlying transport which may be configured to give no authentication information.

There are six cases to consider:

a) the authentication mechanism gives no information, and the client doesn't specify "requesting-user-name".
b) the authentication mechanism gives no information, but the client specifies "requesting-user-name".
c) the authentication mechanism specifies a user which has no human readable representation, and the client doesn't specify "requesting-user-name".
d) the authentication mechanism specifies a user which has no human readable representation, but the client specifies "requesting-user-name".

e) the authentication mechanism specifies a user which has a human readable representation. The Printer object ignores the "requesting-user-name".

f) the authentication mechanism specifies a user who is trusted and whose name means that the value of the "requesting-user-name", which MUST be present, is treated as the authenticated name.

Note: Case "f" is intended for a tightly coupled gateway and server to work together so that the "user" name is able to be that of the gateway client and not that of the gateway. Because most, if not all, system vendors will initially implement IPP via a gateway into their existing print system, this mechanism is necessary unless the authentication mechanism allows a gateway (client) to act on behalf of some other client.

The user-name has two forms:

- one that is human readable: it is held in the REQUIRED "job-originating-user-name" Job Description attribute which is set during the job creation operations. It is used for presentation only, such as returning in queries or printing on start sheets
- one for authorization: it is held in an undefined (by IPP) Job object attribute which is set by the job creation operation. It is used to authorize other operations, such as Send-Document, Send-URI, Cancel-Job, to determine the user when the "my-jobs" attribute is specified with Get-Jobs, and to limit what attributes and values to return with Get-Job-Attributes and Get-Jobs.

The human readable user name:

- is the value of the "requesting-user-name" for cases b, d and f.
- comes from the authentication mechanism for case e
- is some anonymous name, such as "anonymous" for cases a and c.

The user name used for authorization:

- is the value of the "requesting-user-name" for cases b and f.
- comes from the authentication mechanism for cases c, d and e
- is some anonymous name, such as "anonymous" for case a.

The essence of these rules for resolving conflicting sources of user-names is that a printer implementation is free to pick either source as long as it achieves consistent results. That is, if a user uses the same path for a series of requests, the requests MUST appear to come from the same user from the standpoint of both the human-readable user name and the user name for authorization. This rule MUST continue to apply even if a request could be authenticated by two or more mechanisms. It doesn't matter which of several authentication mechanisms a Printer uses as long as it achieves consistent results. If a client uses more than one authentication mechanism, it is recommended that an administrator make all credentials resolve to the same user and user-name as much as possible.

20) ISSUE: Non-spooling printers accept/reject additional jobs

Some IPP Printer implementations reject a second Print-Job (or Create-Job) while they are processing a Print-Job. Other IPP Printer implementations, such as forwarding servers and non-spooling printers, accept some number of subsequent jobs, but flow control them off until the first job is finished.

Suggested clarification (same as Issues 4 and 5):

Also clarify the IPP/1.1 Model and Semantics document that the following actions are conforming for non-spooling IPP Printer objects: After accepting a create job operation, a non-spooling IPP Printer MAY either:

- Reject any subsequent create job operations while it is busy transferring and/or processing an accepted job request and return the 'server-error-busy (0x0507).

- Accept up to some implementation-defined subsequent create job operations and flow control them to prevent buffer overflow. When the implementation-defined number of jobs is exceeded, the IPP Printer MUST return the 'server-error-busy' status code and reject the create job request as in 1 above.

Client (desktop or server) ~~MUST~~ SHOULD NOT close the channel when flow controlled off, unless the layer that initiated the submission does the close. Clients that are rejected with a 'server-error-busy' status code MAY retry periodically, try another IPP Printer, and/or subscribe for a 'ready-for-job' event when we have notification specified.

IIG: Suggest that a client implementer avoid using synchronous writes, since they automatically close the channel. Use asynchronous writes instead, so that the lower layer doesn't time out the channel.

Suggested text for section 3.1.9 Job Creation Operations:

At job submission time, a Printer object, especially a non-spooling Printer, MAY accept jobs that it does not have enough space for. In such a situation, a Printer object MAY stop reading data from a client for an indefinite period of time. A client MUST be prepared for a write operation to block for an indefinite period of time (See section 5.1 on client conformance).

When a Printer object has too little space for starting a new job, it MAY reject a new create request. In this case, a Printer object MUST return a response (in reply to the rejected request) with a status-code of 'server-error-busy' (See section 14.1.5.8) and it MAY close the connection before receiving all bytes of the operation. When receiving a 'server-error-busy' status-code in an operation response, a client MUST be prepared for the Printer object to close the connection before the client has sent all of the data (especially for the Print-Job operation). A client MUST be prepared to keep submitting a create request until the IPP Printer object accepts the create request.

Suggested text for section 5.1 Client Conformance Requirements:

While a client is sending data to a printer, it SHOULD do its best to prevent a channel from being closed by a lower layer when the channel is blocked (i.e. flow-controlled off) for whatever reason, e.g. 'out of paper' or 'job ahead hasn't freed up enough memory'. However, the layer that launched the print submission (e.g. an end user) MAY close the channel in order to cancel the job. When a client closes a channel, a Printer MAY print all or part of the received portion of the document. See the "Encoding and Transport" document [IPP-PRO] for more details.

21) ISSUE: Does 'none' "uri-security-supported" mean Basic/Digest?

Section 4.4.2 "uri-security-supported" 'none' values says:

'none': There are no secure communication channel protocols in use for the given URI.

