3
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6   IPP Event Notifications (Very Short)

7   Version 0.54

8   Abstract

9   This document describes an extension to the IPP/1.0 model that allows end users to
10 subscribe to printing related events as part of job submission. This type of subscription is
11 called "Job Submission Subscription". See a companion white paper entitled: "Job
12 Independent Subscriptions for IPP" [ipp-sub] for operations to subscribe to the same
13 printing related events that is independent of job submission.

14 With either subscription method, a subscription includes:

15   -   the names of groups of events that are of interest to the subscriber
16   -   the delivery methods and addresses to use for event reports (socket, email, etc.)

17 A subscription does *not* include

18   -   complicated lists and sets of names of individual events that are of interest to the
19   subscriber
20   -   arbitrary lists of additional attributes to be returned in the event report
21   -   specification of which format to use in the event report (the delivery method
22   implicitly defines the format that is used)

23 A simple method is provided for subscribing to printing related events:

24   -   Two new subscription attributes are supplied by the client as part of an IPP create
25   request (Print-Job, Print-URI, Create-Job, Validate-Job)

26 An event is some occurrence (either expected or unexpected) within the printing system.
27 Events can be classified using two dimensions:

28   -   Either as Job Events or Device Events, and
29   -   Either as Errors, Warnings, or Reports

30 When the event occurs, an event report is generated and delivered using the information
31 specifiede to in the job's subscription which was submitted with the job.

32
33   **Table of Contents**

57

1 Summary of the proposal

59 This proposal includes the following concepts:

60 1. Two new multi-valued subscription operation attributes are defined:

```
61      attribute name                  Syntax
62      --------------                  ------
63      "notify-recipients"             1setOf uri
64      "notify-event-groups"           1setOf type2 keyword
65
```

66   The presence of the "notify-recipients" indicates that notification is desired. The
67   values of "notify-recipients" are URIs that identify the notification delivery method
68   and delivery address to use for event reports (See Section 4.1.1). The delivery
69   method dictates the event report content type to be used. For example, 'mailto' uses
70   "text/plain" and 'ipp-tcp-notify' uses "application/ipp". The values for "notify-event-
71   groups" are keywords representing job event groups or, device event groups, or both
72   (See Section 4.1.2). Each event groups implies a set of attributes to be sent in the
73   event report. Some delivery methods imply a fixed subset of the event groups. For
74   example, the 'mailto' delivery method only uses the 'job-completions-basic' event
75   group.

76

77 2. These subscription operation attributes can be supplied by the client in any of the IPP
78   job submission operations: Print-Job, Print-URI, Create-Job, and Validate-Job.
79   Subscriptions that include interest in job event groups apply only to the job being
80   submitted and no other job.

81

82 3. Each Printer object supports new attributes that describe the notification delivery
83   methods and the event groups that it supports: "notify-recipients-schemes-supported"
84   and "notify-event-groups-supported".

85 4. Each Printer object supports new Job Description attributes: "job-trigger-event" and
86   "job-trigger-date-time" that store the current/last event and its date/time.

87 5. Each Printer object supports new Printer Description attributes: "device-trigger-
88   event" and "device-trigger-date-time" that store the current/last event and its
89   date/time.

90 As events occur, for each event the Printer searches the set of subscriptions for any
91 interest in that event. As the Printer finds that some entity is interested in that event (the
92 entity is subscribed to the group of events to which the event belongs), an event report is
93 generated and delivered using the methods and target addresses identified in the
94 subscription.

2 Terminology

96

97 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD
98   NOT, MAY, NEED NOT, and OPTIONAL, have special meaning relating to

99   conformance. These terms are defined in [ipp-mod section 13.1 on conformance
100   terminology, most of which is taken from RFC 2119 [RFC2119].
101   **Job Submitting End User -** A human end user who submits a print job to an IPP
102   Printer.
103   **IPP Client -** The software component on the client system which implements the IPP
104   protocol.
105   **Job Recipient -** A human who is the ultimate consumer of the print job. In many
106   cases this will be the same person as the Job Submitting End User, but need not
107   be.
108   **Job Recipient Proxy -** A human acting on behalf of the Job Recipient. In particular,
109   the Job Recipient Proxy physically picks up the printed document from the
110   Device, if the Job Recipient cannot perform that function.
111   **Subscription-** The set of attributes that indicate the "what, where, who, and how-" for
112   notification. Events Reports are generated for certain events (what) and delivered
113   using various delivery methods (how) to certain addresses (where and who).
114   **Notification Recipient -** Any entity identified as a recipient within a subscription.
115   Some notification recipients are Job Submitting End Users and others are
116   interested third parties, such as the Job Recipient or Job Recipient Proxy.
117   **Notification Recipient Agent -** A program which receives event reports on behalf of
118   the notification recipient.
119   **Event -** An event is some occurrence (either expected or unexpected) within the
120   printing system. Events can be classified using two dimensions:
121   - Either as Job Events or Device Events, and
122   - Either as Errors, Warnings, or Reports
123
124   A Job event is some interesting state change in the Job object, and a Device event
125   is some interesting change in the Printer object. The Printer MIB alerts define the
126   set of interesting Device events [RFC1759] and [draftprtmib].
127
128   A report event is purely informational, such as 'job-completed' or 'printer-
129   accepting-jobs'. A warning is not serious and processing continues (e.g., Printer
130   MIB alerts with the prtAlertSeverityLevel value set to noInterventionRequired).
131   An error is serious and either the job is aborted or the device stops.
132
133   An event occurs for a job or device whether any entity is registered to be notified
134   for that event or not.
135
136   **Event Report -** When an event occurs, an event report is generated that fully
137   describes the event (what the event was, where it occurred, when it occurred,
138   etc.).-. Event reports are delivered to all the notification recipients that are
139   subscribed to that event, if any. The event report is delivered to the address of the
140   notification recipient using the notification delivery method defined in the
141   subscription. However, an Event Report is sent only if there is a corresponding
142   subscription
143   **Notification Delivery Method (**or **Delivery Method** for short) - Event reports are
144   delivered using a method, such as email, TCP/IP, etc.

