

1 **Subj: Event notifications for the IPP print protocol [and JMP]**

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5
6 *There are several issues indicated in the document that we should cover at the*
7 *upcoming meeting, as well as review the proposal. See color highlighting. [Items in*
8 *square brackets relate to the PWG JMP MIB trapping and will be removed when this*
9 *document is made into an IPP Internet-Draft.]*

10 **1 Introduction**

11 In IPP/1.0, the user can determine what is happening to submitted jobs by using the Get-
12 Attributes and Get-Jobs operations to poll for results. This document describes an
13 OPTIONAL extension to the IPP/1.0 Model document for subscribing for event
14 notifications using IPP, but which are delivered over some other protocol. See the IPP
15 Notification Requirements document [req] for further details. See also "General Event
16 Notification Architecture Base [cohen] for terminology and framework.

17 IPP is considering the definition and use of event notifications (see terminology section)
18 for two main purposes. First, when used to achieve printing over a wide area network, or
19 the Internet, the end-user experience is similar to today's FAX paradigm, so we want to
20 provide notification that the job has completed successfully (or not). This notification
21 may traverse the Internet as an e-mail message or end up on someone's pager. Second,
22 and more widely, when used as a standard LAN print submission protocol (i.e., LPR
23 replacement), the end-user will have the desire and opportunity for a much more dynamic
24 interaction with the printer and the print job. Here, notification should consist of a local
25 area network messaging scheme that addresses unsolicited events related to the printer,
26 the job's position in the server or printer queue, start of processing, printing progress and
27 job completion, including forms of cancellation. This paper proposes MANDATORY
28 IPP attributes to be used for both purposes, and OPTIONAL attributes and values that are
29 appropriate only for one or the other.

30 [The notification events and content are also intended to apply to the PWG Job
31 Monitoring MIB (JMP). See sections 5.1.1.2 and 8.]

32

33 **1.1 Summary of the proposal**

34 This paper proposes the following:

- 35 1. One OPTIONAL "job-notify" Operation attribute for use with the Print-Job, Print-
 36 URI, and Create-Job operation. The "job-notify" Operation attribute has an attribute
 37 syntax of '1setOf collection' so that the client can request different events for different
 38 notification recipients for the same job. Each collection value SHALL contain the
 39 "job-notify-recipients" and MAY contain~~consists of~~ any of the following remaining
 40 member attributes with the indicated syntax and support by the IPP object if it
 41 supports the "job-notify" Operation attribute ~~is supported~~-at all:

| 42 Member attribute name | syntax | in request | support |
|---------------------------------------|----------------------|--------------------------------|------------------|
| 43 ----- | ---- | ----- | ----- |
| 44 "job-notify-event-groups" | 1setOf type2 keyword | MAY | mandatory |
| 45 "job-notify-recipients" | 1setOf uri | SHOULD <u>SHALL</u> | mandatory |
| 46 <u>"job-notify-content-type"</u> | <u>mimeMediaType</u> | <u>MAY</u> | <u>mandatory</u> |
| 47 "job-notify-charset" | charset | MAY | mandatory |
| 48 "job-notify-natural-language" | naturalLanguage | MAY | optional |
| 49 "job-notify-additional-attributes" | 1setOf keyword | MAY | optional |

- 50
- 51 2. One "job-notify" Job Description attribute which is populated with the supplied
 52 Operation attribute ~~or the Printer's default~~.
- 53 3. ~~Five Six~~ corresponding "xxx-default" and five "xxx-supported" Printer object
 54 attributes that correspond to these six member attributes. See the IPP Model for the
 55 semantics of xxx-supported Printer attributes.
- 56 4. Two new Register-For-Event-Notifications and Un-Register-For-Event-Notifications
 57 operations on the Printer object. These operations are intended for
 58 operator/administrators and servers for long term registration for Printer object events
 59 that are independent of job submission. The servers may be involved with (1) job
 60 submission to IPP Printer objects and/or (2) collecting accounting data using the
 61 event notification mechanism. ISSUE: Ok to add these two new notification
 62 operations as discussed on the telecon?

63 2 Terminology

64 It is necessary to define a set of terms in order to be able to clearly express the
65 requirements for notification services in an IPP System. These terms are from the
66 requirements document [req]. Cohen [cohen] has similar terminology, with some
67 differences. ISSUE: Which terminology should we use?

68 2.1 Job Submitting End User

69 A human end user who submits a print job to an IPP Printer. This person may or may not
70 be within the same security domain as the Printer. This person may or may not be
71 geographically near the printer.

72 2.2 Job Submitting Application

73 An application (for example a batch application), acting on behalf of an end user, which
74 submits a print job to an IPP Printer. The application may or may not be within the same
75 security domain as the Printer. This application may or may not be geographically near
76 the printer.

77 2.3 Security Domain

78 For the purposes of this discussion, the set of network components which can
79 communicate without going through a proxy or firewall. A security domain may be
80 geographically very large, for example - anyplace within IBM.COM.

81 2.4 IPP Client

82 The software component on the client system which implements the IPP protocol. 65

83 2.5 Job Recipient

84 A human who is the ultimate consumer of the print job. In many cases this will be the
85 same person as the Job Submitting End User, but this need not always be the case. For
86 example, if I use IPP to print a document on a printer in a business partner's office, I am
87 the Job Submitting End User, while the person I intend the document for in my business
88 partner's office is the Job Recipient. Since one of the goals of IPP is to be able to print
89 near the ultimate recipient of the printed output, we would normally expect the Job
90 Recipient to be in the same security domain as, and geographically near the Printer.
91 However, this may not always be the case. For example, I submit a print job across the
92 Internet to a Kinko's print shop. I am both the Submitting end User and the Job
93 Recipient, but I am neither near nor in the same security domain as the Printer.

94 2.6 Job Recipient Proxy

95 A person acting on behalf of the Job Recipient. In particular, the Job Recipient Proxy
96 physically picks up the printed document from the Printer, if the Job Recipient cannot
97 perform that function. The Proxy is **by definition** geographically near and in the same
98 security domain as the printer. For example, I submit a print job from home to be printed
99 on a printer at work. I'd like my secretary to pick up the print job and put it on my desk.

100 In this case, I am acting as both Job Submitting End User and Job Recipient. My
101 secretary is acting as a Job Recipient Proxy. An issue that needs to be considered in the
102 notification architecture is the impact of a third party receiving many unwanted
103 notifications.

104 **2.7 Notification Recipient**

105 Any of: Job Submitting End User, Job Submitting Application, Job Recipient, or Job
106 Recipient Proxy.

107 **2.8 Notification Recipient Agent**

108 A program which receives events on behalf of the notification recipient. The agent may
109 take some action on behalf of the recipient, forward the notification to the recipient via
110 some alternative means (for example, page the recipient), or queue the notification for
111 later retrieval by the recipient.