Should be clarified that the REQUIRED Basic and Digest are intended for the 'none' value. (Hugo Parra)

Suggested clarification:

Instead, clarify that the "uri-security-supported" is only referring to the privacy part of security, not the authentication part, such as HTTP Basic and Digest authentication. Add a note to both the "uri-security-supported" attribute and Section 5.4 on Security Conformance Requirements in the IPP/1.1 Model and Semantics that authentication conformance requirements are specific to a transport, such as HTTP Basic and Digest, and are specified in the Encoding and Transport [ipp-pro] document.

Suggested text for (new) section 4.4.2 "uri-authentication-supported":

'basic': When a client performs an operation whose target is the associated URI, the Printer object challenges the client with HTTP basic authentication. The Printer object assumes that the authenticated user is the name received via the basic authentication mechanism. This authentication mechanism SHOULD be used with a secure channel, that is, the corresponding value of "uri-security-supported" SHOULD NOT be 'none'.

Suggested text for section 4.4.3 "uri-security-supported":

This attribute is orthogonal to the specification of a client authentication mechanism. Specifically, 'none' does not exclude client authentication. See section 4.4.2.

22) ISSUE: Status code on variable-length attributes that are 'too short'

IPP defines a status code 'client-error-request-value-too-long' for a variable-length attribute that exceeds the maximum length allowed by the attribute. However, it is not clear what status code to use in the opposite case, i.e. the supplied attribute value is shorter than the requirement. In the current spec, this problem will arise when a 0-length value is supplied in 'keyword' attributes. In this case, should the request be rejected with status code 'client-error-request-value-too-long' or 'client-error-bad-request'?

Furthermore, if "ipp-attribute-fidelity" is 'false', should the request be rejected at all? (Jason Chien-Hung Chen)

Suggested clarification in the IIG:

No special status code is needed and no special action is needed by the IPP object. Since this is a keyword, its value needs to be compared with the supported values. Assuming that the printer doesn't have any values in its corresponding "xxx-supported" attribute that are keywords of zero length, the comparison will fail. Then the request will be accepted or rejected depending on the value of "ipp-attributes-fidelity" being 'false' or 'true', respectively. No change to the [ipp-mod]. Indicate this handling of too short keywords in the IIG. All other variable length attribute syntaxes have a minimum greater than 0.

23) ISSUE: There seems to be some misunderstanding about the unsupported-attributes group.

Some implementations return all the attributes that are in the spec that their implementation does not support in the Unsupported Attributes group on a get-attributes operation, independent of the attributes that were actually requested. The unsupported-attributes presumably contains all the attributes the implementation knows about but does not support. I do not believe this is the proper use of the unsupported-attributes group. Do we need a clarification in the specification.

Suggested clarification (related to Issues 11 and 18):

Clarify IPP/1.1 Model and Semantics document that only attributes (operation, Job Template, ...) supplied in the request by the client that the IPP object does not support are returned in the Unsupported Attributes group, not all attributes that the implementation doesn't support.

Suggested text for section 3.1.3 Attributes:

The Unsupported Attribute group is defined for all operation responses for returning unsupported attributes that the client supplied in the request.

Suggested text for (new) section 3.1.7 Unsupported Attributes:

See Issue 18.

24) ISSUE What status does Get-Jobs return when no jobs?

Should Get-Jobs return 'successful-ok' when there are no jobs to be returned? The client can see that the Jobs group contains no jobs from the response. Returning an error may confuse the client. Some implementations returned 'client-error-not-found' error code.

Suggested clarification:

Clarify IPP/1.1 Model and Semantics document that the IPP Printer MUST return 'successful-ok' even when there are no jobs to return. The operation is successful and the client will see that there are no returned jobs.

Suggested text for section 3.2.6.2 Get-Jobs Response:

It is not an error for the Printer to return 0 jobs. If the response returns 0 jobs because there are no jobs matching the criteria, and the request would have returned 1 or more jobs with a status code of 'successful-ok' if there had been jobs matching the criteria, then the status code for 0 jobs MUST be 'successful-ok'.

25) ISSUE - MAY an IPP object return more Operation attributes?

Is it ok for an IPP object to return additional operation attributes in a response (as an extension to the standard)? If so, then the client MUST ignore or do something with them. (Hugo Parra)

Suggested clarification:

Clarify IPP/1.1 Model and Semantics document that the client MUST ignore or do something with additional operation attributes returned than are in the IPP/1.1 Model and Semantics specification.

Suggested text for section 5.1 Client Conformance:

A ~~query~~ response MAY contain attribute groups, attributes, and values that the client does not expect. Therefore, a client implementation MUST gracefully handle such responses and not refuse to inter-operate with a conforming Printer that is returning registered or private extensions, including attribute groups, attributes, and attribute values that conform to Section 6. Clients may choose to ignore any parameters, attributes, or values that they do not understand.

26) ISSUE: MAY an IPP object return additional groups?

It is ok for an IPP object to return additional groups of attributes in a response (as an extension to the standard)? For example, returning the "job-state" and "job-state-reasons" in a Hold-Job, Release-Job, and/or Cancel-Job operation. What about newly registered groups of attributes. If so, then the client MUST ignore or do something with them. (Hugo Parra)

Suggested clarification:

Clarify IPP/1.1 Model and Semantics document that the client MUST ignore or do something with additional attribute groups returned than are in the IPP/1.1 Model and Semantics specification. Also clarify that these additional groups MAY occur in any position.

Suggested text for section 5.2.2 Operations:

Conforming IPP objects MAY return operation responses that contain attributes groups, attributes name and attribute values that are extensions to this standard. The additional attribute groups MAY occur in any order.

27) ISSUE: Return first or all unsupported attributes in Unsupported Group?

