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12 January ~~2148~~, 1999

13 Internet Printing Protocol/1.0: IPP Event Notification (~~Very Short~~)

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15 ~~Version 0.5~~

16 Status of this Memo

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26 **Abstract**

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

31 ~~With either subscription method,~~ A subscription includes:

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

34 ~~A subscription does not include~~

- 35 ~~-complicated lists and sets of names of individual events that are of interest to the subscriber~~
- 36 ~~-arbitrary lists of additional attributes to be returned in the event report~~
- 37 ~~-specification of which format to use in the event report (the delivery method implicitly defines the~~
38 ~~format that is used)~~

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

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

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

- 44 - Either as Job Events or Device Events, and
- 45 - Either as Errors, Warnings, or Reports

46 When the event occurs, an event report is generated and delivered using the information specified in the
47 job's subscription which was submitted with the job.

48

49 The full set of IPP documents includes:

50 [Design Goals for an Internet Printing Protocol \[IPP-REQ\]](#)

51 [Rationale for the Structure and Model and Protocol for the Internet Printing Protocol \[IPP-RAT\]](#)

52 [Internet Printing Protocol/1.0: Model and Semantics \(this document\)](#)

53 [Internet Printing Protocol/1.0: Encoding and Transport \[IPP-PRO\]](#)

54 [Internet Printing Protocol/1.0: Implementer's Guide \[IPP-IIG\]](#)

55 [Mapping between LPD and IPP Protocols \[IPP LPD\]](#)

56

57 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
58 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be
59 included in a printing protocol for the Internet. It identifies requirements for three types of users: end
60 users, operators, and administrators. It calls out a subset of end user requirements that are satisfied in
61 IPP/1.0. Operator and administrator requirements are out of scope for version 1.0.

62 The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document
63 describes IPP from a high level view, defines a roadmap for the various documents that form the suite of
64 IPP specifications, and gives background and rationale for the IETF working group's major decisions.

65 The "Internet Printing Protocol/1.0: Model and Semantics", describes a simplified model with abstract
66 objects, their attributes, and their operations that are independent of encoding and transport. It introduces
67 a Printer and a Job object. The Job object optionally supports multiple documents per Job. It also
68 addresses security, internationalization, and directory issues.

69 The "Internet Printing Protocol/1.0: Encoding and Transport" document is a formal mapping of the
70 abstract operations and attributes defined in the model document onto HTTP/1.1. It defines the
71 encoding rules for a new Internet media type called "application/ipp".

72 The "Internet Printing Protocol/1.0: Implementer's Guide" document gives insight and advice to
73 implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.0 and some of
74 the considerations that may assist them in the design of their client and/or IPP object implementations.
75 For example, a typical order of processing requests is given, including error checking. Motivation for
76 some of the specification decisions is also included.

77 The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of
78 gateways between IPP and LPD (Line Printer Daemon) implementations.

79

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129

130 **1 Summary of the Event Notification specification**

131 ~~This proposal includes the following concepts~~ Implementations conforming to this notification
 132 specification MUST support the following new REQUIRED attributes and MAY support the following
 133 new OPTIONAL attributes:

- 134 1. Two new **REQUIRED** multi-valued subscription Operation attributes and Job Description attributes
 135 are defined:

136 attribute name	137 Syntax
138 -----	-----
138 "notify-recipients"	1setOf uri
139 "notify-event-groups"	1setOf type2 keyword

140
 141 The presence of the "notify-recipients" indicates that notification is desired. The values of "notify-
 142 recipients" are URIs that identify the notification delivery method and delivery address to use for
 143 event reports (See Section 4.1.1). The delivery method dictates the event report content type to be
 144 used. For example, 'mailto' uses "text/plain" and 'ipp-tcp-notify' uses "application/ipp". The values
 145 for "notify-event-groups" are keywords representing job event groups or device event groups (See
 146 Section 4.1.2). Each event groups implies a set of attributes to be sent in the event report. Some
 147 delivery methods imply a fixed subset of the event groups. For example, the 'mailto' delivery
 148 method only uses the 'job-completions-basic' event group.