112 **2.9 Notification Events**

113 Any of the following constitute events that a Job Submitting End User can specify
114 notifications be sent for. Notifications are sent to an end user only for that end user's job,
115 or for events that affect the processing of that end user's job:

- 116 • Any standard Printer MIB alert (i.e. device events that impact the end user's
117 job)
- 118 • Job Received (transition from Unknown to Pending or Pending-held)
- 119 • Job Started (Transition from Pending to Processing)
- 120 • Page Complete (Page is stacked)
- 121 • Collated Copy Complete (last sheet of collated copy is stacked)
- 122 • Job Complete (transition from Processing or Processing-stopped to Completed)
- 123 • Job aborted (transition from Pending, Pending-held, Processing, or Processing-
124 stopped to Aborted)
- 125 • Job canceled (transition from Pending, Pending-held, Processing, or Processing-
126 held to Canceled)
- 127 • The job has not ended (Completed, Aborted, Canceled, etc.) within a specified
128 time limit.

129 **2.10 Notification Registration**

130 It should be possible for end users to "Register" for notifications of certain types of
131 events. These include any of those described in the preceding section.

132 ISSUE: Cohen's paper [cohen] uses the terms "subscribe" and "unsubscribe". Which
133 should we use? If we change to use the terms "subscribe" and "unsubscribe", the we
134 should also change the name of the new operations from Register-For-Event-

135 Notifications and Un-Register-For-Event-Notifications to Subscribe and Unsubscribe
136 which are also the two methods (operations) in Cohen's paper.

137 **2.11 Notification Attributes**

138 IPP Objects (for example, a print job) from which notification are being sent may have
139 attributes associated with them. A user may want to have one or more of these associated
140 attributes returned along with a particular notification. In general, these may include any
141 attribute associated with the object emitting the notification. Examples include:

142 number-of-intervening jobs
143 job-k-octets
144 job-k-octets processed
145 job impressions
146 job-impressions-interpreted
147 job-impressions-completed
148 impressionsCompletedCurrentCopy (job MIB)
149 sheetCompletedCopyNumber (job MIB)
150 sheetsCompletedDocumentNumber (job MIB)
151 Copies-requested
152 Copy-type
153 Output-destination
154 Job-state-reasons

155 **2.12 Immediate Notification**

156 Notifications sent to the notification recipient or the notification recipient's agent in such
157 a way that the notification arrives immediately , within the limits of common addressing,
158 routing, network congestion and quality of service.

159 **2.13 Queued Notification**

160 Notifications which are not necessarily sent immediately, but are queued for delivery by
161 some intermediate network application, or for later retrieval. Email with store and
162 forward is an example of queued notification.

163 **2.14 Notification with Reliable Delivery**

164 Notifications which are delivered by a reliable, sequenced delivery of packets or
165 character stream, with acknowledgment and retry, such that delivery of the notification is
166 guaranteed within some reasonable time limits. For example, if the notification recipient
167 has logged off and gone home for the day, an immediate notification cannot be
168 guaranteed to be delivered, even when sent over a reliable transport, because there is
169 nothing there to catch it. Guaranteed delivery requires both queued notification and a
170 reliable transport. If delivery of the notification requires process to process
171 communications, each session is managed in a reliable manner, assuring fully ordered,
172 end-to-end delivery.

173 **2.15 Notification with Unreliable Delivery**

174 Notifications are delivered via the fundamental transport address and routing framework,
175 but no acknowledgment or retry is required. Process to process communications, if
176 involved, are unconstrained.

177 **2.16 Quality of Service**

178 Some notification delivery methods may allow users to select quality of service
179 parameters. These will depend upon the specific delivery method chosen, and may
180 include parameters such as priority, security, number of retries, and the like.

181 **2.17 Human Consumable Notification**

182 Notifications which are intended to be consumed by human end users **only**. They contain
183 no machine readable encodings of the event. Email would be an example of a Human
184 consumable notification.

185 **2.18 Machine Consumable Notification**

186 Notifications which are intended for consumption by a program **only**, such as an IPP
187 Client. Machine Consumable notifications may not contain human readable information.

188 **2.19 Mixed Notification**

189 A mixed notification may contain both human readable and human readable information.

190 **3 Model for Job and Printer Event Notification**

191 The following pictures from the IPP/1.0 Model and Semantics [ipp-model] are enhanced
192 to show registration for event notification (1) as part of IPP job submission and (2) using
193 the new IPP Register-For-Event-Notifications operations event notifications to (multiple)
194 end-user notification-recipients and a system operator.

195 NOTE: The event notifications are shown coming from the IPP Printer object. An
196 implementation option is for the IPP Printer object to forward the registration requests
197 received in the job submission and with Register-For-Event-Notification operations to a
198 notification service transparently to the requester. The IPP object then passes events to
199 this notification service to distribute the event notifications to the notification recipients.
200 To keep the drawings simple, this implementation option is not shown.

201 **ISSUE: Should we show the notification service case too?**

202

204

205 Legend:

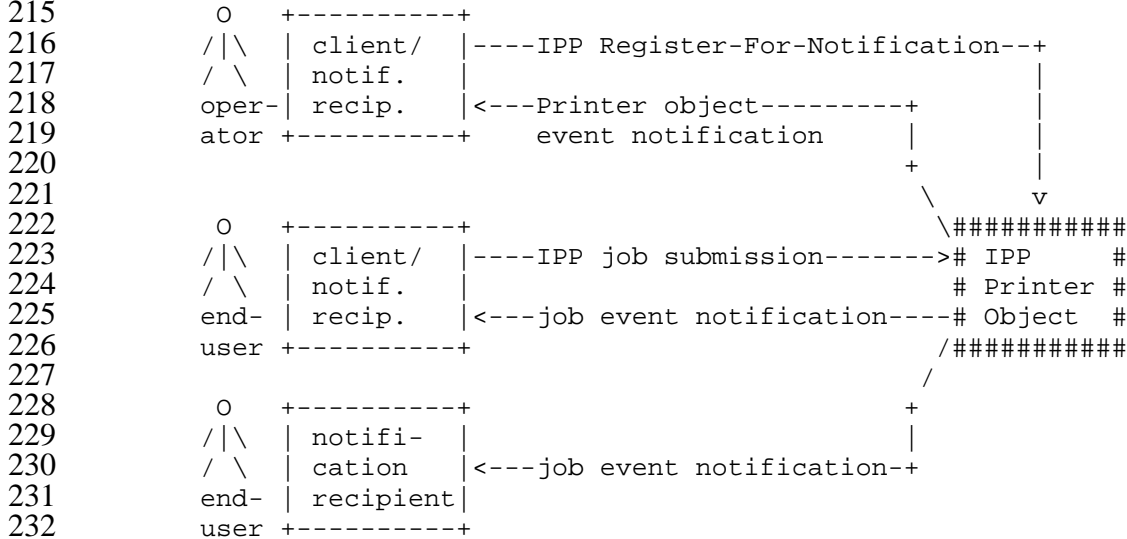
206

207 ##### indicates a Printer object which is
 208 either embedded in an output device or is
 209 hosted in a server. The Printer object
 210 might or might not be capable of queuing/spooling.