145   **Immediate Notification -** Event reports that are delivered using a delivery method
146   which is not store-and-forward (e.g. TCP connection, UDP datagram).
147   **Queued Notification -** Event reports that are delivered using a delivery method
148   which has some sort of store-and-forward mechanism (e.g., email).
149   **Human Consumable Event Report -** Event reports that are intended to be consumed
150   by human end users only.
151   **Machine Consumable Event Report -** Event reports that are intended for
152   consumption by a program only**.**
153   **Mixed Format Event Report -** A mixed event report may contain both human
154   consumable and machine consumable information.
155

3   Model for Job and Device Event Notification

156

157 Figure 1 shows the model.

```
158
159
160  Legend:
161
162       A = Client and Notification Recipient
163       B = Notification Recipient (subscription by some third party)
164
165       O A +---------+    Create Request with        ##########
166      /|\  | client/ |----Subscriptions----------->#  IPP    #
167      / \  | notif.  |                              #  Printer #
168      end- | recip.  |<---Job and Device ----------#  Object  #
169      user +---------+    Event Reports             ##########
170                                                         /
171       O B +---------+                                  /
172      /|\  | notif.  |                                 /
173      / \  | recip.  |<---Job and Device -------+
174      end- |         |     Event Reports
175      user +---------+
176
177
```
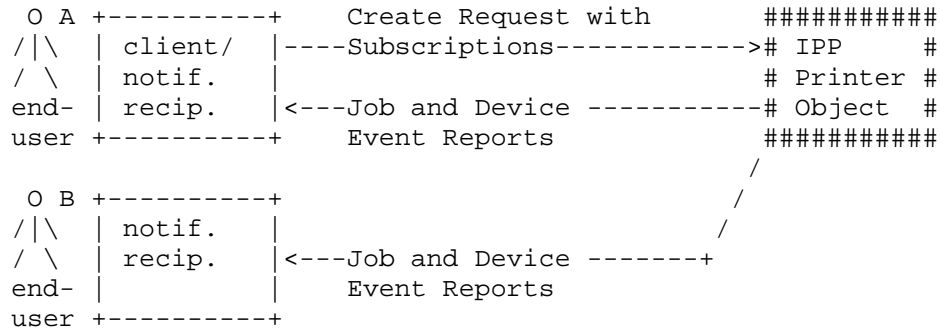
178   **Figure 1 - Model for Job and Device Notification**

179 Note: This model does not mandate that the IPP Printer object implement the full
180 semantics of subscription, report generation, and multiple delivery methods. A simple
181 (embedded) implementation may be configured to use some notification service. Figure
182 2 shows this partitioning.

```
183
184
185
186          Create Request with              ##########
187      ----Subscriptions------------------># IPP     #
188                                           # Printer #
189                                           # Object  #
190                                           ##########
191                                                |
192                              *******|**********
193                        *        Subscriptions    *
194                      *           & Events          *
195                    *                   |
196                   *          +----v---------+
197                  *           | notification |
198      <---Job and Device -------*---------| service      |
199         Event Reports       *           +--------------+
200                              *
201                              *
202
203      *** = Implementation configuration opaque boundary
204
205
```
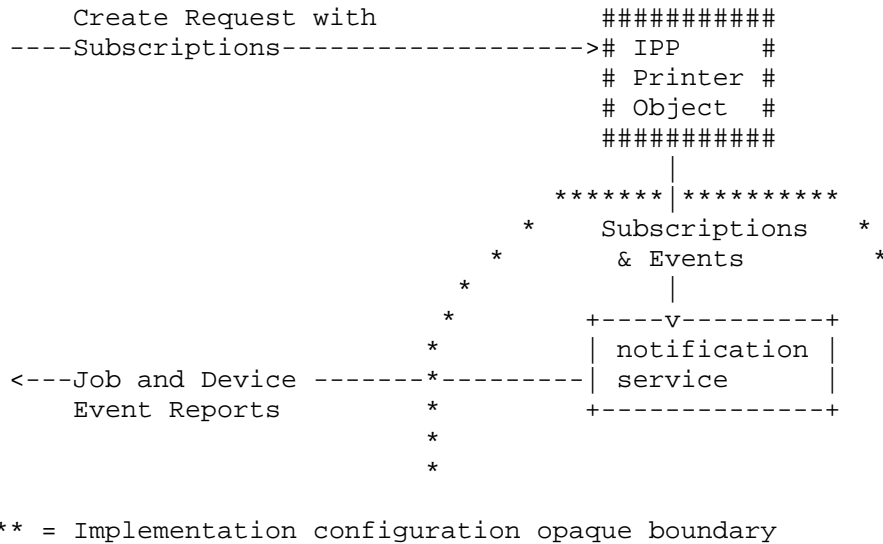
206   **Figure 2 - Opaque Use of a Notification Service**

207   4   New subscription Operation attributes

208   This section specifies two new subscription operation attributes. A client subscribes to
209   event groups by supplying these attributes in any create request (i.e., a Print-Job Request,
210   Print-URI Request, Validate-Job Request, or a Create-Job Request). These attributes are
211   multi-valued attributes; the client can supply more than one value. If the client does not
212   supply these attributes in the operation, there is no subscription made (either implicitly or
213   explicitly).