149
 150 These subscription operation attributes can be supplied by the client in any of the IPP job submission
 151 operations: Print-Job, Print-URI, Create-Job, and Validate-Job. Subscriptions that include interest in
 152 job event groups apply only to the job being submitted and no other job.

153 A subscription does *not* include:

- 154 - complicated lists and sets of names of individual events that are of interest to the subscriber
- 155 - arbitrary lists of additional attributes to be returned in the event report
- 156 - specification of which format to use in the event report

- 157
 158 2. REQUIRED "notify-recipients" and "notify-event-groups" Job Description attributes are populated
 159 from the corresponding create request Operation attributes of the same names.

- 160 3. ~~Each Printer object supports new~~ REQUIRED Printer Description attributes: "notify-recipients-
 161 schemes-supported" and "notify-event-groups-supported" that describe the notification delivery
 162 methods and the event groups that it supports, respectively.

- 163 4. ~~Each Printer object supports new~~ REQUIRED Job Description attributes: "job-trigger-events" and
 164 "job-trigger-date-time" that store the current/last event and its ~~date~~/time in seconds since the device
 165 was started

- 166 5. OPTIONAL Job Description attributes: "job-trigger-date-time" and "job-trigger-message".

- 167 6. ~~Each Printer object supports new~~ REQUIRED Printer Description attributes: "device-trigger-events"
 168 and "device-trigger-date-time" that store the current/last event and its ~~date~~/time in seconds since the
 169 device was started

170 7. OPTIONAL Printer Description attributes: "device-trigger-date-time" and "device-trigger-message".

171 As events occur, for each event the Printer searches the set of subscriptions for any interest in that event.
172 As the Printer finds that some entity-notification recipient is interested in that event (the entity
173 notification recipient is subscribed to the group of events to which the event belongs), an event report is
174 generated and delivered using the methods and target addresses identified in the subscription.

175 Note: New operations to subscribe and unsubscribe to event notification that is independent of job
176 submission is outside the scope of this proposal, but is being developed as a separate extension (see [ipp-
177 sub]).

178

179 **2 Terminology**

180

181 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY,
182 NEED NOT, and OPTIONAL, have special meaning relating to conformance. These terms are
183 defined in [ipp-mod section 13.1 on conformance terminology, most of which is taken from RFC
184 2119 [RFC2119].

185 **Job Submitting End User** - A human end user who submits a print job to an IPP Printer.

186 **IPP Client** - The software component on the client system which implements the IPP protocol.

187 **Job Recipient** - A human who is the ultimate consumer of the print job. In many cases this will be
188 the same person as the Job Submitting End User, but need not be.

189 **Job Recipient Proxy** - A human acting on behalf of the Job Recipient. In particular, the Job
190 Recipient Proxy physically picks up the printed document from the Device, if the Job Recipient
191 cannot perform that function.

192 **Subscription** - The set of attributes that indicate the "what, where, who, and how" for notification.
193 Events Reports are generated for certain events (what) and delivered using various delivery
194 methods (how) to certain addresses (where and who).

195 **Notification Recipient** - Any entity identified as a recipient within a subscription. Some
196 notification recipients are Job Submitting End Users and others are interested third parties, such
197 as the Job Recipient or Job Recipient Proxy.

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

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

201 Events can be classified using two dimensions:

202 - Either as Job Events or Device Events, and

203 - Either as Errors, Warnings, or Reports

204

205 A Job event is some interesting state change in the Job object, and a Device event is some
206 interesting change in the Printer object.

207

208 A report event is purely informational, such as 'job-completed' or 'accepting-jobs'. A warning is
209 not serious and processing continues. An error is serious and either the job is aborted or the
210 device stops.

211

212 An event occurs for a job or device whether any entity is registered to be notified for that event
213 or not.

214
215 **Event Report** - When an event occurs, an event report is generated that fully describes the event
216 (what the event was, where it occurred, when it occurred, etc.). Event reports are delivered to
217 all the notification recipients that are subscribed to that event, if any. The event report is
218 delivered to the address of the notification recipient using the notification delivery method
219 defined in the subscription. However, an Event Report is sent only if there is a corresponding
220 subscription

221 **Notification Delivery Method** (or **Delivery Method** for short) - Event reports are delivered using a
222 method, such as email, TCP/IP, etc.