211

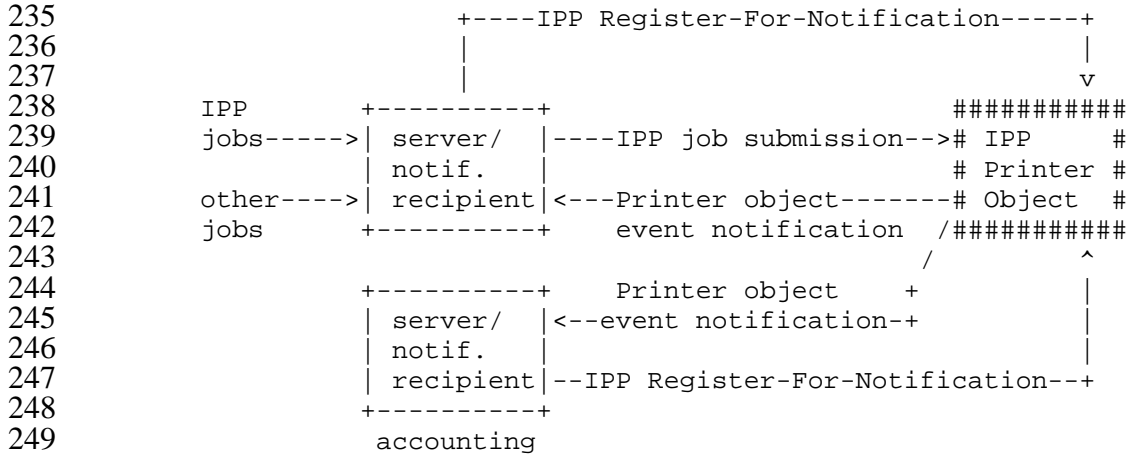
212 any indicates any network protocol or direct
 213 connect, including IPP

214



233

234



250

251 4 Registration for notification

252 4.1 End-user and server-to-device registration as part of job submission

253 Registration for notifications ~~should be~~ accomplished via IPP for end-user and server-
 254 to-device notifications related to the jobs being submitted. This proposal includes

255 specifics for these types of registrations. Here the registration information is submitted
256 with the job and an implementation ~~may~~ **SHALL** store the information with the Job
257 object so that it may be queried with the Get-Job-Attributes operation. In addition, an
258 implementation MAY employ an event notification service to keep the event notification
259 registration information and to actually deliver the event notifications. In this case, the
260 IPP object passes each event as it occurs to the event notification service for event
261 notification delivery to the notification recipients for which the Printer object had
262 previously forwarded event notification registrations.

263 When the IPP Printer removes the job from the system, the registration is automatically
264 removed with such an implementation. If the IPP Printer object implementation uses a
265 notification server, then the IPP object will have to un-register with that notification
266 server when the job completes.

267 **4.2 Registration by servers and third parties for device and/or job** 268 **monitoring**

269 Registration ~~should also be possible by servers that control IPP Printers and~~ by 3rd party
270 accounting or job monitoring applications, which are independent of job submissions, is
271 accomplished by using the Register-For-Event-Notification operation. ~~This proposal~~
272 ~~does NOT include specifics for this type of registration. A similar Printer "printer-notify"~~
273 ~~attribute could be defined along the lines of the "job-notify" Job attribute and be set by~~
274 ~~means outside the scope of IPP/1.0 (perhaps by a future extension, such as a Set-Printer-~~
275 ~~Attributes operation?).~~

276 **5 New Operation attributes for the create operations**

277 While e-mail notifications may be freeform and flexible, for applications to make use of
278 the server-to-device protocol notifications there needs to be a defined (extendable) set of
279 notification methods. The following IPP Job and Printer attributes are proposed to meet
280 the requirements for notification and querying of supported capabilities, including human
281 readable and program processable forms. The events are taken from Ron's and Harry's
282 previously published lists, as well as the original set in the IPP Model from last October.
283 The create operation attributes are intended to meet the requirements in the requirements
284 document [\[req\]\(draft-ietf-ipp-not-01.txt, .pdf\)](#).

285 **5.1 job-notify (1setOf collection)**

286 The client OPTIONALLY supplies this Operation attribute as a *collection* attribute as
 287 part of the Print-Job, Print-URI, and Create-Job operations. The Printer object
 288 OPTIONALLY supports this Operation attribute as part of the Print-Job, Print-URI, and
 289 Create-Job operations. If the Printer object supports this attribute for any of these create
 290 operations, it MUST support it for all of these create operations that it supports.

291 ISSUE: Include the definition for the collection attribute syntax in this specification or
 292 keep separate. The current white paper has the encoding updates and example that
 293 corresponds to the IPP Protocol document, but could be put in this document as an
 294 appendix.

295 The value of this attribute is one or more collection values. Each collection value
 296 SHALL contain a "job-notify-recipients" member attribute and MAY consist contain any
 297 of the remaining following of a "job-notify event-groups", a "job-notify recipients", a
 298 "job-notify charset", a "job-notify natural languages", and a "job-notify additional-
 299 attributes" member attributes with the following indicated syntax:

| 300 Member attribute name | 300 syntax | 300 in request | 300 support |
|--|--------------------------|-----------------------------|----------------------|
| 301 ----- | 301 ----- | 301 ----- | 301 ----- |
| 302 "job-notify-event-groups" | 302 1setOf type2 keyword | 302 MAY | 302 mandatory |
| 303 "job-notify-recipients" | 303 1setOf uri | 303 SHOULD SHALL | 303 mandatory |
| 304 <u>"job-notify-content-type"</u> | 304 <u>mimeMediaType</u> | 304 <u>MAY</u> | 304 <u>mandatory</u> |
| 305 "job-notify-charset" | 305 charset | 305 MAY | 305 mandatory |
| 306 "job-notify-natural-language" | 306 naturalLanguage | 306 MAY | 306 optional |
| 307 "job-notify-additional-attributes" | 307 1setOf keyword | 307 MAY | 307 optional |

308 The "support" column indicates the support required by the IPP object if it supports the
 309 "job-notify" Operation attribute at all. If the IPP object supports the "job-notify"
 310 Operation attribute, the "job-notify event-groups", "job-notify recipients", and "job-
 311 notify charset" member attributes are MANDATORY for the IPP object to support and
 312 the other member attributes are OPTIONAL for support.

313 If the client does not supply the "job-notify" Operation attribute, the Printer object
 314 SHALL reject the request and return the 'client-error-bad-request' status code, since the
 315 syntax is not correctMAY populate the corresponding Job object attribute using the
 316 Notification Default Printer attributes (see section 5.1).

317 For this attribute (like the "job-k-octets", "job-impressions", and "job-media-sheets"
 318 Operation attributes, see [ipp-model]), if the client supplies the attribute, but the Printer
 319 object does not support the "job-notify" Operation attribute or some of its member
 320 attributes, the Printer object ignores the client-supplied "job-notify" value or the member
 321 attributes, respectively.

322 If the client supplies the "job-notify" Operation attribute and the Printer object supports
 323 the "job-notify" Operation attribute, the collection value(s) of the attribute are used to
 324 populate the job object's "job-notify" Job Description attribute (see section 6) according
 325 to the following conditions:

326 If the ~~client supplies the "job-notify" Operation attribute and the Printer supports~~
327 ~~the attribute, and the~~ values of the member attributes are within the range of the
328 corresponding Printer object's "xxx-supported" attributes (see section 7.1), the
329 Printer object SHALL use the collection value(s) to populate the job object's "job-
330 notify" Job Description attribute.