Section 16.3 and 16.4 of the Model and Semantics document was moved to the Implementer's Guide when creating the November 1998 draft from the June 1998 draft. The following note was contained in section 16.4 that was moved:

Note: whether the request is accepted or rejected is determined by the value of the "ipp-attribute-fidelity" attribute in a subsequent step, so that all Job Template attribute supplied are examined and all unsupported attributes and/or values are copied to the Unsupported Attributes response group.

Suggested clarification (same clarification as Issue 18):

Clarify in the IPP/1.1 Model and Semantics document that all operation attributes and all Job Template attributes MUST be returned in the Unsupported Attributes group, unless there is a specific error status for the unsupported operation attribute, such as: server-error-version-not-supported, server-error-

operation-not-supported, client-error-charset-not-supported, client-error-compression-not-supported, client-error-document-format-not-supported, and client-error-uri-scheme-not-supported.

Suggested text:

See Issue 18.

28) ISSUE: What if compression is supplied but not supported?

The "compression" operation attribute is an OPTIONAL attribute for a Printer object to support in a create operation. However, if a client supplies the "compression" attribute, but the IPP object doesn't support the attribute at all, the Printer might attempt to print data it doesn't understand, because it is compressed. In order to prevent this error, the "compression" operation attribute should have been REQUIRED.

Possible Alternatives (related to Issues 3 and 6):

1. Clarify that an IPP object MUST reject a request that supplies a "compression" operation attribute, if the IPP object does not support the "compression" attribute at all. As with any such error, the IPP object copies the "compression" attribute to the Unsupported Attribute Group setting the value to the out-of-band 'unsupported' value and returns the "client-error-attributes-or-values-not-supported" status code. The IPP object MAY reject the request, even if the client supplies the 'none' value, since the IPP Printer does not have a corresponding "compression-supported" attribute.

2. Add a 'client-error-compression-not-supported' error status code. Require IPP Printer's to support this error code if they do not support the "compression" operation attribute.

3. Change IPP/1.1 Model and Semantics conformance requirement for the "compression" and "compression-supported" attributes from OPTIONAL to REQUIRED.

Suggested change:

Suggested IPP/1.1 Change (related to Issues 3 and 6): REQUIRE that IPP/1.1 implementations MUST support "compression" and "compression-supported" (with at least the 'none' value), even though it is OPTIONAL for IPP/1.0.

Add the 'client-error-document-format-error' for error detected at request time with a supported document format, such as PostScript Level 3 not supported by a PostScript level 2 printer. Describe the priority between 'client-error-document-format-not-supported', 'client-error-compression-not-supported', 'client-error-document-format-error', and 'client-error-compression-error' status codes.

Also add "compression-supported" to the Appendix E on directory schema as a RECOMMENDED attribute.

Add to IIG for IPP/1.0: IPP/1.0 SHOULD at least check for the "compression" attribute being present and reject the create request, if they don't support "compression". Not checking is a bug, since the data will be unintelligible.

Suggested text for "compression" operation attribute:

"compression" (type3 keyword)

The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute and the "compression-supported" attribute (see section 4.4.30). The client supplied "compression" operation attribute identifies the compression algorithm used on the document data. The following cases exist:

a) If the client omits this attribute, the Printer object MUST assume that the data is not compressed (i.e. the Printer follows the rules below as if the client supplied the "compression" attribute with a value of 'none').

b) If the client supplies this attribute, but the value is not supported by the Printer object, i.e., the value is not one of the values of the Printer object's "compression-supported" attribute, the Printer object MUST reject the request, and return the 'client-error-compression-not-supported' status code. See section 3.2.1.2 for returning unsupported attributes and values.

c) If the client supplies the attribute and the Printer object supports the attribute value, the Printer object uses the corresponding decompression algorithm on the document data.

d) If the decompression algorithm fails before the Printer returns an operation response, the Printer object MUST reject the request and return the 'client-error-compression-error' status code.

e) If the decompression algorithm fails after the Printer returns an operation response, the Printer object MUST abort the job and add the 'compression-error' value to the job's "job-state-reasons".

f) If the decompression algorithm succeeds, the document data MUST then have the format specified by the job's "document-format" attribute (q.v.).

Suggested text for a new section 13.1.4.16 client-error-compression-not-supported

13.1.4.16 client-error-compression-not-supported (0x040F)

The IPP object is refusing to service the request because the document data, as specified in the "compression" operation attribute, is compressed in a way that is not supported by the Printer object. This error is returned independent of the client-supplied "ipp-attribute-fidelity". The Printer object MUST return this status code, even if there are other Job Template attributes that are not supported as well, since this error is a bigger problem than with Job Template attributes. See section 0.

29) ISSUE: Should "queued-job-count" be REQUIRED?

The "queued-job-count" Printer Description attribute is an OPTIONAL attribute for a Printer object to support. Since some clients may want a quick way to determine the load on an IPP Printer, querying the "Printer's "queued-job-count" should always be possible, but an implementation might not support it.

Suggested change:

Change IPP/1.1 Model and Semantics so that the "queued-job-count" changes from RECOMMENDED to REQUIRED.

30) ~~OPEN -~~ ISSUE: Should "job-state-reasons" and "printer-state-reasons" be REQUIRED in IPP/1.1?

Considering that we tend to put more and more information into the currently OPTIONAL 'job-state-reason' and 'printer-state-reason' attributes, should we make them a MUST for the IPP/1.1 version? (Discussion in 990324 phone conference).

