

IPP Event Notifications (Very Short)

Version 0.1

Abstract

This document describes an extension to the IPP/1.0 model that allows end users to subscribe to printing related events. A subscription includes:

- the names of groups of events that are of interest to the subscriber

- the delivery methods and addresses to use for event reports (socket, email, etc.)

A subscription does not include

- complicated lists and sets of names of individual events that are of interest to the subscriber

- arbitrary lists of additional attributes to be returned in the event report

- specification of which format to use in the event report (the delivery method

implicitly defines the format that is used)

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

- A new "subscriptions" attribute is supplied by the client as part of an IPP create request

An event is some occurrence (either expected or unexpected) within the printing system.

Events can be classified using two dimensions:

- Either as Job Events or Printer Events, and

- Either as Errors, Warnings, or Reports

When the event occurs, an event report is generated and delivered using the information specific to each subscription.

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40

41 **1 Summary of the proposal**

42 This proposal includes the following concepts.

43 1. A new multi-valued "subscriptions" attribute is defined. The values of this attribute
44 are collections. The members of each collection are:

45 Member attribute name	45 Syntax
46 -----	46 -----
47 "notify-event-groups"	1 setOf type2 keyword
48 "notify-recipients"	1 setOf uri

49

50 The values for "notify-event-group" are keywords representing job event groups,
51 printer event groups, or both (See Section 4.1.1). The values of "notify-recipients"
52 are URIs that identify the method and delivery address to use for event reports (See
53 Section 4.1.2).

54

55 2. The "subscriptions" operation attribute can be supplied by the client in any of the IPP
56 job submission operations. Subscriptions that include interest in job event groups
57 apply only to the job being submitted and no other job.

58

59 3. Each Printer object can support new attributes that describe the event groups and the
60 notification methods that it supports.61 As events occur, for each event the Printer searches the set of subscriptions for any
62 interest in that event. As the Printer finds that some entity is interested in that event (the
63 entity is subscribed to the group of events to which the event belongs), an event report is
64 generated and delivered using the method and target address identified in the
65 subscription.66 **2 Terminology**

67

68 **Job Submitting End User** - A human end user who submits a print job to an IPP
69 Printer.70 **IPP Client** - The software component on the client system which implements the IPP
71 protocol.72 **Job Recipient** - A human who is the ultimate consumer of the print job. In many
73 cases this will be the same person as the Job Submitting End User, but need not
74 be.75 **Job Recipient Proxy** - A human acting on behalf of the Job Recipient. In particular,
76 the Job Recipient Proxy physically picks up the printed document from the
77 Printer, if the Job Recipient cannot perform that function.78 **Subscription**- A data structure that indicates the "what, where, who, and how " for
79 notification. Events Reports are generated for certain events (what) and delivered
80 using various delivery methods (how) to certain addresses (where and who).81 **Notification Recipient** - Any entity identified as a recipient within a subscription.
82 Some notification recipients are Job Submitting End Users and others are
83 interested third parties.

84 **Notification Recipient Agent** - A program which receives event reports on behalf of
85 the notification recipient.

86 **Notification Events** - An event is some occurrence (either expected or unexpected)
87 within the printing system. Events can be classified using two dimensions:
88 - Either as Job Events or Printer Events, and
89 - Either as Errors, Warnings, or Reports
90

91 A Job event is some interesting state change in the Job object, and a Printer event
92 is some interesting change in the Printer object. The Printer MIB alerts define the
93 set of interesting Printer events.
94

95 A report event is purely informational, such as 'job-completed' or 'printer-
96 accepting-jobs'. A warning is not serious and processing continues (e.g., Printer
97 MIB alerts with the prtAlertSeverityLevel value set to noInterventionRequired).
98 An error is serious and either the job is aborted or the printer stops.
99

100 **Event Report** - When an event occurs, an event report is generated that fully
101 describes the event (what the event was, where it occurred, when it occurred,
102 etc.). Event reports are delivered to all the notification recipients that are
103 subscribed to that event. The event report is delivered to the address of the
104 notification recipient using the notification method defined in the subscription.

105 **Immediate Notification** - Event reports are delivered using a delivery method which
106 is not store-and-forward (e.g. TCP connection, UDP datagram).

107 **Queued Notification** - Event reports are delivered using a delivery method which
108 has some sort of store-and-forward mechanism (e.g., email).

109 **Human Consumable Event Report** - Event reports which are intended to be
110 consumed by human end users **only**.