331 If ~~the client supplies the "job-notify" Operation attribute and the Printer supports~~
332 ~~the attribute, but~~ some of the member attributes are not supported, the Printer
333 object SHALL copy such member attributes to the Unsupported Attributes
334 response group with the out-of-band value of 'not-supported', copy the remaining
335 (supported) member attributes to the job object's "job-notify" Job Description
336 attribute, accept the request, and return the 'successful-ok-ignored-or-substituted-
337 attributes' status code.

338 If ~~the client supplies the "job-notify" Operation attribute and the Printer supports~~
339 ~~the attribute, but~~ some of the member attribute values are outside the range of the
340 corresponding Printer object's "xxx-supported" attributes (see section 7.1), the
341 Printer object SHALL copy such member attributes and their values to the
342 Unsupported Attributes response group, substitute or ignore the supplied values,
343 copy the remaining (supported) member attribute values to the job object's "job-
344 notify" Job Description attribute, accept the request, and return the 'successful-ok-
345 ignored-or-substituted-attributes' status code.

346 "The following attributes are defined for use in one or more collection values of the "job-
347 notify" Operation attribute:

348 **5.1.1 job-notify-event-groups (1setOf type2 keyword)**

349 The client OPTIONALLY supplies this attribute as a member of the "job-notify"
350 Operation attribute. The Printer object SHALL support this attribute if it supports the
351 "job-notify" Operation attribute. This attribute specifies one or more event groups for
352 which the end user desires some sort of notification to be sent to one or more notification
353 recipients that the client supplies in the same "job-notify" collection value in the create
354 request for this job.

355 Each event is assigned a keyword value (see section 5.1.1.2). Each of the events is
356 assigned to one of the standard event groups. Each standard group is also assigned a
357 keyword (see section 5.1.1.1), in order to simplify (1) client registration for the events
358 supplied by the client and (2) event filtering by the notification mechanism.
359 Implementers MAY add additional events to a group. Therefore, notification recipients
360 SHOULD check the event that is sent in the notification content (see section 8) to make
361 sure that it is an event that is wanted.

362 **5.1.1.1 Job Notification Groups**

363 This section defines the event groups that a client may register for in the create operation.
364 These event group keywords (not the actual event keywords themselves) are passed as
365 attribute values in the "job-notify-event-groups" Operation attribute in the create request.

366 Standard event group values are:

367 'none': the Printer SHALL not notify on any notification events for this job. This
368 value is useful to prevent notifications when the ~~Printer-object-client~~ has default
369 notification attributes configured.
370 'all': the Printer SHALL notify when any of the supported notification events occur
371 for this job.
372 'delivery': the Printer SHALL notify on any of the following events which, in
373 general, pertain to the progress of delivering the job to the Printer:
374 'job-received', 'job-started-processing', ~~'print-deadline-exceeded'~~
375 'progress': the Printer SHALL notify on any of the following events which, in
376 general, pertain to the progress of pending or actually interpreting, marking,
377 finishing or otherwise processing the job by the Printer object:
378 'job-held', 'job-released', 'sheet-completed', 'collated-copy-completed'
379 'problems': the Printer SHALL notify on any of the following events which, in
380 general, pertain to problems with the job or the Printer. The notification recipient
381 is able to check the "job-state" attribute in the notification content to determine
382 whether this job caused the problem-:
383 'problems'
384 'completion': the Printer SHALL notify on any of the following events which, in
385 general, pertain to ways that a job can end:
386 'job-completed', 'job-aborted', 'job-canceled'
387 'management': the Printer SHALL notify on any of the following events which, in
388 general, pertain to the logistics of print job management and accounting:
389 'job-entry-expired'

390 **ISSUE: What event groups are MANDATORY for a Printer to support?**

391 In a create request, if the client supplies 'none' along with any other combination of
392 values, it is the same as if only that other set of values had been supplied (i.e., the 'none'
393 value has no affect). If the client supplies 'all' along with any other combination of
394 values, it is the same as if only 'all' had been supplied (i.e., the 'all' value subsumes all
395 other values).

396 Note: the group 'progress' is intended for those who wish to receive more frequent,
397 "real-time" progress notifications on a page and copy boundary basis. This is why 'job-
398 started-printing' is in the 'delivery' group, rather than the 'progress' group, for example.
399 An application which was interested in less granular milestones of print job progress
400 would likely register for ~~'delivery'~~, 'completion' and 'problems' (only).

401 **5.1.1.2 Job Notification Events**

402 This section defines the notification events. Each event is a member of an event group.
403 When an event occurs, the event keyword, not the event group, is included in the
404 notification content (see section 8).

405 The standard event values are:

406 'job-received': the Printer SHALL notify when it accepts this job (i.e., when the job is
407 created entering the 'pending' or 'pending-held' (JMP 'pendingHeld' states) (JMP:
408 issued by the agent when the agent creates a row in the MIB for that job).
409 'job-started-processing': the Printer SHALL notify when the Printer starts processing
410 this Job (i.e., when the job leaves the 'pending' state and enters the 'processing'
411 state).
412 'sheet-completed': the Printer SHALL notify when each sheet in this job is completed
413 (i.e., stacked in the output bin).
414 'collated-copy-completed': the Printer SHALL notify when each document copy in
415 this job is completed (i.e., last sheet of a collated copy is stacked in an output bin)
416 'job-held': The Printer SHALL notify when this job enters the 'pending-held' (JMP
417 pendingHeld) state (using some protocol operation not defined in IPP/1.0, but
418 perhaps in another protocol or added as an extension), or the system or device
419 holds the job because of some requirement that cannot be met and other jobs
420 could be processed, if there are any.
421 'job-released': the Printer SHALL notify when this job leaves the 'pending-held' (JMP
422 pendingHeld) state entering the 'pending' or 'processing' states due to the user,
423 operator, or system releasing the held job (using some protocol operation not
424 defined in IPP/1.0, but perhaps in another protocol or added as an extension).
425 'problems': the Printer SHALL notify when this job encounters a problem (i.e., when
426 the job leaves the 'processing' state and enters the 'processing-stopped' state) OR
427 when this job is affected by a Printer problem caused by another job (i.e., when
428 the Printer enters the 'stopped' state while this job is in any of the 'pending' or
429 'pending-held' states, even though the job remains in the 'pending' or 'pending-
430 held' job state). The job attributes sent in the notification content (see section 8)
431 SHALL be for the job that was processing when the problem occurred, not the job
432 for which the registration was submitted. Thus a number of jobs may have
433 registered for this event, and their specified notification recipients will all get the
434 same notification content.

435 ***ISSUE 1: Ok to have combined these two events into one***
436 ***event (and one event group) for simplicity and specified that***
437 ***the notification content is the same for all notification***
438 ***recipients receiving this event?***

439 'job-completed': the Printer SHALL notify when this job completes processing (with
440 or without errors or warnings) and enters the 'completed' state.
441 'job-aborted': the Printer SHALL notify when this job was aborted by the system
442 while in the 'processing' or 'processing-stopped' state, due to some encountered
443 problem that cannot be remedied by human intervention.
444 'job-canceled': the Printer SHALL notify when this job was canceled by the user or
445 operator using the Cancel-Job operation while the job was in any state .
446 ~~'job-deadline-to-start-exceeded': the Printer SHALL notify when this job has not~~
447 ~~started-process before the job's "job-deadline-to-start" time arrived.~~

448 ***ISSUE 2: Should we register a "job-deadline-to-start" Job***
449 ***Template attribute for use with IPP/1.0?***

450 'job-entry-expired': - the Printer SHALL notify when the Printer (or SNMP agent)
451 removes the job from the system so that the job is no longer available via the Get-
452 Jobs or Get-Job-Attributes operations after being in the 'completed', 'aborted', or
453 'canceled' states for a time period that depends on implementation and site policy
454 (JMP: when agent removes the MIB row).