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

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

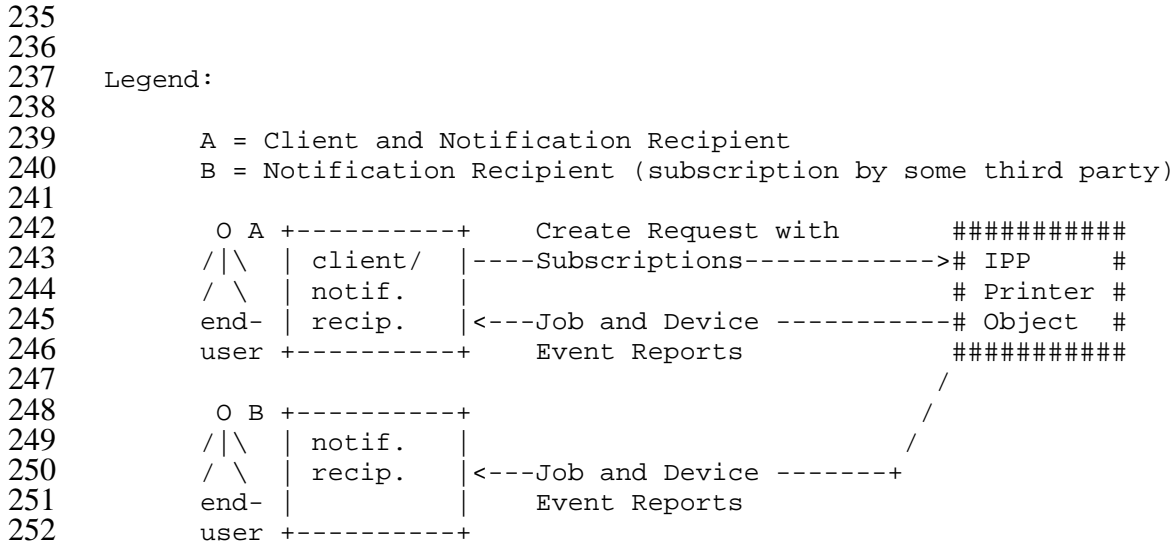
227 **Human Consumable Event Report** - Event reports that are intended to be consumed by human end
228 users only.

229 **Machine Consumable Event Report** - Event reports that are intended for consumption by a
230 program only.

231 **Mixed Format Event Report** - A mixed event report may contain both human consumable and
232 machine consumable information.

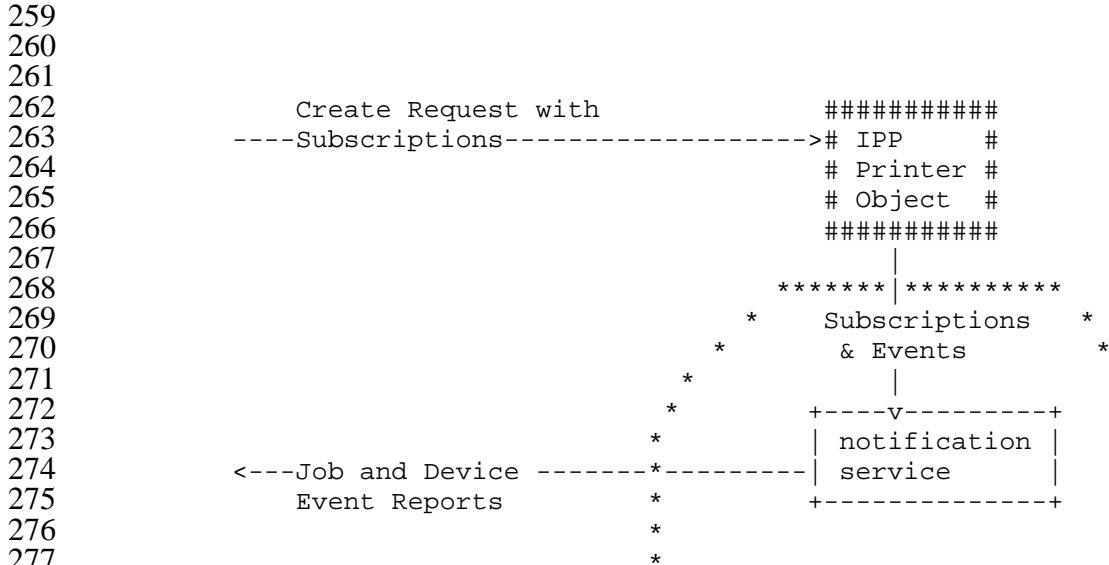
233 3 Model for Job and Device Event Notification