Suggested change:

Change IPP/1.1 document "job-state-reasons" and "printer-state-reasons" from OPTIONAL to REQUIRED for IPP/1.1. All references to "If the "job-state-reasons" attribute is supported, need to be removed.

Suggested changed to the "job-state-reasons" description in Print-Job response:

"job-state-reasons":

The Printer object MUST ~~OPTIONALLY~~ return the Job object's REQUIRED ~~OPTIONAL~~ "job-state-reasons" attribute. ~~If the Printer object supports this attribute then it MUST be returned in the response. If this attribute is not returned in the response, the client can assume that the "job-state-reasons" attribute is not supported and will not be returned in a subsequent Job object query.~~

31) ~~OPEN -~~ ISSUE: How indicate a ripped job that is waiting for the marker?

Three alternatives being pursued: job stays in 'processing', job moves to 'pending', job moves to 'pending-held' job states. Any of the alternatives MAY use a new 'queued-for-marker~~interpreted-waiting-to-print~~' job state reason to indicate that the job has been ripped but is waiting for the marker in a high end system. The 'pending-held' state is used by systems where the Operator explicitly does a Release-Job to schedule the next job to be marked, while the 'pending' or 'processing' state is used by systems that choose the next job to mark automatically. The 'processing' state is typically used by systems that tend not to have much time between ripping and marking.

Suggested clarifications:

1. Clarify that a Printer may have more than one job in the processing state at the same time.

2. Clarify that a job can remain in the 'processing' state even when the Printer is 'stopped', if that job is being ripped; only the job that is being marked MUST be moved to the 'processing-stopped' state.

Suggested addition:

All three job states may be used to represent jobs that have been interpreted and are waiting to be marked, depending on implementation.

Suggested text for section 4.3.8 job-state-reasons:

'job-queued-for-marker': Job is in any of the 'pending-held', 'pending', or 'processing' states, but more specifically, the Printer has completed enough processing of the document to be able to start marking and the job is waiting for the marker. Systems that require human intervention to release jobs using the Release-Job operation, put the job into the 'pending-held' job state. Systems that automatically select a job to use the marker put the job into the 'pending' job state or keep the job in the 'processing' job state while waiting for the marker, depending on implementation. All implementations put the job into (or back into) the 'processing' state when marking does begin.

Suggested text for section 4.4.10 printer-state:

'3' 'idle': If a Printer receives a job (whose required resources are ready) while in this state, such a job MUST transit into the 'processing' state immediately. If the "printer-state-reasons" attribute contains any reasons, they MUST be reasons that would not prevent a job from transiting into the 'processing' state immediately, e.g., 'toner-low'.

If a Printer can interpret one or more jobs while marking a job, then it is idle if it is available to interpret jobs even while marking a job.

If a Printer controls more than one output device, the above definition implies that a Printer is 'idle' if at least one output device is idle, i.e., the IPP Printer is available to immediately start processing a job if a client submitted it.

'4' 'processing': If a Printer receives a job (whose required resources are ready) while in this state, such a job MUST transit into the 'pending' state immediately. Such a job MUST transit into the 'processing' state only after jobs ahead of it complete. If the "printer-state-reasons" attribute contains any reasons, they MUST be reasons that do not prevent the current job from printing, e.g. 'toner-low'.

If a Printer can interpret one or more jobs while marking a job and receives a job (whose required resources are ready) while in this state, such a received job MAY transit into the 'processing' state along with the job that is being marked, if any.

If a Printer controls more than one output device, the above definition implies that a Printer is 'processing' if at least one output device is processing, and none is idle.

'5' 'stopped': If a Printer receives a job (whose required resources are ready) while in this state, such a job MUST transit into the 'pending' state immediately. Such a job MUST transit into the 'processing' state only after some human fixes the problem that stopped the printer and after jobs ahead of it complete processing. Issue 30 The "printer-state-reasons" attribute MUST contain at least one reason, e.g. 'media-jam', which prevents it from either processing the current job or transitioning a 'pending' job to the 'processing' state.

If a Printer can interpret one or more jobs while marking a job and receives a job (whose required resources are ready) while in this state, such a submitted job MAY transit into the 'processing' state in order to be interpreted even while the

Printer is in the 'stopped' state. However, before such a job can be completed, a human needs to fix the problem.

If a Printer controls more than one output device, the above definition implies that a Printer is 'stopped' only if all output devices are stopped.

Note: ~~Also,~~ it is tempting to define 'stopped' as when a sufficient number of output devices are stopped and leave it to an implementation to define the sufficient number. But such a rule complicates the definition of 'stopped' and 'processing'. For example, with this alternate definition of 'stopped', a job can move from 'pending' to 'processing' without human intervention, even though the Printer is stopped.

32) ~~OPEN -~~ ISSUE: Is Digest REQUIRED for an IPP Client and an IPP Printer to support?

The Transport and Encoding document contains the following incorrect sentence:

> The IPP Model document defines an IPP implementation with "authentication" as one that implements the standard way for transporting IPP messages within HTTP 1.1.

since the IPP Model document doesn't mention HTTP 1.1, since that is a transport issue.

The Transport and Encoding document refers to RFC 2068 (HTTP/1.1) and RFC 2069 (Digest), but does not require that RFC 2069 be supported. Furthermore, RFC 2068 does not require that RFC 2069 be supported either.

Suggested change:

Change the Transport and Encoding document to require that clients and Printers MUST support HTTP 1.1.

Suggested change:

~~IPP/1.1 clients and Printers MUST support Digest [RFC 2069]; OPTIONAL for IPP/1.0.~~

Suggested change to Encoding and Transport document for IPP/1.1 conformance:

> An IPP Printer MUST contain software that allows an administrator to configure the client authentication part of HTTP Digest (but not encryption of the body)
>
> IPP clients MUST implement the above in order to be able to interoperate with conforming Printers.