455

456 5.1.2 job-notify-recipients (1setOf uri)

457 The client OPTIONALLY supplies this attribute as a member of the "job-notify"
458 Operation attribute. The Printer object SHALL support this attribute if it supports the
459 "job-notify" Operation attribute. This attribute describes both where (the address) and
460 how (the mechanism for delivery) events are to be delivered. The Printer object SHALL
461 use this attribute as the set of addresses and methods for sending notifications when one
462 of the events occurs that the client supplied in the "job-notify-event-groups" member
463 attribute in the same "job-notify" collection value "in the create request for this job. The
464 Printer object MAY achieve the registration and event notification delivery either (1)
465 itself or (2) by using some (unspecified) notification service that supports the requested
466 mechanism of notifying the notification recipients. Either implementation choice
467 SHALL be transparent to clients and notification-recipients.

468 Standard uriScheme values are:

469 'mailto': a text message via email to the specified email address
470 'http': an HTML formatted message via an HTTP POST method to the specified URI
471 'ftp': a text message via an FTP 'append' command to the specified remote file.

472

473 The following values are not yet standardized or registered. Some of them represent
474 work in progress. They will be registered following the procedures [url-reg]. See
475 also [cohen] for HTTP URL schemes for notification.

476

477 **ISSUE: Which schemes do we want to progress?**

478

479 'page': a pager phone number to call as specified by the /phone-number parameter in
480 the URL.

481 'tcp-ip-sockets': a notification via a TCP/IP socket that is opened by the Printer object
482 on the IP address specified in the URI (using IP address dot notation) using the
483 port on that host specified using the /port=nnn keyword. For example:

484 tcp-ip-socket:13.240.120.138/port=6000

485 would cause the Printer object to open the TCP/IP port 6000 at IP address
486 13.240.120.138.

487 'snmpv1': a notification as an SNMPv1 trap to the host specified as the address in the
488 URI.

489 Note: by specifying different port numbers for each registration on different
490 Printers, a notification recipient can differentiate between events from different
491 Printers, even when the "job-notify-additional-attributes" attribute is not
492 supported.

493 'snmpv2': a notification as an SNMPv2 inform to the host specified as the address in
494 the URI.

495 'snmpv3': a notification as an SNMPv3 inform to the host specified as the address in
496 the URI.

497 'sense': a notification as a SENSE UDP data gram that is opened by the Printer object
498 on the IP address specified in the URI (using IP address dot notation) using the

499 port on that host specified using the /port=nnn keyword. See the tcp-ip-socket
500 example.

501

502 The Printer object SHALL validate that the schemes supplied in the "job-notify-
503 recipients" is supported by comparing with the Printer object's "job-notify-schemes-
504 supported".

505 If the Printer object supports the "job-notify" Operation attribute, it MUST support the
506 'mailto' scheme for "job-notify-recipients". **ISSUE: Is it too hard to require and**
507 **embedded device to include sending e-mail?**

508

509 **5.1.3 job-notify-content-type (mimeMediaType)**

510 The client OPTIONALLY supplies this attribute as a member of the "job-notify"
511 Operation attribute. The Printer object SHALL support this attribute if it supports the
512 "job-notify" Operation attribute. This attribute specifies the type of content that is sent in
513 the notification. Thus the client can control whether the event notification content is
514 human readable, machine readable, or both.

515 Standard values are:

516 'multi-part/alternative' - contains both human consumable notification content
517 using the 'text/plain' MIME media type and machine consumable
518 notification content using the 'application/ipp' MIME media type with the
519 Get-Job-Attributes response encoding of the attributes listed in Table 1.
520 This value SHALL be supported and is the default, if the client does not
521 supply the "job-notify-content-type" member attribute.

522
523 'application/ipp' - the machine consumable notification content using the
524 'application/ipp' MIME media type [ipp-model] with the Get-Job-
525 Attributes response encoding of the attributes listed in Table 1.

526
527 'text/plain' - the human consumable notification content. If the charset is other
528 than US-ASCII, the /charset parameter SHALL be included in the event
529 notification content. RFC 2046 indicates that the absence of the charset
530 parameter SHALL mean US-ASCII rather than simply unspecified
531 [RFC2046].

532 **5.1.35.1.4 job-notify-charset (charset)**

533 The client OPTIONALLY supplies this attribute as a member of the "job-notify"
534 Operation attribute. The Printer object SHALL support this attribute if it supports the
535 "job-notify" Operation attribute. This attribute specifies the charset for the IPP object to
536 use in the human readable part of the notification content that is sent to the notification
537 recipients that the client supplied in this same collection value. If the attribute is not
538 supplied, the charset supplied in the "attributes-charset" Operation attribute SHALL be
539 used, if the charset value is supported by the Printer, else the Printer object shall use the
540 Printer's "charset-configured" value.

541 **5.1.45.1.5 job-notify-natural-language (naturalLanguage)**

542 The client OPTIONALLY supplies this attribute as a member of the "job-notify"
543 Operation attribute. The Printer object OPTIONALLY supports this attribute if it
544 supports the "job-notify" Operation attribute. This attribute specifies the natural language
545 for the IPP object to use in the human readable part of the notification content is sent to
546 the notification recipients that the client supplied in this same collection value. If this
547 attribute is not supported or the supplied value is not supported, the IPP Printer SHALL
548 return the attribute in the Unsupported Attributes Group but still accept the operation, as
549 with all create operations. If this attribute is not supplied or the attribute or value is not
550 supported by the Printer object, the natural language supplied in the "attributes-natural-

551 language" create operation attribute SHALL be used, if that natural language value is
552 supported by the Printer, else the Printer object SHALL use the Printer's "natural-
553 language-configured" value. See the Print-Job operation in [ipp-model].

554 **5.1.55.1.6 job-notify-additional-attributes (1setOf keyword)**

555 The client OPTIONALLY supplies this attribute as a member of the "job-notify"
556 Operation attribute. The Printer object OPTIONALLY supports this attribute if it
557 supports the "job-notify" Operation attribute. This attribute specifies the additional
558 attributes that the requester wishes to be included in the notification content, in addition
559 to the fixed set that depends on the event as shown in the table in section 8. If this
560 attribute is not supported or not supplied by the client, the Printer object SHALL supply
561 the fixed set of attributes indicated in section 8 depending on the event being requested.

562

563 **6 ~~Notification-Job~~ Object attributes for Job Notification**

564 **6.1 "job-notify" (1setOf collection)**

565 This attribute specifies one or more collections of events, notification-recipients, and
566 other member attributes that the client supplied in the "job-notify" Operation attribute of
567 the create request ~~and/or the Printer object defaulted~~. The Printer object SHALL support
568 this Job attribute if it supports the "job-notify" Operation attribute. See the description of
569 the "job-notify" Operation attribute for the complete specification of the semantics of this
570 Job Description attribute.