234 [Figure 1](#) shows the model.



254
255 **Figure 1 - Model for Job and Device Notification**

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



278
279 *** = Implementation configuration opaque boundary

280
281
282 **Figure 2 - Opaque Use of a Notification Service**

283 4 New subscription Operation attributes

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

289 The following rules apply:

- 290 1. Any subscription can contain job event groups, device event groups, or both.
- 291 2. The Job Submission Subscription is only valid while the job is "active". The job is "active" while it
292 is in the 'pending', 'processing', and 'processing-stopped' states. The job ceases to be active when it
293 enters the 'pending-held' state or until the time it is done processing and enters any of the
294 'completed', 'canceled', or 'aborted' states. The job becomes active again when it is released from the
295 'pending-held' state or is restarted using the Restart-Job operation (see [ipp-ops-set1]). Since no job
296 is created for the Validate-Job operation, the only purpose of supplying the subscription operation
297 attributes in the Validate-Job operation is to validate that the values are supported; the Printer object
298 does not establish a notification subscription as a result of the Validate-Job operation.
- 299 3. Since a Job Submission Subscription is included within a job submission operation, any interest in
300 job events is limited to "this job" only (the Job object created because of this job creation operation).
301 There is no mechanism to subscribe to events for all jobs or specifically some job other than this job
302 in a create operation. But see [ipp-sub] for such a mechanism to subscribe persistently for job and
303 printer events independently of any particular job submission.

304 4.1 Two subscription operation attributes

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

308 4.1.1 notify-recipients (1setOf uri)

309 The client supplies this operation attribute in a create request in order to subscribe for job events while
310 this job is active. In order to claim conformance to this notification specification, the Printer object
311 MUST support this attribute. This attribute describes both where (the address) and how (the delivery
312 method) event reports are to be delivered when any of the events specified in the "notify-events"
313 attribute occur. If the client does not supply this attribute in a create request, the Printer object MUST
314 not provide any job-based notification for this job.

315 Some notification delivery methods imply a fixed event group, and so ignore the supplied values of
316 "notify-event-groups". These delivery methods may be used with other delivery methods that do not
317 have such restrictions. Unless specified otherwise, a delivery method may be used with any event
318 group.

319 IPP Printer objects MUST support the '**ipp-tcp-notify**' and '**ipp-udp-notify**' delivery methods in order
320 to conform to this notification specification. Support of the other methods is OPTIONAL.