Clients and Printers MAY also support additional Client Authentication, such as:

1. HTTP Basic (not certificates) over a TLS secured channel (implementing TLS authentication is NOT REQUIRED).

2. HTTP Basic (not certificates) over an SSL3 secured channel.

A Printer implementation MAY allow an administrator to configure the Printer so that all, some, or none of the users are authenticated.

Suggested text for Section 5.1 Client Conformance:

A client MUST/SHOULD [which is to be determined in consultation with the Area Director] support Client Authentication as defined in the IPP/1.1 Encoding and Transport document [ipp-pro]. A client SHOULD support Operation Privacy and Server Authentication as defined in the IPP/1.1 Encoding and Transport document [ipp-pro]. See also [ipp-mod] section 8.

Suggested text for a new sub-section to Section 5.2 IPP Object Conformance:

5.2.7 Security

An IPP Printer implementation MUST/SHOULD [which is to be determined in consultation with the Area Director] contain support for Client Authentication as defined in the IPP/1.1 Encoding and Transport document [ipp-pro]. A Printer implementation MAY allow an administrator to configure the Printer so that all, some, or none of the users are authenticated. See also [ipp-mod] section 8.

An IPP Printer implementation SHOULD contain support for Operation Privacy and Server Authentication as defined in the IPP/1.1 Encoding and Transport document [ipp-pro]. A Printer implementation MAY allow an administrator to configure the degree of support for Operation Privacy and Server Authentication. See also [ipp-mod] section 8.

33) ~~OPEN -~~ ISSUE: ~~Ok to i~~Include the IPP/1.0 conformance requirements in the IPP/1.1 document?

Suggested change:

No. The IPP/1.1 Model and Semantics document and the IPP/1.1 Encoding and Transport document will only cover IPP/1.1. They will NOT obsolete the experimental RFC that describes IPP/1.0. They will NOT describe IPP/1.0 at all.

The IPP/1.1 document will say that for interoperability with IPP/1.0 clients, that an IPP Printer SHOULD accept IPP/1.0 requests ("version-number" parameter = '1.0') and, if they accept the request, MUST respond with IPP/1.0 responses ("version-number" parameter = '1.0') . Furthermore, an IPP/1.1 conforming Printer or an IPP/1.0 conforming Printer MAY respond with any IPP/1.1 feature in such an IPP/1.0 response that would not jeopardize interoperability with any IPP/1.0 client. See Issue 17 for an example of an IPP/1.1 extension that MUST NOT be returned in a '1.0' response. If the IPP/1.1 Printer does not support version '1.0' requests, then it MUST reject such requests and return the 'server-error-version-number-not-supported' status code with the "version-number" parameter set to '1.1'.

Fix the rule for using minor version numbers so that we can still use '1.1' for this version.

Suggested text for section 3.1.7 versions:

3.1.7 Versions

Each operation request and response carries with it a "version-number" parameter. Each value of the "version-number" is in the form "X.Y" where X is the major version number and Y is the minor version number. By including a version number in the client request, it allows the client to identify which version of IPP it is interested in using. If the IPP object does not support that version, the object responds with a status code of 'server-error-version-not-supported' along with the closest version number that is supported (see section 13.1.5.4).

There is no version negotiation per se. However, if after receiving a 'server-error-version-not-supported' status code from an IPP object, there is nothing that prevents a client from trying again with a different version number. In order to conform to IPP/1.1, an IPP object implementations MUST support version~~s~~ '1.1~~0~~' and SHOULD support version '1.0'.

There is only one notion of "version number" that covers both IPP Model and IPP Protocol changes. Thus the version number MUST change when introducing a new version of the Model and Semantics document [IPP-MOD] or a new version of the "Encoding and Transport" document [IPP-PRO].

Changes to the major version number indicate structural or syntactic changes that make it impossible for older version of IPP clients and Printer objects to correctly parse and correctly process the new or changed attributes, operations and responses. If the major version number changes, the minor version numbers is set to zero. As an example, adding the REQUIRED "ipp-attribute-fidelity" attribute to version '1.1' (if it had not been part of version '1.0~~1~~'), would have required a change to the major version number, since an IPP/1.0 Printer would not have processed a request with the correct semantics that contained the "ipp-attribute-fidelity" attribute that it did not know about. Items that might affect the changing of the major version number include any changes to the Model and Semantics document [IPP-MOD] or the "Encoding and Transport" document [IPP-PRO] itself, such as:

- reordering of ordered attributes or attribute sets
- changes to the syntax of existing attributes
- ~~changing Operation or Job Template attributes from OPTIONAL to REQUIRED and vice versa~~
- ~~adding REQUIRED (for an IPP object to support) operation attributes~~
- adding REQUIRED (for an IPP object to support) operation attribute groups
- adding values to existing REQUIRED operation attributes
- adding REQUIRED operations

Changes to the minor version number indicate the addition of new features, attributes and attribute values that may not be understood by all IPP objects, but which can be ignored if not understood. Items that might affect the changing of the minor version number include any changes to the model objects and attributes but not the encoding and transport rules [IPP-PRO] (except adding attribute syntaxes). Examples of such changes are:

- grouping all extensions not included in a previous version into a new version
- adding new attribute values
- adding new object attributes
- adding OPTIONAL (for an IPP object to support) operation attributes (i.e., those attributes that an IPP object can ignore without confusing clients)

- adding OPTIONAL (for an IPP object to support) operation attribute groups (i.e., those attributes that an IPP object can ignore without confusing clients)
- adding new attribute syntaxes
- adding OPTIONAL operations
- changing Job Description attributes or Printer Description attributes from OPTIONAL to REQUIRED or vice versa.
- adding OPTIONAL attribute syntaxes to an existing attribute.