214   The following rules apply:

215   1. Any subscription can contain job event groups, device event groups, or both.

216   2. The Job Submission Subscription is only valid while the job is "active". The job is
217   "active" while it is in the 'pending', 'processing', and 'processing-stopped' states. The
218   job ceases to be active when it enters the 'pending-held' state or until the time it is
219   done processing and enters any of the 'completed', 'canceled', or 'aborted' states. The
220   job becomes active again when it is released from the 'pending-held' state or is
221   restarted using the Restart-Job operation (see [ipp-ops-set1]). Since no job is created
222   for the Validate-Job operation, the only purpose of supplying the subscription
223   operation attributes in the Validate-Job operation is to validate that the values are
224   supported; the Printer object does not establish a notification subscription as a result
225   of the Validate-Job operation.

226   3. Since a Job Submission Subscription is included within a job submission operation,
227   any interest in job events is limited to ~~only~~ "this job" only (the Job object created
228   because of this job creation operation). There is no mechanism to subscribe to events
229   for all jobs or specifically some job other than this job in a create operation. But see
230   [ipp-sub] for such a mechanism to subscribe persistently for job and printer events
231   independently of any particular job submission.

232   *4.1   Two subscription operation attributes*

233   Two subscription operation attributes are OPTIONALLY supplied by the client in create
234   operations: Print-Job, Print-URI, Create-Job, and Validate-Job. Both operation attributes
235   are REQUIRED to be supported by Printer objects that support this notification
236   specification.

237   ~~1.1.1~~4.1.1 notify-recipients (1setOf uri)

238   The client supplies this operation attribute in a create request in order to subscribe for job
239   events while this job is active. In order to claim conformance to this notification
240   specification, the Printer object MUST support this attribute ~~if it supports the "notify-~~
241   ~~event-groups" attribute~~. This attribute describes both where (the address) and how (the
242   delivery method) event reports are to be delivered when any of the events specified in the
243   "notify-events" attribute occur. If the client does not supply this attribute in a create
244   request, the Printer object MUST not provide any job-based notification for this job.

245   Some notification delivery methods imply a fixed event group, and so ignore the supplied
246   values of "notify-event-groups". These delivery methods may be used with other

247 delivery methods that do not have such restrictions. Unless specified otherwise, a
248 delivery method may be used with any event group.

249 IPP Printer objects MUST support the **'ipp-tcp-notifysocket'** and **'ipp-udp-**
250 **notifydatagram'** delivery methods in order to conform to this notification specification.
251 Support of the other methods is OPTIONAL.

252 Standard uriScheme values are:

253 **'mailto':** a message is sent via email to the specified email address. The "text/plain"
254 event report content format is used for this method (see Section 54.1.2). This
255 delivery method ignores the supplied values of the "notify-event-groups" attribute
256 and implies the 'job-completions-basic' event group ('job-completed', 'job-
257 aborted', 'job-canceled' events). The notification recipient does not acknowledge
258 receipt of the mail message.
259 **'ipp-tcp-notifysocket':** an IPP notification report is sent via a TCP/IP socket that is
260 opened by the Printer object on the IP address specified in the URI using the
261 specified port using the "host:port" HTTP convention. For example:
262   ipp-tcp-notifyip-socket:foo.com13.240.120.138:6000
263 The "application/ipp" event report content format is used for this method (see
264 Section 54.1.2).
265 The event recipient does not respond or acknowledge the event report.
266 ISSUE 1 - What is the default port for this method?
267 ISSUE 2 - Are the origin and destination ports the same or not?
268 ISSUE 3 - Ok that the notification recipient doesn't respond or acknowledge the
269 event report? or should it?
270 **'snmpv1-notify':** a notification report is sent as an SNMPv1 trap to the host specified
271 as the address in the URI. The notification recipient does not acknowledge
272 receipt of the notification event report (trap).
273 **'snmpv2-notify':** a notification report is sent as an SNMPv2 inform to the host
274 specified as the address in the URI. The notification recipient does acknowledge
275 receipt of the notification event report (inform).
276 **'snmpv3-notify':** a notification report is sent as an SNMPv3 inform to the host
277 specified as the address in the URI. The notification recipient does acknowledge
278 receipt of the notification event report (inform).
279 ISSUE 4 - Are these 3 SNMP notification delivery methods ok to keep?
280 **'ipp-udp-notifydatagram':** an IPP notification report is sent via a UDP datagram
281 that is opened by the Printer object on the IP address specified in the URI using
282 the specified port using the "host:port" HTTP convention. For example:
283   ipp-udp-notifydatagram:bar.com13.240.120.138:6000
284 The UDP datagram contains the "application/ipp" event report content format (see
285 Section 54.1.2). The notification recipient does not acknowledge receipt of the
286 notification event report.
287 ISSUE 5 - What is the default port for this method?
288 ISSUE 6 - Are the origin and destination ports the same or not?
289 ISSUE 7 - Ok that the notification recipient doesn't respond or acknowledge the
290 event report? or should it?

291   **'ndps-notify':** an IPP notification report is sent via NDPS notification mechanism.
292   See ???.
293   ISSUE 8 - Need reference to NDPS documentation. Also need more description
294   here, such as which end opens, does the recipient acknowledge, and any salient
295   information about the transport.
296   **'sense-notifydatagram':** a notification report is sent as a SENSE UDP data-gram
297   [sense] that is opened by the Printer object or notification service on the IP
298   address specified in the URI using the specified port using the "host:port" HTTP
299   convention. The notification recipient does acknowledge receipt of the
300   notification event report.