111 **Machine Consumable Event Report** - Event reports which are intended for
112 consumption by a program **only**.

113 **Mixed Format Event Report** - A mixed event report may contain both human
114 consumable and machine consumable information.
115

116 **3 Model for Job and Printer Event Notification**

117 Figure 1 shows the model.
118
119

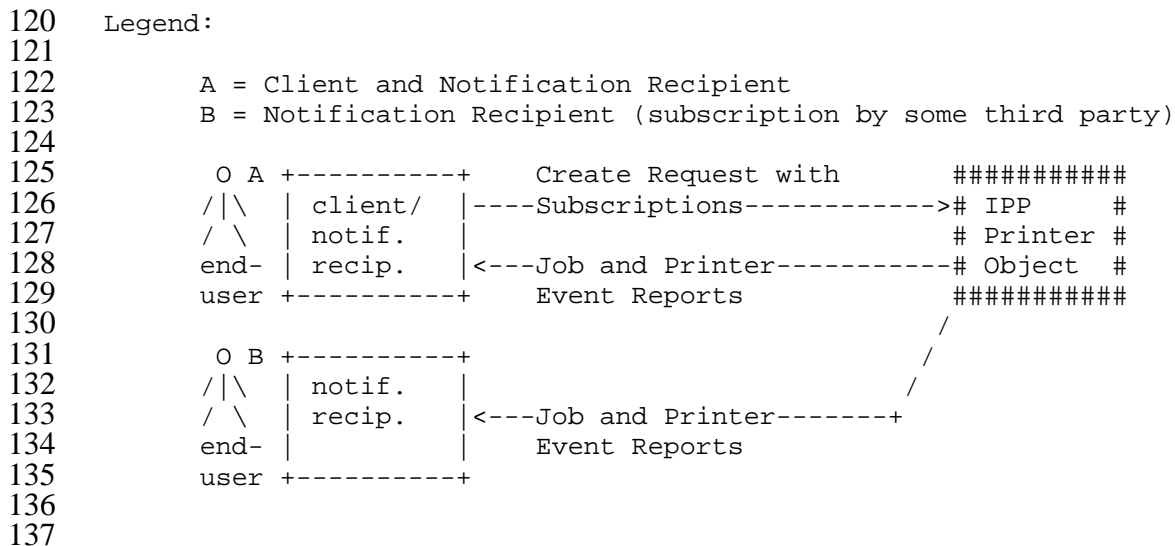
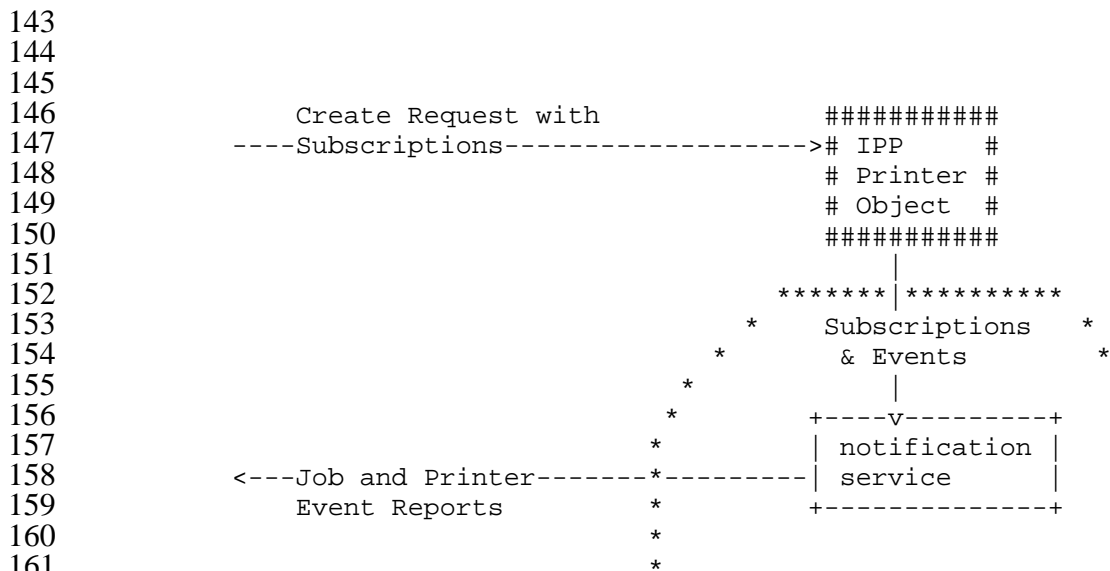


Figure 1 - Model for Job and Printer Notification

139 Note: This model does not mandate that the IPP Printer object implement the full
140 semantics of subscription, report generation, and multiple delivery methods. A simple
141 (embedded) implementation may be configured to use some notification service. Figure
142 2 shows this partitioning.