571 **7 ~~Notification-Printer~~ Object attributes for Job Notification**

572 If the Printer object supports the "job-notify" Operation attribute for the Print-Job, Print-
573 URI, and Create-Job operations, then the Printer object SHALL support the following
574 ~~default and~~-supported Printer object attributes that correspond to the "job-notify" member
575 attributes supported.

576 Note: These Printer attributes are specified as separate Printer object attributes, rather
577 than as member attributes of a Printer object's collection attribute, since any combination
578 of values may be used for any of the attributes.

| 579 | -----+-----+-----+ Operation and 580 Job Attribute | Printer: Default Value 581 Attribute | Printer: Supported Values Attribute |
|-----|--|--|--|
| 582 | -----+-----+-----+ job-notify-event- 583 groups 584 (1setOf type2 585 keyword) | job_notify_event- 586 groups_default 587 (1setOf type2 keyword) | job-notify-event- groups-supported (1setOf type2 keyword |
| 588 | -----+-----+-----+ job-notify- 589 recipients 590 (1setOf uri) | job_notify- 591 recipients_default 592 (uriScheme) | job-notify- schemes recipients-supported (1setOf uriScheme) |
| 593 | -----+-----+-----+ job-notify- 594 content-type 595 (mimeType) | job_notify-content- 596 type-supported 597 (1setOf mimeType) | job-notify-content- type-supported (1setOf mimeType) |
| 598 | -----+-----+-----+ job-notify-charset 599 (1setOf charset) | job_notify_charset- 600 default 601 (charset) | job-notify-charset- supported (1setOf charset) |
| 602 | -----+-----+-----+ job-notify- 603 natural-language 604 (naturalLanguage) | job_notify-natural- 605 default 606 (naturalLanguage) | job-notify-natural- language-supported (1setOf naturalLanguage) |
| 607 | -----+-----+-----+ job-notify- 608 additional- 609 attributes (1setOf keyword) | job_notify- additional- attributes_default (1setOf keyword) | job-notify- additional- attributes-supported (1setOf keywords) |

610

611 ~~4.1 Notification Default Printer attributes~~

612 ~~The value of the Printer object's "job-notify-recipients-default" attribute is a 'uriScheme'.~~
613 ~~If the Printer object supports this attribute, the Printer object adds additional characters to~~
614 ~~form the 'uri' value for the job's "job-notify-recipients" member attribute of the "job-~~
615 ~~notify" Job attribute.~~

616 ~~The client MAY omit the "job-notify-recipients" member attribute, if the Printer object~~
617 ~~supports "job-notify-recipients-default". However, if the Printer object does NOT~~
618 ~~support the "job-notify-recipients-default" Printer attribute, the client MUST supply the~~
619 ~~"job-notify-recipients" member attribute. That is why the table specifies that the client~~
620 ~~SHOULD supply the "job-notify-recipients-default" in order to interoperate with any~~
621 ~~Printer object.~~

622 4.27.1 **Notification Supported Printer attributes**

623 The value of the Printer object's "job-notify-recipients-supported" attribute is a
624 'uriScheme'. The Printer object SHALL use the values of this attribute to validate the
625 scheme supplied by the client in the "job-notify-recipients" member attribute. These
626 Printer **object** attributes specify the supported values for the corresponding member
627 attributes of the "job-notify" Operation collection attribute.

628 For example, if a Printer object supports:

- 629 1) 'mailto:' method for the 'job-completed', 'job-canceled', and 'job-aborted' events
630 using English, French, U.S. English, and German and supporting additional
631 attributes: "job-uri", "job-name", "job-originating-user-name", "number-of-
632 documents", "job-state", "sides", "finishing"
633 2) 'sense' and 'tcp/ip-socket' methods for the 'job-received', 'job-started', 'job-
634 completed', 'job-aborted', 'job-canceled' events in English only

635 a system administrator could configure the following Printer attributes":

636 "job-notify-~~schemes-supported~~addresses" = 'mailto', 'sense', 'tcp-ip-sockets'

637 "job-notify-event-groups-~~supported~~" = 'delivery', 'completed'

638 "job-notify-natural-language-~~supported~~" = 'en', 'fr', 'en-us', 'de'

639 "job-notify-additional-attributes-~~supported~~" = 'job-uri', 'job-name',

640 'job-originating-user-name', 'number-of-documents',

641 'job-state', 'sides', 'finishing'

642 Note: the fact that not all events are supported for the mailto scheme, or that not all
643 languages are supported for the 'sense' and 'tcp-ip-sockets' methods is not represented,
644 since the collection mechanism is not used to represent the supported attributes. If the
645 client supplies a combination that is not supported, the Printer object SHALL accept the
646 create request (independent of the value of the "ipp-attribute-fidelity" attribute supplied
647 by the client), make suitable substitutions, and return the attributes that are ignored or
648 substituted in the create operation response.

649 **8 Operations to Register and Un-register for notifications**

650 There are two new OPTIONAL operations to allow a client or server to register for
651 Printer object events without submitting a job. These new operations are intended for use
652 by servers that control printers, by clients used by operators/administrators that manage
653 printers, and by applications that collect accounting data.

654 **8.1 Register-For-Event-Notifications Operation**

655 This OPTIONAL operation allows a client to register with the Printer object to be
656 notified when identified events happen to the device(s) that the Printer object is
657 representing without requiring that the client submit jobs. In the request, the client
658 supplies the set of Printer event group names in which the notification-recipient is
659 interested. In the response, the Printer object returns a list of the current registrations,
660 including the new one requested by this operation.

661 This operation is intended for use by system operators and administrators that have a long
662 term interest in the events without submitting jobs. It is also intended to be used by
663 servers that control IPP Printers. Finally, it is also intended to be used by accounting
664 applications that need to be notified when jobs complete.

665 For Printer objects, the possible names of event groups are the same as for use in the
666 "job-notify" Operation attribute in create requests.

667 It is NOT REQUIRED that a Printer object support all event groups or all events within
668 the supported event groups.

669 **8.1.1 Register-For-Event-Notifications Request**

670 The following sets of attributes are part of the Register-For-Event-Notifications Request:

671 Group 1: Operation Attributes

672 Target:

673 The "printer-uri" operation attribute which is the target for this operation as
674 described in section **Error! Reference source not found.**

675

676 Natural Language and Character Set:

677 The "attributes-charset" and "attributes-natural-language" attributes as described
678 in section **Error! Reference source not found.**

679

680 Requesting User Name:

681 The "requesting-user-name" attribute SHOULD be supplied by the client as
682 described in section **Error! Reference source not found.**

683

684 "printer-notify" (1setOf collection) :

685 The client SHALL supply a "printer-notify" Operation attribute that MUST
686 specify the notification-recipient(s), and MAY specify additional information
687 about the registration. The value of this attribute is one or more collection values.
688 Each collection value SHALL contain a "job-notify-recipients" member attribute

689 and MAY contain any of the other *member* attributes defined for use with the
690 "job-notify" Operation attribute in create operations. The Printer object MUST
691 support this Operation attribute (if it supports this OPTIONAL operation). If the
692 client omits this attribute, the Printer SHALL reject the operation and return the
693 'client-error-bad-request' status code.