301   ### 1.1.24.1.2 notify-event-groups (1setOf type2 keyword)

302   The client OPTIONALLY supplies this operation attribute in a create request. In order to
303   claim conformance to this notification specification, the Printer object MUST support this
304   attribute if it supports the "notify-recipients" attribute. This attribute identifies the event
305   groups for which a notification event report is desired. If the client does not supply this
306   attribute in a create request, but does supply the "notify-recipients", the Printer object
307   assumes the 'job-completions-basic' event group value.

308   There are both job events and device events. Each job and device event is assigned a
309   keyword to use in the event report. For device events, the various changes in "printer-
310   state", "printer-state-reasons", and "printer-is-accepting-jobs" are used to generate
311   events..

312   Each event is assigned to one or more event groups. Each event group is assigned a
313   keyword. The '-basic' suffix indicates that only the basic set of attributes are to be
314   included in the event report.

315   Standard event group keyword values are:
316   Special event groups:
317   **'none':** no notifications of any events (an IPP object can use this value to indicate
318   that it has is configured not to support for event notification; a client would
319   not subscribe to this group).
320   **'all-basic':** any and all events that the implementation is capable of detecting.
321   **'all-job-events-basic':** all job events (all errors, warnings, and reports).
322   **'all-device-events-basic':** all device events (all errors, warnings, and reports)
323
324   Job Event Groups (See section 6.1 for a description of each job event):
325   **'job-state-changes-basic':** includes 'job-received', 'job-held', 'job-released', 'job-
326   started-processing', 'job-stopped', 'job-continued'.
327   **'job-completions-basic':** includes 'job-completed', 'job-aborted', 'job-canceled'
328   **'job-warnings-basic':** includes 'job-warning' which are any implementation-
329   specific job warning events
330   **'job-errors-basic':** includes 'job-aborted' and any implementation-specific job
331   errors
332
333   Note: The 'job-aborted' event appears in both the 'job-completions-basic' and
334   'job-errors-basic' event groups, since it is both a completion and an error.

335
336   Device Event Groups (See section 7.1 for a description of each job event):
337   **'device-reports-basic':** includes 'started-processing', 'became-idle', 'device-state-
338   reason-removed', 'accepting-jobs', and 'powered-up'any event that is not a
339   warning or an error, i.e., an event that is providing information about the
340   device. Device-report events include:
341   1.the Printer's "printer-state" transitions to the 'processing' or 'idle' state
342   2.removal of a value from the Printer's "printer-state-reasons" attribute,
343   such as 'toner-low-warning' or 'media-jam'
344   3.change of the Printer's "printer-is-accepting-jobs" attribute to 'true'
345   4.1.   the device is powered up.
346
347   From [ipp-mod] section 4.4.11, device reports are indicated as "printer-state-
348   reasons" keywords with a ' report' suffix.   An implementation may choose to
349   omit some or all device-reports. Some device-reports specify finer granularity
350   about the printer state; others serve as a precursor to a warning. A 'device-
351   report' event MUST not indicate anything that affects the printed output.
352
353   Note: Printer MIB equivalent events that fall in this report group include the
354   alertRemovalOfBinaryChangeEntry(1801) alert that indicates that a binary
355   change event entry row has been removed from the Alert Table and any event
356   with the prtAlertSeverityLevel value set to noInterventionRequired(7).
357
358   **'device-warnings-basic':** includes 'device-state-reason-warning-added' and -
359   'not-accepting-jobs'A device-warning event is any non-critical event, i.e., non-
360   critical alert where the Printer object's "printer-state" attribute remains in the
361   'processing' state and the device(s) continue to operate. Device-warning
362   events include:
363   1.addition of an 'xxx-warning' value to the Printer's "printer-state-reasons"
364   attribute, such as 'media-low-warning'
365   2.1.   change of the Printer's "printer-is-accepting-jobs" attribute to 'false'
366
367   From [ipp-mod] section 4.4.11, device warnings are indicated as "printer-
368   state-reasons" keywords with a ' warning' suffix.
369   Note: Printer MIB equivalent examples of device warnings include:
370   inputMediaSupplyLow(807) and markerTonerAlmostEmpty(1104)
371   prtAlertCode values.
372
373   **'device-errors-basic':** includes 'device-stopped', 'device-state-reason-error-
374   added', and 'powering-down'A device error is any critical event, i.e., critical
375   alert where the Printer stops processing. Device-error events include:
376   1.the Printer's "printer-state" transitions to the 'stopped' state

377   2.addition of an 'xxx-error' (or 'xxx' that indicates a device error) value to
378   the Printer's "printer-state-reasons" attribute, such as 'media-empty-
379   error', 'media-empty', or 'media-jam'
380   3.1.   the device is powered down.

381

382   From [ipp-mod] section 4.4.11, device errors are indicated as "printer-
383   state-reasons" keywords with an '-error' suffix or with no suffix at all. For
384   example, 'media-jam' or 'paused'.

385

386   Note: Printer MIB equivalent examples of the device errors include:
387   jammed(8) and markerTonerEmpty(1101) prtAlertCode values.

388

389   ISSUE 9 - This simplified proposal no longer includes returning the Printer MIB alert
390   codes, but relies on "device-trigger-event' and IPP/1.0 [ipp-mod] "printer-state-reasons"
391   keywords, which contain most of the Printer MIB alert codes, except for the generic ones.
392   Ok?