*** = Implementation configuration opaque boundary

Figure 2 - Opaque Use of a Notification Service

4 New "subscriptions" Operation attribute

167 This section specifies a new "subscriptions" operation attribute. A client subscribes to
168 event groups by supplying this attribute in any create request (i.e., a Print-Job Request,
169 Print-URI Request, or a Create-Job Request). This attribute is a multi-valued attribute;
170

171 the client can supply more than one value. If the client does not supply the attribute in
 172 the operation, there is no subscription made (either implicitly or explicitly).

173 The following rules apply:

- 174 1. Any subscription can contain job event groups, printer event groups, or both.
- 175 2. The subscription is only valid while the job is "active". The job is "active" while it is
 176 in the 'pending', 'processing', and 'processing-stopped' states. The job ceases to be
 177 active when it enters the 'pending-held' state or until the time it is done processing and
 178 enters any of the 'completed', 'canceled', or 'aborted' states. The job becomes active
 179 again when it is released from the 'pending-held' state.
- 180 3. Since a subscription is included within a job submission operation, any interest in job
 181 events is limited to only "this job" (the Job object created because of this job creation
 182 operation). There is no mechanism to subscribe to events for all job or specifically
 183 some job other than this job.

184 **4.1 subscriptions (1setOf collection (1023))**

185 The attribute contains one or more collections. Each collection contains the following
 186 member attributes:

187 Member attribute name	188 syntax	189 in request	190 support
-----	-----	-----	-----
189 "notify-event-groups"	1setOf type2 keyword	SHALL	mandatory
190 "notify-recipients"	1setOf uri	SHALL	mandatory

191 The "support" column indicates the support required by the IPP object if it supports the
 192 "subscriptions" operation attribute at all.

193 **4.1.1 notify-event-groups (1setOf type2 keyword)**

194 There are both job events and printer events. Each job event is assigned a keyword to use
 195 in the event report. For printer events where there is overlap with the Printer MIB, the
 196 Printer MIB "alertCodes" are used in the event report. For other printer events where
 197 there is no overlap with the Printer MIB, the printer event is assigned a keyword to use
 198 in the event report.

199 Each event is then assigned to one or more event groups. Each group is assigned a
 200 keyword.

201 Standard event group values are:

202 Special:

- 203 **'none'**: no notifications of any events (an IPP object can use this value to indicate that
 204 it has no support for event notification; a client would not subscribe to this group).
- 205 **'all'**: any and all events that the implementation is capable of detecting.
- 206 **'all-job-events'**: all job events (all errors, warnings, and reports).
- 207 **'all-printer-events'**: all printer events (all errors, warnings, and reports)

208
 209 Job Events

- 210 **'job-state-changes'**: includes 'job-received', 'job-held', 'job-released', 'job-started-
 211 processing'.

212 **'job-progress'**: includes 'sheet-completed', 'collated-copy-completed'
213 **'job-completion'**: includes 'job-completed', 'job-aborted', 'job-canceled'
214 **'job-warnings'**: includes any implementation specific job warnings
215 **'job-errors'**: includes 'job-aborted' and any implementation specific job errors
216

217 Printer Events

218 **'printer-reports'**: Printer MIB events that fall in this report group included the
219 alertRemovalOfBinaryChangeEntry(1801) alert that indicates that a binary
220 change event entry row has been removed from the Alert Table and any event
221 with the prtAlertSeverityLevel value set to noInterventionRequired(7). Two
222 additional events that are included in this group are 'printer-accepting-jobs', and
223 'printer-not-accepting-jobs'
224 **'printer-warnings'**: any printer warning, i.e., non-critical alert where the Printer
225 object's "printer-state" attribute remains in the 'processing' state and the device(s)
226 continue to operate. Examples of printer-warnings include:
227 inputMediaSupplyLow(807) and markerTonerAlmostEmpty(1104)
228 prtAlertCodes.
229 **'printer-errors'**: any printer error, i.e., critical alert where the Printer object's
230 "printer-state" attribute changes to 'stopped' or (at least one of) the devices stop
231 Examples of the printer errors include: jammed(8) and markerTonerEmpty(1101)
232 prtAlertCodes.
233

234 4.1.2 notify-recipients (1setOf uri)

235 This attribute describes both where (the address) and how (the mechanism for delivery)
236 events are to be delivered.