The encoding of the "version-number" MUST NOT change over any version number (either major or minor). This rule guarantees that all future versions will be backwards compatible with all previous versions (at least for checking the "version-number"). In addition, any protocol elements (attributes, error codes, tags, etc.) that are not carried forward from one version to the next are deprecated so that they can never be reused with new semantics.

Implementations that support a certain ~~major~~ version NEED NOT support ALL previous versions. As each new ~~major~~ version is defined (through the release of a new specification), that ~~major~~ version will specify which previous ~~major~~ versions MUST and which versions SHOULD be supported in compliant implementations.

Suggested text for the Appendices

The IPP/1.1 documents will contain an appendix that summarizes each difference from IPP/1.0 by section number and a brief description (see February 1999 I-Ds). The appendix will contain two separate lists: one is clarifications and OPTIONAL additions to IPP/1.1 and the other is changes in conformance requirements of existing IPP/1.0 features or new REQUIRED IPP/1.1 features.

Here are the items for the Appendix for IPP-PRO:

1. IPP/1.1 clients and Printers MUST support the IPP scheme; IPP/1.0 clients and Printers MUST support the http scheme.

2. IPP/1.1 clients MUST support the secured channel part of TLS with at least Basic authentication AND the user authentication part of Digest and non-TLS access; IPP/1.0 clients SHOULD support SSL3 which uses the https scheme and non-SSL3 access. (See Issue 32)

3. IPP/1.1 Printers MUST be configurable to support the secured channel part of TLS access with at least Basic authentication OR the user authentication part of Digest; IPP/1.0 Printers SHOULD support SSL3 which uses the https scheme and non-SSL3 access. (See Issue 32)

Here are the items for the second list in the Appendix for IPP-MOD:

The following changes in semantics and/or conformance have been incorporated into this document:

1. Section 3.1.8, 5.2.4, and 13.1.5.4 - Clients and IPP objects MUST support version 1.1 and SHOULD support version 1.0. Issue 33 and Issue 36
2. Section 3.2.1.1 and section 4.4.32 - changed the "compression" and "compression-supported" attributes from OPTIONAL to REQUIRED. Issue 28

3. Sections 3.2.1.2 and 4.3.8 - changed "job-state-reasons" from RECOMMENDED to REQUIRED, so that "job-state-reasons" MUST be returned in create operation responses. Issue 30
4. Sections 3.2.4, 3.3.1, 4.4.16, and 16 - changed Create-Job/Send-Document so that they MAY be implemented while only supporting one document jobs. Added the "multiple-document-jobs-supported" boolean Printer Description attribute to indicate whether Create-Job/Send-Document support multiple document jobs or not. Added to the Directory schema. Issue 34
5. Section 4.1.9 - deleted 'text/plain; charset=iso-10646-ucs-2', since binary is not legal with the 'text' type.
6. Section 4.3.8 - changed "job-state-reasons" from RECOMMENDED to REQUIRED. Issue 30
7. Section 4.3.12 - added OPTIONAL 'dateTime' attribute syntax to "time-at-creation", "time-at-processing", and "time-at-completed" Event Time Job Description attributes for use in version '1.1' responses. Issue 17
8. Section 4.3.12 - changed the "time-at-creation", "time-at-processing", and "time-at-completed" Event Time Job Description attributes from OPTIONAL to REQUIRED. Issue 17
9. Section 4.3.12.4 - added the REQUIRED "job-printer-up-time (integer(1:MAX))" Job Description attribute as an alias for "printer-up-time" to reduce number of operations to get job times. Issue 17
10. Section 4.4.2 - added the REQUIRED "uri-authentication-supported (1setOf type2 keyword)" Printer Description attribute to describe the Client Authentication used by each Printer URI. Issue 2
11. Section 4.4.11 - clarified the "printer-state" to allow a Printer that can interpret one or more jobs (rip) while marking one job to have those jobs all in the 'processing' state. Issue 31
12. Section 4.4.12 - changed "printer-state-reasons" Printer Description attribute from OPTIONAL to REQUIRED. Issue 30
13. Section 4.4.14 - added the REQUIRED "ipp-versions-supported (1setOf keyword)" Printer Description attribute, since IPP/1.1 Printers do not have to support version '1.0'.
14. Section 4.4.16 - added the REQUIRED "multiple-document-jobs-supported (boolean)" Printer Description attribute so that a client can tell whether a Printer that supports Create-Job/Send-Document supports multiple document jobs or not. Issue 34
15. Section 4.4.24 - changed the "queued-job-count" Printer Description attribute from RECOMMENDED to REQUIRED. Issue 29
16. Section 4.4.32 - changed "compression-supported (1setOf type3 keyword)" Printer Description attribute from OPTIONAL to REQUIRED. Issue 28
17. Section 5.1 - changed the client security requirements from RECOMMENDED non-standards track SSL3 to MUST/SHOULD [which is to be determined in consultation with the Area Director] support Client Authentication as defined in the IPP/1.1 Encoding and Transport document [IPP-PRO]. A client SHOULD support Operation Privacy and Server Authentication as defined in the IPP/1.1 Encoding and Transport document [IPP-PRO]. Issue 32
18. Section 5.2.7 - changed the IPP object security requirements from OPTIONAL non-standards track SSL3 to MUST/SHOULD [which is to be determined in consultation with the Area Director] contain support for Client Authentication as defined in the IPP/1.1 Encoding and Transport document [IPP-PRO]. A Printer implementation MAY allow an administrator to configure the Printer so that all, some, or none of the users are authenticated. An IPP Printer implementation SHOULD contain support for Operation Privacy and Server Authentication as defined in the IPP/1.1 Encoding and Transport document [IPP-PRO]. A Printer implementation MAY allow an administrator to configure the degree of support for Operation Privacy and Server Authentication. Issue 32

For the IIG:

1. Discuss the advantage for client implementations to support both IPP/1.1 and IPP/1.0, so that they can interoperate with either Printer implementations.