321 Standard uriScheme values are:

- 322 **'mailto'**: a message is sent via email to the specified email address. The "text/plain" event report
323 content format is used for this method (see Section 5). This delivery method ignores the
324 supplied values of the "notify-event-groups" attribute and implies the 'job-completions-basic'
325 event group ('job-completed', 'job-aborted', 'job-canceled' events). The notification recipient
326 does not acknowledge receipt of the mail message.
- 327 **'ipp-tcp-notify'**: an IPP notification report is sent via a TCP/IP socket that is opened by the Printer
328 object on the IP address specified in the URI using the specified port using the "host:port" HTTP
329 convention. For example:
330 `ipp-tcp-notify://foo.com:6000`
- 331 If the port is omitted, the default port is TBD (see Appendix C: Registration of ipp-tcp-notify
332 scheme for use with IPP). The "application/ipp" event report content format is used for this
333 method (see Section 54.1.2).
334 The event recipient does not respond or acknowledge the event report.
335 ~~ISSUE 1—What is the default port for this method?~~
336 ~~ISSUE 2—Are the origin and destination ports the same or not?~~
337 ~~ISSUE 3—Ok that the notification recipient doesn't respond or acknowledge the event report? or~~
338 ~~should it?~~
- 339 **'snmpv1-notify'**: a notification report is sent as an SNMPv1 trap to the host specified as the address
340 in the URI. The notification recipient does not acknowledge receipt of the notification event
341 report (trap).
- 342 **'snmpv2-notify'**: a notification report is sent as an SNMPv2 inform to the host specified as the
343 address in the URI. The notification recipient does acknowledge receipt of the notification event
344 report (inform).
- 345 **'snmpv3-notify'**: a notification report is sent as an SNMPv3 inform to the host specified as the
346 address in the URI. The notification recipient does acknowledge receipt of the notification event
347 report (inform).
348 ~~ISSUE 4—Are these 3 SNMP notification delivery methods ok to keep?~~
- 349 **'ipp-udp-notify'**: an IPP notification report is sent via a UDP datagram that is opened by the Printer
350 object on the IP address specified in the URI using the specified port using the "host:port" HTTP
351 convention. For example:
352 `ipp-udp-notify://bar.com:6000`
- 353 If the port is omitted, the default port is TBD (see Appendix D: Registration of ipp-udp-notify
354 scheme for use with IPP). The UDP datagram contains the "application/ipp" event report content
355 format (see Section 54.1.2). The notification recipient does not acknowledge receipt of the
356 notification event report.
357 ~~ISSUE 5—What is the default port for this method?~~
358 ~~ISSUE 6—Are the origin and destination ports the same or not?~~
359 ~~ISSUE 7—Ok that the notification recipient doesn't respond or acknowledge the event report? or~~
360 ~~should it?~~
- 361 **'ndps-notify'**: an IPP notification report is sent via NDPS notification mechanism. See ???.
362 **ISSUE 1 - Need reference to NDPS documentation. Also need more description here, such as**
363 **which end opens, does the recipient acknowledge, and any salient information about the**
364 **transport.**
- 365 **'sense-notify'**: a notification report is sent as a SENSE UDP datagram [sense] that is opened by the
366 Printer object or notification service on the IP address specified in the URI using the specified

367 port using the "host:port" HTTP convention. The notification recipient does acknowledge
368 receipt of the notification event report.

369
370
371

ISSUE 2 - Which URL parameters should we mention (which like SLP) are removed before being used?

372 4.1.2 notify-event-groups (1setOf type2 keyword)

373 The client OPTIONALLY supplies this operation attribute in a create request. In order to claim
374 conformance to this notification specification, the Printer object MUST support this attribute. This
375 attribute identifies the event groups for which a notification event report is desired. If the client does not
376 supply this attribute in a create request, but does supply the "notify-recipients", the Printer object
377 assumes the 'job-completions-basic' event group value.

378 There are both job events and device events. Each job and device event is assigned a keyword to use in
379 the event report.

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

382 Standard event group keyword values are:

383 Special event groups:

384 '**none**': no notifications of any events (an IPP object can use this value to indicate that it is
385 configured not to support event notification; a client would not subscribe to this group).

386

387 Job Event Groups (See section 6.1 for a description of each job event):

388 '**job-state-changes-basic**': includes 'job-received', 'job-held', 'job-released', 'job-started-
389 processing', 'job-stopped', 'job-continued'

390 '**job-completions-basic**': includes 'job-completed', 'job-aborted', 'job-canceled'

391 '**job-warnings-basic**': includes 'job-warning' which are any implementation-specific job
392 warning events

393 '**job-errors-basic**': includes 'job-aborted' and any implementation-specific job errors

394

395 Note: The 'job-aborted' event appears in both the 'job-completions-basic' and 'job-errors-
396 basic' event groups, since it is both a completion and an error.

397

ISSUE 3 - which event groups are REQUIRED besides 'job-completion'?