237 Standard uriScheme values are:

238 **'mailto'**: a message via email to the specified email address. The "text/plain" content
239 format is used for this method.
240 **'ipp-tcp-socket'**: an IPP notification via a TCP/IP socket that is opened by the Printer
241 object on the IP address specified in the URI using the specified port using the
242 "host:port" HTTP convention. For example:
243 ipp-tcpip-socket:13.240.120.138:6000
244 The "application/ipp" content format is used for this method.
245 **'snmpv1'**: a notification as an SNMPv1 trap to the host specified as the address in the
246 URI.
247 **'snmpv2'**: a notification as an SNMPv2 inform to the host specified as the address in
248 the URI.
249 **'snmpv3'**: a notification as an SNMPv3 inform to the host specified as the address in
250 the URI.
251 **'sense-datagram'**: a notification as a SENSE UDP data gram that is opened by the
252 Printer object on the IP address specified in the URI using the specified port using
253 the "host:port" HTTP convention.
254
255

256 5 Event Report Content

257 Event reports are generated using the following content formats:

258 **'application/ipp'** - machine consumable content using the 'application/ipp' MIME
259 media type

260 **'text/plain'** - human consumable content type. If the charset is other than US-ASCII,
261 the /charset parameter must be included in the value of this attribute and in the
262 event notification content.

263 The notification method dictates that content type used. For example, email uses
264 "text/plain" and "ipp-tcp-socket" uses "application/ipp". For any string in any event
265 report, the charset and natural language rules that apply to all IPP operations apply to the
266 event report strings as well.

267 The following information is included in every event report based on the type of the
268 event:

269 Job Events

270 - time-at-event (in seconds using the IPP "printer-up-time" attribute for reference)

271 - event keyword

272

273 Printer Events

274 - time-at-event (in seconds using the IPP "printer-up-time" attribute for reference)

275 - which-device

276 - which-table

277 - which-row

278 - location

279 - severity level

280 - training level

281 - event code

282

283 6 New Printer Object Support Attributes

284 6.1 *notify-event-groups-supported (1setOf type2 keyword)*

285 This attribute describes the event groups are supported by this object. If no event groups
286 are supported, then the object either supports this attribute with only the 'none' value, or
287 does not support this attribute at all. Standard values are defined in Section 4.1.1)

288 6.2 *notify-recipients-supported (1setOf uriScheme)*

289 This attribute describes the notification methods supported. If an IPP object supports this
290 attribute, it should support the "notify-event-groups-supported" attribute as well and vice
291 versa. Standard values are defined in Section 4.1.2).

292 7 Issues

293 1. Do we want to define any additional attributes that come back in the event report on a
294 per-event basis? That is, do we want a table that shows for each event, the fixed set of

295 relevant attributes that also come back in the event report? If so, we can include the table
296 in table that has already been thought out.

297

298 2. Do we want the ability for a client to arbitrarily request any set of "additional
299 attributes" that are returned in the event report for that subscription. If so we can add a
300 "notify-additional-attributes" back into the "subscriptions" collection.

301

302 3. The time in the event report is proposed to be in seconds, relative to the Printer objects
303 "printer-up-time" attribute (which is just the number of seconds that that Printer object
304 has been up). Do we want to mandate that it be a standard string format representing
305 absolute time (GMT/UTC)? We can, but it would mandate the all implementations be
306 able to generate this synchronized, absolute time value for all events.

307

308 4. Do we want the ability for a client to specify the natural language and charset of the
309 event report? Can we just live with the fact that the event report uses the charset and
310 natural language of the operation and the set of supported values for event reports are just
311 the same as those that the Printer object supports for operation? If we want the more
312 powerful semantics of specifying the charset and natural language for each subscription,
313 then we can add the "notify-charset" and "notify-natural-language" attribute back into the
314 "subscriptions" collection.

315

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

318

319 6. Do we want to allow the client to specify the format of the event report independent of
320 the delivery method? If so, we can add "notify-content-type" back into the
321 "subscriptions" attribute.

322

323 7. Do we want to extended the list of uriSchemes defined for standard delivery methods
324 to include: 'ftp', 'pager', 'http', etc.? If so, they are easy to add.

325

326