2. Discuss the advantage for Printer implementations to support both IPP/1.1 and IPP/1.0, so that they can interoperate with either client implementations.

~~Most conformance requirements are the same for IPP/1.0 and IPP/1.1. For those make no special indication in the document. For those for which the conformance is REQUIRED for IPP/1.1, but OPTIONAL for IPP/1.0, state: IPP/1.1 xxx MUST ...; OPTIONAL in IPP/1.0, where xxx is either clients or Printers.~~

34) ~~OPEN~~ ISSUE: Ok to REQUIRE "multiple-document-handling if Create-Job is supported?

The IPP/1.0 Implementer's Guide contains the following issue:

> 2.16 Support of multiple document jobs
>
> IPP/1.0 is silent on which of the four effects an implementation would perform if it supports Create-Job, but does not support "multiple-document-handling".
>
> A fix to IPP/1.0 would be to require implementing all four values of "multiple-document-handling" if Create-Job is supported at all. Or at least 'single-document-new-sheet' and 'separate-documents-uncollated-copies'. In any case, an implementation that supports Create-Job SHOULD also support "multiple-document-handling". Support for all four values is RECOMMENDED, but at least the 'single-document-new-sheet' and 'separate-documents-uncollated-copies' values, along with the "multiple-document-handling-default" indicating the default behavior and "multiple-document-handling-supported" values. If an implementation spools the data, it should also support the 'separate-documents-collated-copies' value as well.

There is a need to allow Create-Job and Send-Document to be supported while making it OPTIONAL to support multiple documents per job. A client that wants to monitor a job while it is sending data can do so with Create-Job and Send-Document. A Printer that wants to support "long documents", namely, when the document data is indefinitely long (so long it can't be spooled) but does not want to support multiple documents.

Suggested solution:

Instead of requiring "multiple-document-handling" if Create-Job and Send-Document are supported as proposed in the original solution for Issue 34, lets:

1. Clarify that a conforming implementation NEED NOT support multiple documents when it supports the Create-Job and Send-Document operations. (There currently is no conformance sentence that requires support of multiple document jobs when Create-Job and Send-Document are supported, though that was certainly our intent which this clarification would countermand).

2. If the Printer does support the Create-Job and Send-Document operations, then it MUST support the (new) "multiple-document-jobs-supported (boolean)" Printer Description attribute. A 'true' value indicates that multiple documents are supported in a job.

3. Add "multiple-document-jobs-supported (boolean)" to the Directory Schema in Appendix E as OPTIONAL.

4. If the Printer does support multiple documents in a job, then it MUST support the "multiple-document-handling" Job Template attribute with at least one value and the associated "multiple-document-handling-default" and "multiple-document-handling-supported" Job Template Printer attributes.

5. Add a new status code: 'server-error-multiple-document-jobs-not-supported'

6. In the table in section 14.2 indicate that 'server-error-multiple-document-jobs-not-supported' can be used only with the Send-Document and Send-URI operations.

Suggested text for section 3.2.4 Create-Job:

If the Printer object supports this operation, then it MUST support the "multiple-document-jobs-supported" Printer Description attribute and indicate whether or not it supports multiple-document jobs.

If the Printer object supports this operation and supports multiple documents in a job, then it MUST support the "multiple-document-handling" Job Template job attribute with at least one value (see section 4.2.4) and the associated "multiple-document-handling-default" and "multiple-document-handling-supported" Job Template Printer attributes.

Suggested text for section 3.3.1 Send-Document operation:

If the Printer supports this operation but does not support multiple documents per job, the Printer MUST reject subsequent Send-Document operations supplied with data and return the 'server-error-multiple-document-jobs-not-supported'. However, the Printer MUST accept the first document with a 'true' or 'false' value for the "last-document" operation attribute (see below), so that clients MAY always submit one document jobs with a 'false' value for "last-document" in the first Send-Document and a 'true' for "last-document" in the second Send-Document (with no data).

Suggested text for section 4.2.4 multiple-document-handling

After the first sentence which says:

> This attribute is relevant only if a job consists of two or more documents.

add:

> This attribute MUST be supported if the Printer supports multiple documents per job (see sections 3.2.4 and 3.3.1).

Suggested text for new section 4.4.28 multiple-document-jobs-supported

4.4.28 multiple-document-jobs-supported (boolean)

This Printer attribute indicates whether or not the Printer supports more than one document per job, i.e., more than one Send-Document or Send-Data operation with document data. If the Printer supports the Create-Job and Send-Document operations, it MUST support this attribute.

Suggested text for new section 14.1.5.10:

14.1.5.10 server-error-multiple-document-jobs-not-supported (0x0509)

The IPP object does not support multiple documents per job and a client attempted to supply document data with a second Send-Document or Send-URI operation.

35) ~~OPEN --~~ ISSUE: What error code to return on Print-URI or Send-URI if document not accessible?