694
695 ISSUE: If we agree to these operations, we should remove the "job-" prefix on all
696 the member attributes in the "job-notify" collection attribute, so that the same
697 collection can be used with the "printer-notify" Printer attribute as well.

698
699 The Printer object SHALL validate that this client is permitted to register for
700 notifications. The means for configuring the permissions is outside the scope of this
701 specification. If a requester is not permitted to register for notifications, the IPP Printer
702 SHALL reject the request and return the 'client-error-authenticated' or 'client'-error-not-
703 authorized' status code.

704 If the IPP Printer object accepts the request, it SHALL add the registration to the Printer
705 object's "printer-notify" attribute. The Printer object SHALL add a "notify-registration-
706 id" member attribute with a unique integer id for each collection value added. This id is
707 used to un-register using the Un-Register-For-Event-Notifications operations. If this
708 client had already registered, this registration will be added to the value of the "printer-
709 notify" attribute anyway. Clients SHOULD remove registrations that are no longer
710 wanted using the Un-Register-For-Event-Notifications operation.

711 8.1.2 Register-For-Event-Notifications Response

712 The Printer object returns the following sets of attributes as part of Register-For-Event-
713 Notifications Response:

714 Group 1: Operation Attributes

Status Code and Message:

715 The response includes the MANDATORY status code and an OPTIONAL
716 "status-message" (text) operation attribute as described in section **Error!**
717 **Reference source not found.**

718
719

Natural Language and Character Set:

720 The "attributes-charset" and "attributes-natural-language" attributes as described
721 in section **Error! Reference source not found.**

722
723

724 Group 2: Unsupported Attributes

725 This is a set of Operation (member) attributes supplied by the client (in the
726 request) that are not supported by the Printer object or that conflict with one
727 another (see sections **Error! Reference source not found.** and **Error! Reference**
728 source not found.).

729

730 Group 3: Printer Object Attributes

731 The updated "printer-notify" attribute that contains the requested registration(s)
732 supplied in this operation request, along with any that have been previously
733 registered by any client.
734

735 **8.2 Un-Register-For-Event-Notifications Operation**

736 This OPTIONAL operation allows a client to un-register with the Printer object for event
737 notifications that had been registered previously using the Register-For-Event-
738 Notification operation. In the request, the client supplies the notify-registration-id
739 attribute that the Printer object created in the Register-For-Event-Notifications operation.
740 In the response, the Printer object returns a list of the current registrations which SHALL
741 NOT include the ones removed by this operation.

742 This operation is intended for use by system operators and administrators that have a long
743 term interest in the events without submitting jobs. It is also intended to be used by
744 servers that control IPP Printers. Finally, it is also intended to be used by accounting
745 applications that need to be notified when jobs complete.

746 **8.2.1 Un-Register-For-Event-Notifications Request**

747 The following sets of attributes are part of the Un-Register-For-Event-Notifications
748 Request:

749 Group 1: Operation Attributes

750 Target:

751 The "printer-uri" operation attribute which is the target for this operation as
752 described in section **Error! Reference source not found.**
753

754 Natural Language and Character Set:

755 The "attributes-charset" and "attributes-natural-language" attributes as described
756 in section **Error! Reference source not found.**
757

758 Requesting User Name:

759 The "requesting-user-name" attribute SHOULD be supplied by the client as
760 described in section **Error! Reference source not found.**
761

762 "notify-registration-id" (integer(1:MAX)):

763 The client SHALL supply a "notify-registration-id" Operation attribute that
764 specifies a registration id assigned by the Printer object in a previous Register-
765 For-Event-Notifications. The Printer object MUST support this Operation
766 attribute (if it supports this OPTIONAL operation). If the client omits this
767 attribute, the Printer SHALL reject the operation and return the 'client-error-bad-
768 request' status code.
769

770 The Printer object SHALL validate that this client is permitted to un-register notifications
771 in general and this notification registration in particular. The means for configuring the
772 permissions is outside the scope of this specification. If a requester is not permitted to

773 un-register for notifications in general or for the requested registration, the IPP Printer
774 SHALL reject the request and return the 'client-error-authenticated' or 'client-error-not-
775 authorized' status code. If the value of the "notify-registration-id" is not found, the IPP
776 Printer SHALL reject the request and return the 'client-error-not-found' status code.

777 If the IPP Printer object accepts the request, it SHALL remove the requested event
778 notification registration from the Printer object's "printer-notify" attribute. Clients
779 SHOULD remove registrations that are no longer wanted using this operation.

780 **8.2.2 Un-Register-For-Event-Notifications Response**

781 The Printer object returns the following sets of attributes as part of Register-For-Event-
782 Notifications Response:

783 Group 1: Operation Attributes

784 Status Code and Message:

785 The response includes the MANDATORY status code and an OPTIONAL
786 "status-message" (text) operation attribute as described in section **Error!**
787 **Reference source not found.**

789 Natural Language and Character Set:

790 The "attributes-charset" and "attributes-natural-language" attributes as described
791 in section **Error! Reference source not found.**

793 Group 2: Unsupported Attributes

794 This is a set of Operation (member) attributes supplied by the client (in the
795 request) that are not supported by the Printer object or that conflict with one
796 another (see sections **Error! Reference source not found.** and **Error! Reference**
797 **source not found.**)

799 Group 3: Printer Object Attributes

800 The updated "printer-notify" attribute that no longer contains the event
801 notification registration that was requested to be removed.

802 **9 Printer Object Attributes for Printer Notification**

803 If the Printer object supports the Register-For-Event-Notifications operations, then the
804 Printer object SHALL support the following supported Printer object attributes that
805 correspond to the "printer-notify" member attributes supported.

806 Note: These Printer attributes are specified as separate Printer object attributes, rather
807 than as member attributes of a Printer object's collection attribute, since any combination
808 of values may be used for any of the attributes.

809 **NOTE: The following assumes that we have removed the "job-" prefix on the collection**
810 **member attributes.**

| | | |
|-----|-----------|--------------------|
| 811 | +=====+ | |
| 812 | Operation | Printer: Supported |
| 813 | Attribute | Values Attribute |

| | | |
|-----|-------------------|-------------------------|
| 814 | +-----+-----+ | |
| 815 | notify-event- | printer-notify-event- |
| 816 | groups | groups-supported |
| 817 | (1setOf type2 | (1setOf type2 keyword |
| 818 | keyword) | |
| 819 | +-----+-----+ | |
| 820 | notify-recipients | printer-notify-schemes |
| 821 | | -supported |
| 822 | (1setOf uri) | (1setOf uriScheme) |
| 823 | +-----+-----+ | |
| 824 | notify- | printer-notify-content- |
| 825 | content-type | type-supported |
| 826 | (mimeType) | (1setOf mimeType) |
| 827 | +-----+-----+ | |
| 828 | notify-charset | printer-notify-charset- |
| 829 | (1setOf charset) | supported |
| 830 | | (1setOf charset) |
| 831 | +-----+-----+ | |
| 832 | notify- | printer-notify-natural- |
| 833 | natural-language | language-supported |
| 834 | (naturalLanguage) | (1setOf |
| 835 | | naturalLanguage) |
| 836 | +-----+-----+ | |
| 837 | notify- | printer-notify- |
| 838 | additional- | additional- |
| 839 | attributes | attributes-supported |
| 840 | (1setOf keyword) | (1setOf keywords) |
| 841 | +-----+-----+ | |

842

843 10 Notification Content definitions

844 Just as applications need a defined (extendable) set of notifications, they also need a fixed
845 structure and reliable notification content. The notification content depends on the event.
846 For all events, except the 'problems' event, the job to which the event occurred is the
847 same as the job for which the registration was specified in the create job operation. For
848 the 'problems' event, the eat attributes that are included in the notification content are for
849 the job that caused the event, not the jobs that registered for the event. Thus when a
850 queue of jobs all register for the 'problem' event, their specified notification-recipients all
851 receive the same notification content (for the job that caused the problem event on the
852 Printer).