393   ## 5   Event Report Content

394   Event reports are generated using the following content formats:

395   'application/ipp' - machine consumable event report content using the 'application/ipp'
396   MIME media type [ipp-mod] using the Get-Job-Attributes response encoding
397   for job events and Get-Printer-Attributes for device events. The attributes
398   listed in section 5.1 are sent in a notification report for job events. The
399   attributes listed in section 5.2 are sent in a notification report for device
400   events. For any string in any event report, the charset and natural language
401   rules that apply to all IPP operations apply to the event report strings as well,
402   since they are represented as operation responses.

403

404   **'text/plain'** - human consumable event report content type. The text message
405   SHOULD include information about the attributes in section 5.1 for job events or
406   in section 5.2 for device events. If the charset to be used in the mail message is
407   other than US-ASCII, the /charset parameter must be included in the value of this
408   content-type header and in the event notification report content [RFC2046].
409   The notification delivery method dictates the event report content type to be used. For
410   example, 'email to' uses "text/plain" and "ipp-tcp-notifysocket" uses "application/ipp".

411   ### *1.1*5.1   *Basic Job event notification* report *content*

412   This section lists the notification content attributes that MUST be included in any
413   notification event report content for each job event group.   Additional job event groups
414   can be registered which include additional attributes. However, all job event groups
415   MUST include the following "basic" job object attributes in any job event report. All job
416   event reports MUST use the Get-Job-Attributes response syntax. In order to claim
417   conformance to this notification specification, If an IPP Printer supports "notify-

418 recipients", then it MUST support all of the following Job Description attributes, except
419 "status-message" and "job-impressions-completed":
420   job-printer-uri (uri) - see [ipp-mod] section 4.3.3
421   job-id (integer(1:MAX)) - see [ipp-mod] section 4.3.2
422   job-trigger last-event (type2 keyword) - see section 6.1
423   job-trigger last-date-time of event (dateTime) - see section 6.2
424   job-state (type1 enum) - see [ipp-mod] section 4.3.7
425   job-state-reasons (1setOf type2 keyword) - see [ipp-mod] section 4.3.8
426   status-message (text(255)) - see [ipp-mod] section 3.1.6
427   job-impressions-completed (integer(0:MAX)) - see [ipp-mod] section 4.3.21
428

429 ISSUE 10 - How can an event recipient tell the difference between a job event and a
430 device event, if both have been subscribed to? Is looking whether "job-trigger-event"
431 versus "device-trigger-event" is present in the event content ok?

432 ISSUE 11 - Which of the above attributes are sent as Operation Attributes and which are
433 included as Job Attributes in the Get-Job-Attributes response format?

434 ISSUE 12 - Should we define a new operation, say Send-Event (or Send-Job-Event?),
435 which has a format that we specify and so that the event recipient can respond when
436 required to using an IPP operation response depending on the subscription?

437 ISSUE 13 - The data type of "job-trigger-date-time" (dateTime) is needed, so that there is
438 no ambiguity when relaying notifications from server to server which may cross time
439 zones? Proper date and time is especially important when notification is used with IFAX.
440 However, for low end implementations, knowing the date is a burden, even though the
441 date is sent by the client in every HTTP request header.

442 The "job-state-reasons" is an OPTIONAL attribute in [ipp-mod]. However, in order to
443 claim conformance to this notification specification, the Printer object MUST support this
444 Job Description attribute in order to provide necessary information about the event.

445 If "status-message" is supported as an Operation attribute in operation responses, then it
446 MUST be supported in the event report content. If "job-impressions-completed" is
447 supported as a Job Description attribute, then it MUST be supported in event report
448 content. If "status-message" and/or "job-impressions-completed" are not supported, then
449 they are omitted from the event report content.

450 If the values of any of the attributes sent in an event report content are not known, the
451 value sent in the report content is the out-of-band 'unknown' value, rather than omitting
452 the attribute. See [ipp-mod] section 4.1.
453 ISSUE 14: Do we agree to this small sub-set of attributes that MUST be sent in any
454   event report content?

455 ISSUE 15: Do we agree to the ones that are REQUIRED for an IPP Printer to support if
456 it supports notification at all?

1.25.2   Basic device event notification report content

This section lists the notification content attributes that MUST be included in any event report notification content for each device event group.   Additional device event groups can be registered which include additional attributes. However, all device event groups MUST include the following "basic" printer object attributes in any device event report. All device event reports MUST use the Get-Printer-Attributes response syntax. In order to claim conformance to this notification specification, If an IPP Printer supports "notify-recipients", then it MUST support all of the following Printer Description attributes, except "status-message":

ISSUE 16: Do we agree to this small sub-set of attributes that MUST be sent in any event report content?

    printer-uri-supported (uri) - see [ipp-mod] section 4.4.1
    job-id (integer(1:MAX)) - the job id of the current job processing on the printer.
    device-trigger-event (keyword) - the event that caused this notification -
    printerdevice-lasttrigger-date-time-of-event (dateTime) - see section 7.1
    printer-state (type1 enum) - see [ipp-mod] section 4.4.10
    printer-state-reasons (type2 keyword) - see [ipp-mod] section 4.4.11 which includes
        most of the Printer MIB alert codes represented as keywords
    printer-is-accepting-jobs (boolean) - see [ipp-mod] section 4.4.20
    status-message (text(255)) - see [ipp-mod] section 3.1.6

ISSUE 17 - How can an event recipient tell the difference between a job event and a device event, if both have been subscribed to? Is looking whether "job-trigger-event" versus "device-trigger-event" ok?