Section 3.2.2, "Print-URI Operation", it looks like it's an implementation decision whether to pull the data from the document-uri at job submission time or at job processing time. Say I decide to pull the data at job submission time. Say I get some kind of error doing so, like no-route-to-host, or HTTP 404. Shouldn't I return some kind of error status? Currently, it looks like I have to return successful-ok as long as the document-uri uses a scheme I support, regardless of whether or not I can actually get the document data.

Suggested addition:

Add both a new 'client-error-document-access-error' status code and a 'document-access-error' value for "job-state-reasons", just like we have done for compression and document format errors for Issue 3, 6, and 28.

Suggested text for section 3.2.2 Print-URI Operation:

Replace the sentences:

> See The Implementer's Guide [IPP-IIG] for suggested additional checks. The Printer NEED NOT follow the reference and validate the contents of the reference.

with:

> The IPP Printer MAY validate the accessibility of the document as part of the operation or subsequently. If the Printer determines an accessibility problem before returning an operation response, it rejects the request and returns the 'client-error-document-access-error' status code. If the Printer determines this accessibility problem after accepting the request and returning an operation response with one of the successful status codes, the Printer adds the 'document-access-error' value to the job's "job-state-reasons" attribute. See The Implementer's Guide [IPP-IIG] for suggested additional checks.

Suggested text for section 4.3.8 job-state-reasons:

'document-access-error': After accepting a Print-URI or Send-URI request, the Printer could not access one or more documents passed by reference. This reason is intended to cover any file access problem, including file does not exist and access denied because of an access control

problem. Whether the Printer aborts the job and moves the job to the 'aborted' job state or prints all documents that are accessible and moves the job to the 'completed' job state and adds the 'completed-with-errors' value in the job's "job-state-reasons" attribute depends on implementation and/or site policy.

Suggested text for section 14.1.4.19 Client Error Status Codes:

4.1.4.19 client-error-document-access-error (0x0412)

The IPP object is refusing to service the Print-URI or Send-URI request because Printer encountered an access error while attempting to validate the accessibility or access the document data specified in the "document-uri" operation attribute. This error is returned independent of the client-supplied "ipp-attribute-fidelity". The Printer object MUST return this status code, even if there are Job Template attributes that are not supported as well, since this error is a bigger problem than with Job Template attributes.

36) ~~OPEN~~ ISSUE: Don't require 1.0 support and add REQUIRED "version-numbers-supported" attribute

Suggested addition:

RECOMMEND, rather than REQUIRE, conforming IPP/1.1 clients and the IPP/1.1 Printers to support IPP/1.0 requests and responses. Therefore, add an "ipp-versions-supported" Printer Description attribute. Indicate that version '1.0' can include any extension in the IPP/1.1 document as long as it follows the rules of an IPP/1.0 request, if any, such as in the "time-at-xxx" Job Description attributes and the "operations-supported" attribute. Also add this attribute as RECOMMENDED in the directory schema list in the Appendix.

Suggested text for new attribute:

4.4.n ipp-versions-supported(1setOf type2 keyword)

This REQUIRED attribute identifies the IPP protocol versions that this Printer supports, including minor versions, i.e., the values of the "version-number" parameter that it will accept in requests and return in responses. If an IPP Printer receives a request with the "version-number" parameter set to a (two-octet binary) value that does not correspond to one of the values of this (US-ASCII) keyword, it MUST reject the request and return the 'server-error-version-not-supported' status code. See Section 3.1.8.

The following standard keyword values are defined:

'1.0': Version 1.0 as specified in RFC 2566 [RFC2566] and RFC 2565 [RFC2565] including any extensions registered according to Section 6 and any extension defined in this version or any future version of this document following the rules when the "version-number" parameter is '1.0', if any. For an example of such a '1.0' rule, see section 4.3.12.

'1.1': Version 1.1 as specified in this document and [IPP-PRO] including any extensions registered according to Section 6 or defined in any future version of this document following the rules when the "version-number" parameter is '1.1', if any.

Suggested modification to section 3.1.7 Versions:

See Issue 33.

Suggested change to section 5.2.4 [Conformance of] Versions:

Clients MUST support version 1.1 and SHOULD ~~MAY~~ also support version 1.0. IPP objects MUST support ~~both~~ version 1.1~~0~~ and SHOULD also support version 1.0~~1~~. See section 3.1.8.

Suggested changes to section 13.1.5.4 server-error-version-not-supported (0x0503)

13.1.5.4 server-error-version-not-supported (0x0503)

The IPP object does not support, or refuses to support, the IPP protocol version that was ~~used~~ supplied as the value of the "version-number" operation parameter in the request ~~message~~. The IPP object is indicating that it is unable or unwilling to complete the request using the same major and minor version number as supplied in the request other than with this error message. The error response ~~should~~ SHOULD contain a "status-message" attribute ~~Message~~ describing why that version is not supported and what other versions are supported by that IPP object. See section 3.1.6. Issue 11

~~A conforming IPP/1.1 client MUST specify a valid version ('1.1' or '1.0') on each request. A conforming IPP/1.1 object MUST NOT return this status code to a conforming IPP/1.1 or IPP/1.0 client. An IPP object MUST return this status code to a non-conforming IPP client.~~ The error response MUST identify in the "version-number" operation ~~attribute~~parameter the closest version number that the IPP object does support. For example, if a client supplies version '1.0' and ~~, a conforming~~an IPP/1.1 object supports version '1.0', then it MUST respond with version '1.0'. If the IPP/1.1 object does not support version '1.0', then it MUST respond with this error code. Issue 36