853 An IPP Printer object MAY also implement the "job-notify-additional-attributes"
854 Operation member attribute in order to allow a client to request additional attributes over
855 and above the fixed set shown in Table 1. Note: a client may wish to request the
856 "printer-uri" attributes in order for the recipient to receive the URI of the printer, in case
857 the recipient needs to obtain additional job and printer attributes using the Get-Job-
858 Attributes and Get-Printer-Attributes operation.

859 [Some delivery methods, such as SNMP, do not support the requester requesting
860 additional attributes; the notification recipient will have to explicitly use a Get-Job-
861 Attributes or Get-Printer-Attributes operation to get additional attributes about the job or
862 device.]

863 ~~Some~~ All IPP delivery methods SHALL support (via the "job-notify-content-type"
864 member attribute) the ability to encode the notification content as a 'multi-part/alternative'
865 MIME media type in order to represent both (1) the human readable-processable
866 'text/plain' MIME media type alternative and (2) a ~~program-machine~~ processable
867 alternative using the 'application/ipp' MIME media type [ipp-model] with the Get-Job-
868 Attributes response encoding of the attributes listed in Table 1. The client MAY select
869 the content type by supplying the "job-notify-content-type" member attribute in the "job-
870 notify" collection attribute.

871 [IPP does not have some of the job progress attributes that the PWG Job Monitoring has.
872 These are indicated with "-" in the IPP attribute column.]

873 ***~~ISSUE 3: Do we need/want to add these missing attributes to IPP as~~***
874 ***~~Printer object attributes?~~***

875

876 **Table 1 - Mandatory attributes sent in notification content depending on the event**

| IPP attribute (content) | JMP attribute (content) | Event | | | | |
|----------------------------|----------------------------------|--------------|---|---------------------|-------------------------|---|
| | | job-received | job-started-processing, print-deadline-exceeded job-held, job-released | <u>job-problems</u> | <u>printer-problems</u> | sheet-completed, collated-copy-completed, job-completed, job-aborted, job-canceled, job-entry-expired |
| job-uri | jmJobSubmissionID | Yes | Yes | <u>Yes</u> | Yes*** | - |
| job-id | jmJobIndex | Yes | Yes | <u>Yes</u> | Yes*** | Yes |
| number-of-intervening-jobs | jmNumberOfInterveningJobs | Yes | Yes | <u>Yes</u> | Yes | - |
| job-k-octets | jmJobKOctetsPerCopyRequested | - | Yes | <u>Yes</u> | Yes | Yes |
| job-k-octets-processed | jmJobKOctetsProcessed | - | - | <u>Yes</u> | Yes | Yes |
| job-impressions | jmJobImpressionsPerCopyRequested | - | Yes* | <u>Yes*</u> | Yes* | Yes* |
| - | impressionsInterpreted | - | - | <u>Yes</u> | Yes | Yes |
| job-impressions-completed | jmJobImpressionsCompleted | - | - | <u>Yes</u> | Yes | Yes |
| copies | jobCopiesRequested | - | - | <u>Yes</u> | Yes | Yes |
| - | impressionsCompletedCurrentCopy | - | - | <u>Yes</u> | Yes | Yes |
| - | sheetCompletedCopyNumber | - | - | <u>Yes</u> | Yes | Yes |
| - | sheetCompletedDocumentNumber | - | - | <u>Yes</u> | Yes | Yes |
| - | jobCollationType | - | - | <u>Yes</u> | Yes | Yes |
| - | outputBin | - | - | - | - | Yes** |
| job-state | jmJobState | - | - | <u>Yes</u> | Yes | - |

877

| | | | | | | |
|-------------------|--------------------|--------------|---|---------------------|-------------------------|---|
| | | job-received | job-started-processing, print-deadline-exceeded job-held, job-released | <u>job-problems</u> | <u>printer-problems</u> | sheet-completed, collated-copy-completed, job-completed, job-aborted, job-canceled, job-entry-expired |
| job-state-reasons | jmJobStateReasons1 | Yes | Yes | | | Yes |

878

879 '!' indicates that the attribute SHALL NOT be included in the notification content.

880 * The IPP Printer object will treat jmJobImpressionsPerCopyRequested in the following
881 manner. If explicitly *passed in on submission*, this will be the value used. If there is no
882 value passed in on submission, then the *implicit value, derived from the final number of*
883 *impressionsInterpreted for the first copy will be used.*

884

885 ** outputBin may be multi-valued

886 *** Depending on the security policy in force, the "job-uri" and "job-id" attributes MAY
887 NOT be sent to some notification-recipients.

888 **ISSUE:** The above table does not contain a number of attributes that the Printer MIB
889 generates on an alert: prtAlertSeverityLevel, prtAlertTrainingLevel, prtAlertLocation,
890 prtAlertDescription, prtAlertTime. Should we add them? To which event?

891 Note: the 'delivery' group has different patterns of attributes sent in the notification
892 content, so that the IPP Printer object would have to register with the SNMP agent using
893 several different SNMP trap OIDs because the VarBind lists must be different.

894 NOTE: The following objects and attributes have not been included in the fixed set of
895 attributes that SHALL be returned for the indicated reasons (they MAY be requested in
896 implementations that support the "ipp-notify-additional-attributes" attribute):

- 897 1) "job-state" (JMP jmJobState) - the event indicates the job's new state.
898 2) "job-owner" (JMP jobOwner) - the notification recipient should know who the
899 owner is. Also the owner is a string, so it can be long. The total size of the
900 content must fit in the maximum size of a PDU for any transport, which is
901 about 500 octets or so (for IPX).
902 3) For an IPP device, the jmJobSubmissionID is "job-uri", at least the last 47
903 octets of it.

904 11 Encoding

905 The new 'collection' attribute syntax will use the 0x34 tag value that has been reserved ~~for~~
906 ~~the 'dictionary' attribute syntax in~~ the IPP/1.0: Protocol Specification for this purpose.

907 ~~*ISSUE 4-- Should we change the name that is reserved in the IPP/1.0:*~~
908 ~~*Protocol Specification from 'dictionary' to 'collection' before the RFC is*~~
909 ~~*published?*~~

910 **12 References**

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