ISSUE 18 - Which of the above attributes are sent as Operation Attributes and which are included as Job Attributes in the Get-Printer-Attributes response format?

ISSUE 19 - Should we define a new operation, say Send-Event (or Send-Device-Event?) which has a format that we specify and so that the event recipient can respond using an IPP operation response when required to depending on the subscription?

ISSUE 20 - The data type of "device-trigger-date-time" (dateTime) is needed, so that there is no ambiguity when relaying notifications from server to server which may cross time zones? Proper date and time is especially important when notification is used with IFAX. However, for low end implementations, knowing the date is a burden, even though the date is sent by the client in every HTTP request header.

The "printer-state-reasons" is an OPTIONAL attribute in [ipp-mod]. However, in order to claim conformance to this notification specification, the Printer object MUST support this Printer Description attribute in order to provide necessary information about the event.

If "status-message" is supported as an Operation attribute in operation responses, then it MUST be supported in notification event report content. If "status-message" is not supported, then it is omitted from the notification event report content.

498 If the values of any of the attributes sent in an ~~notification~~ event report content are not
499 known, the value sent in the ~~notification~~ report content is the out-of-band 'unknown'
500 value, rather than omitting the attribute. See [ipp-mod] section 4.1.

501 If no job was the current job, then the "job-id" attribute is omitted from the event report
502 content as an indication that the event was not related to any job.

503 ISSUE 21 - Ok to omit the "job-id" attribute, rather than overloading the out-of-band 'no-
504 value' which is only for when the system administrator has not configured a value? See
505 [ipp-mod] section 4.1.

506 ISSUE 22 - Do we agree to this small sub-set of attributes that MUST be sent in any
507 event report content?

508 ISSUE 23 - Do we agree to the ones that are REQUIRED for an IPP Printer to support if
509 it supports notification at all?

6   Job Description Attributes

511 In order to claim conformance to this notification specification, the following Job
512 Description attributes are REQUIRED to be supported ~~if the "notify-recipients" attribute~~
513 ~~is supported~~:

~~1.1~~6.1   job-~~trigger~~last-event (~~type2~~ keyword)

515 This attribute indicates the most recent job event that has occurred for this job. In order
516 to claim conformance to this notification specification, the Printer object MUST support
517 this Job Description attribute ~~if it supports the "notify-recipients" attribute~~. The Printer
518 object supplies a copy of this attribute in every job ~~notification~~ event report that it sends
519 to a notification recipient. This attribute is also available to any client using a Get-Job-
520 Attributes or Get-Jobs operation for this job. The first job event for a job is the 'job-
521 received' event, so this Job Description attribute always has a value.

522 The standard keyword values are:
523   'job-received': when the Printer object accepts the create operation (i.e., when the job
524   is created no matter whether in the 'pending' or 'pending-held' states).
525   'job-held': when the job enters the 'pending-held' state using some protocol operation,
526   such as Hold-Job (see [ipp-ops-set1]), or the system or device holds the job
527   because of some requirement that cannot be met and other jobs could be
528   processed, if there are any.
529   'job-released': when the job leaves the 'pending-held' state and enters the 'pending' or
530   'processing' states due to the user, operator, or system releasing the held job using
531   some protocol operation, such as Release-Job (see [ipp-ops-set1]), or some
532   internal or local operation.
533   'job-started-processing': the Printer starts processing the Job (i.e., when the job leaves
534   the 'pending' or other state and enters the 'processing' state).
535   'job-stopped': The Printer stopped processing the job and the job entered the
536   'processing-stopped' state.
537   'job-continued': The Printer continues processing the job, i.e., the job leaves the
538   'processing-stopped' state and re-enters the 'processing' state.

539   'sheet-completed': when each sheet in the job is completed (i.e., stacked in the output
540   bin).
541   'collated-copy-completed': when each document copy in the job is completed (i.e.,
542   last sheet of a collated copy is stacked in an output bin)
543   'job-warning': when the job encounters a condition which does not abort the job and
544   does not require human intervention, such as the interpreter encountering a
545   request for a missing font, but for which it is able to perform font substitution. A
546   device warning, such as 'toner-low', is a 'device-warning', NOT a 'job-warning'.
547   'job-completed': when the job completes processing (with or without errors or
548   warnings) and enters the 'completed' state.
549   'job-aborted': when the job was aborted by the system while in the 'processing' or
550   'processing-stopped' state, due to some encountered problem that cannot be
551   remedied by human intervention.
552   'job-canceled': when the job was canceled by the user or operator using the Cancel-
553   Job operation while the job was in any state.

1.26.2   job-lasttrigger-date-time-of-event (dateTime)

555   This attribute indicates the point in time at which the most recent job event occurred for
556   this job. In order to claim conformance to this notification specification, the Printer
557   object MUST support this Job Description attribute if it supports the "notify-recipients"
558   attribute. The Printer object supplies a copy of this attribute in every notification event
559   report that it sends to a notification recipient. This attribute is also available to any client
560   using a Get-Job-Attributes or Get-Jobs operation for this job. The first job event for a job
561   is the 'job-received' event when the job is created. Therefore, this job attribute always has
562   a value.

563   If IPP Printers relay jobs to other IPP Printers, the time of the event is intended to be at
564   the IPP Printer object at which the event occurred, not subsequent times of relaying jobs
565   in the forward direction or relaying notification event reports in the reverse direction.

566   ISSUE 24 - Ok to have changed the data type to dateTime, so that there is no ambiguity
567   when relaying notifications from server to server which may cross time zones? Proper
568   date and time is especially important when notification is used with IFAX. However, for
569   low end implementations, knowing the date is a burden, even though the date is sent by
570   the client in every HTTP request header.

7   Printer Description Attributes

572   In order to claim conformance to this notification specification, the following Printer
573   Description attributes are REQUIRED to be supported if the "notify-recipients" attribute
574   is supported:

1.17.1   device-trigger-event (type 2 keyword)

576   This attribute indicates the most recent device event that has occurred for this device. In
577   order to claim conformance to this notification specification, the Printer object MUST
578   support this Printer Description attribute. The Printer object supplies a copy of this
579   attribute in every device event report that it sends to a notification recipient. This
580   attribute is also available to any client using a Get-Printer-Attributes request for this

581 Printer object. The first device event for a device is 'powered-up', so this printer attribute
582 always has a value.

583 The standard keyword values are:

584   Device-report events include:
585   **'started-processing'** - when the Printer object enters the 'processing' state.
586   **'became-idle'** - when the Printer object enters the 'idle' state
587   **'device-state-reason-removed'** - when any value is removed from the Printer's
588   "printer-state-reasons" attribute, such as 'toner-low-warning' or 'media-jam'
589   **'accepting-jobs'** - when the Printer starts accepting jobs, i.e., when the value of
590   the Printer object's "printer-is-accepting-jobs" attribute changes to 'true'
591   **'powered-up'** - when the device is powered up.
592

593   From [ipp-mod] section 4.4.11, device reports are indicated as "printer-state-
594   reasons" keywords with a '-report' suffix.   An implementation may choose to
595   omit some or all device-reports. Some device-reports specify finer granularity
596   about the printer state; others serve as a precursor to a warning. A 'device-
597   report' event MUST not indicate anything that affects the printed output.

598   Note: Printer MIB equivalent events that fall in this report group include the
599   alertRemovalOfBinaryChangeEntry(1801) alert that indicates that a binary
600   change event entry row has been removed from the Alert Table and any event
601   with the prtAlertSeverityLevel value set to noInterventionRequired(7).

602

603   Device-warning events include:
604   **'device-state-reason-warning-added' -** when a warning value is added to the
605   Printer's "printer-state-reasons" attribute, such as 'media-low-warning', i.e.,
606   any 'xxx-warning' value'
607   **'not-accepting-jobs'** - when the Printer ceases to accept jobs, i.e., when the value
608   of the Printer's "printer-is-accepting-jobs" attribute changes to 'false'
609

610   From [ipp-mod] section 4.4.11, device warnings are indicated as "printer-
611   state-reasons" keywords with a '-warning' suffix.

612   Note: Printer MIB equivalent examples of device warnings include:
613   inputMediaSupplyLow(807) and markerTonerAlmostEmpty(1104)
614   prtAlertCode values.

615

616   Device-error events include:
617   **'device-stopped'** - when the Printer object enters the 'stopped' state
618   **'device-state-reason-error-added' -** when an error value is to the Printer's
619   "printer-state-reasons" attribute, such as 'media-empty-error', 'media-empty',
620   or 'media-jam'. Note: [ipp-mod] section 4.4.11 indicates that the 'error' suffix
621   MAY be omitted for errors.
622   **'powering-down'** - when the device is being powered down.
623

624   From [ipp-mod] section 4.4.11, device errors are indicated as "printer-state-
625   reasons" keywords with an '-error' suffix or with no suffix at all. For example,
626   'media-jam-error', "media-jam' or 'paused'.

627   Note: Printer MIB equivalent examples of the device errors include:
628   jammed(8) and markerTonerEmpty(1101) prtAlertCode values.

629   *7.1*7.2   *printer-device-trigger*last-date-time-*of-event* (dateTime)

630   This attribute indicates the point in time at which the most recent printer event occurred
631   for this printer. In order to claim conformance to this notification specification, the
632   Printer object MUST support this Printer Description attribute if it supports the "notify-
633   recipients" attribute. The Printer object supplies a copy of this attribute in every
634   notification event report that it sends to a notification recipient. This attribute is also
635   available to any client using a Get-Printer-Attributes request for this Printer object. The
636   first printer event for a Printer is when it is powered up. Therefore, this printer attribute
637   always has a value.

638   ISSUE 25 - Ok to have changed the data type to dateTime, so that there is no ambiguity
639   when relaying notifications from server to server which may cross time zones? Proper
640   date and time is especially important when notification is used with IFAX. However, for
641   low end implementations, knowing the date is a burden, even though the date is sent by
642   the client in every HTTP request header.

643   *7.2*7.3   notify-recipients-schemes-supported (1setOf uriScheme)

644   This attribute describes the notification delivery methods supported by this Printer object.
645   Standard values are defined in Section 4.1.1). In order to claim conformance to this
646   notification specification, the Printer object MUST support this Printer Description
647   attribute.

648   *7.3*7.4   notify-event-groups-supported (1setOf type2 keyword)

649   This attribute describes the event groups supported by this Printer object. In order to
650   claim conformance to this notification specification, the Printer object MUST support this
651   Printer Description attribute. If no event groups are supported, then the Printer object
652   either supports this attribute with only the 'none' value, or does not support this attribute
653   at all. Standard values are defined in Section 4.1.2)

654   # 8   References

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662 [ipp-ops-set1]
663   Bergman, R., Hastings, T., Herriot R., Moore, P., "Internet Printing Protocol/1.0:
664   Additional Optional Operations - Set 1", <ipp-ops-set1-981023.txt>, work in
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666 [ipp-sub]
667   Isaacson, S., Martin, J., deBry, R., Hastings, T., "Job Independent Subscriptions
668   for IPP", <ipp-notification-printer-980701>, work in progress, July 1, 1998.

669 [RFC1759]
670   Smith, R., Wright, F., Hastings, T., Zilles, S., and Gyllenskog, J., "Printer MIB",
671   RFC 1759, March 1995.

672 [RFC2046]
673   Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types. N. Freed
674   & N. Borenstein. November 1996. (Obsoletes RFC1521, RFC1522, RFC1590),
675   RFC 2046.

676 [RFC2119]
677   S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", RFC
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679 [sense]
680   Martin, J. et all., "System Event Notification System Environment (SENSE)",
681   ftp://ftp.pwg.org/pub/pwg/sense/, work in progress, Spring 1996.

682

9   Issues

684 26. Do we want a Mixed Format for event reports? If so we can add 'multi-
685   part/alternative' back in as a supported format.

686

687 27. Do we want to extended the list of uriScheme values defined for standard delivery
688   methods to include: 'ftp', 'pager', 'http', etc.? If so, they are easy to add. Should we
689   add them now? Or register them later?

690

691 28. Should we make "notify-recipients" and "notify-group-events" also be a Job
692   Description attributes, so that a user can query to determine what subscriptions were
693   supplied (and help an implementation remember job submission subscriptions on the
694   job object - useful whether the implementation is using a notification service or not),
695   as we have done for attributes-charset and attributes-natural-language operation
696   attributes?

697

698 29. Note: since job-independent subscriptions have the time-to-live parameter, there is
699   no need to have Printer Description attributes that list the current job-independent
700   subscriptions, correct?

701

702 27.30. Should we combine the "Job Independent Subscription" paper with this paper, or
703   leave them as separate specifications?

704 **10   Change History**

705 Changes are listed in reverse chronological order:

706 ***10.1 Changes to the December 10, 1998 to make the January 19, 1999***
707 ***version***

708 The following changes made to the December 10, 1998 to make the January 19, 1999
709 version:

710 1.   Changed the names of the REQUIRED notify-recipient keywords from: 'ipp-tcp-
711   socket' and 'ipp-udp-socket' to 'ipp-tcp-notify' and 'ipp-udp-notify'.

712 2.   Added '-notify' to the OPTIONAL 'snmpv1', 'snmpv2', and 'snmpv3' delivery method
713   names.

714 3.   Changed the OPTIONAL 'sense-datagram' to 'sense-notify' to be consistent.

715 4.   Added 'ndps-notify' as an OPTIONAL keyword.

716 5.   Deleted the 'all-basic', 'all-job-events-basic', and 'all-device-events-basic'. Clients
717   should be explicit about which groups they want. If new groups are added, the clients
718   won't know what to do with them, if they had subscribed to 'all-xxx' groups.

719 6.   Changed the names of "job-last-event" and "job-last-date-time-of-event" to "job-
720   trigger-event" and "job-trigger-date-time" events, since the events trigger the
721   notification delivery, but the attribute values remain after the event has been
722   delivered.

723 7.   Added "status-message" as an OPTIONAL event report content attribute.

724 8.   Changed "job-impressions-completed" to OPTIONAL.

725 9.   Indicated that OPTIONAL attributes are not sent in the event report content if they
726   are not supported.

727 10. Required that "status-message" and/or "job-impressions-completed" be sent in an
728   event report content if they are supported as an Operation attribute and a Job
729   Description attribute, respectively.

730 11. Added REQUIRED "device-trigger-event", REQUIRED "job-id", and OPTIONAL
731   "status-message" to the device event report content.

732 12. Specified the "device-trigger-event" Printer Description attribute, naming each event.

733 13. Deleted the 'sheet-completed' and 'collated-copy-completed', since these events are
734   not part of any 'xxx-basic' event group. They can be added back when we have an
735   event group that uses them.

10.2 Changes to the July 1, 1998 to make the December 10, 1998 version

The following changes made from the July 1, 1998 to make the December 10, 1998 version:

1. Clarified the terminology so that an "event" doesn't necessarily mean that a notification report is delivered.

2. Removed many of the job and printer attributes for being sent in a notification event report, so that we can get agreement on a basic set of event report content. Only attributes really needs are included, including what may be needed for FAX. Changed the names of the event groups by adding the suffix '-basic' to indicate that these event groups return only basic information. Additional event groups can be registered in order to get more attributes as needed for accounting and more detailed job monitoring purposes.

3. Deleted the "job-progress" event group. We can bring it back when we agree to all of the extra attributes. Its not very useful with only the basic attributes.

4. The printer events are indicted using the "printer-state-reasons" values, instead of the Printer MIB alert codes. Since most of the Printer MIB alert codes, except for the generic ones, have equivalent IPP keyword reason values, this should be a problem and makes IPP more readably implemented in a server that doesn't have the Printer MIB.

5. Added the "job-last-event" job description attribute to give the job event some persistence.

6. Changed the job's "time-at-event (integer)" to "job-last-date-time-of-event (dateTime)" to give an absolute date and time, in case events are being relayed back through multiple servers, such as in FAX. Also made it a Job Description attribute to give it persistence.

7. Changed the printer's "time-at-event(integer)" to "printer-last-date-time-of-event(dateTime)" to give an absolute date and time, in case events are being relayed back through multiple servers, such as in FAX. Also made it a Printer Description attribute to give it persistence.

8. Added the IPP/1.0 "printer-is-accepting-jobs" to the event report, since changes in its value are really device state changes.

9. Added the complete semantics for each job event under the "last-job-event" Job Description attribute.