398
399

400 Device Event Groups (See section 7.1 for a description of each job event):

401 '**device-reports-basic**': includes 'started-processing', 'became-idle', 'device-state-reason-
402 removed', 'accepting-jobs', and 'powered-up'

403 '**device-warnings-basic**': includes 'device-state-reason-warning-added' and - 'not-accepting-
404 jobs'

405 '**device-errors-basic**': includes 'device-stopped', 'device-state-reason-error-added', and
406 'powering-down'

407

ISSUE 4 - which device event groups are REQUIRED, if any?

408

409 ISSUE 5 - This simplified proposal no longer includes returning the Printer MIB alert codes, but relies
410 on "device-trigger-event" and IPP/1.0 [ipp-mod] "printer-state-reasons" keywords, which contain most of
411 the Printer MIB alert codes, except for the generic ones. Ok?

412 5 Event Report Content

413 Event reports are generated using the following content formats:

414 'application/ipp' - machine consumable event report content using the 'application/ipp' MIME media
415 type [ipp-mod] using the Get-Job-Attributes response encoding for job events and Get-Printer-
416 Attributes for device events. The attributes listed in section 5.1 are sent in a notification report
417 for job events. The attributes listed in section 5.2 are sent in a notification report for device
418 events. For any string in any event report, the charset and natural language rules that apply to all
419 IPP operations apply to the event report strings as well, since they are represented as operation
420 responses. The event content is filled in as follows:

421 Response Parameters:

422 "version-number" - the same version number as returned in the create response.

423 "status-code" parameter - the status code: "job-event" - 0x600 for job events, and

424 "device-event" - 0x601 for device events.

425 "request-id" - 0, since there is no request to which this "response" is associated.

426 Operation attributes:

427 "attributes-charset" and "attributes-natural-language" Operation attributes - the same
428 charset and natural language as the response to the original create request.

429 "status-message" - is not sent as an Operation attribute (the "job-trigger-message" and
430 "device-trigger-message" are sent in the Job Object Attributes and the Printer Object
431 Attributes groups, respectively.

432 Unsupported Attributes Group:

433 Is not sent.

434 Job Object Attributes Group and Printer Object Attributes Group:

435 See section 5.1 and 5.2, respectively.

436
437 'text/plain' - human consumable event report content type. The text message SHOULD include
438 information about the attributes in section 5.1 for job events or in section 5.2 for device events.
439 If the charset to be used in the mail message is other than US-ASCII, the /charset parameter must
440 be included in the value of this content-type header and in the event report content [RFC2046].

441 The notification delivery method dictates the event report content type to be used. For example, 'mailto'
442 uses "text/plain" and 'ipp-tcp-notify' uses "application/ipp".

443 ISSUE 6 - Need to decide whether the 'mailto:' delivery method uses the 'multi-part/alternative' MIME
444 type or 'text/plain' with an 'application/ipp' attachment.

445 5.1 Basic Job event report content

446 This section lists the attributes that MUST be included in any event report content for each job event
447 group. Additional job event groups can be registered which include additional attributes. However, all
448 job event groups MUST include the following REQUIRED "basic" job object attributes and MAY
449 include the following OPTIONAL "basic" job object attributes in any job event report. All job event

450 reports MUST use the Get-Job-Attributes response syntax. ~~In order to claim conformance to this~~
 451 ~~notification specification, an IPP Printer MUST support all of the following Job Description attributes,~~
 452 ~~except "status message" and "job impressions completed"~~ The following "basic" job object attributes are
 453 sent in the job event report as Job Attributes in any order:

Job object attribute	REQUIRED?	reference
job-printer-uri (uri)	REQUIRED	[ipp-mod] 4.3.3
job-id (integer(1:MAX))	REQUIRED	[ipp-mod] 4.3.2
job-trigger-events (1setOf type2 keyword)	REQUIRED	6.1
job-trigger-message (text(255))	OPTIONAL	6.4
job-trigger-time (integer(1:MAX))	REQUIRED	6.5
job-trigger-date-time (dateTime)	OPTIONAL	6.6
job-state (type1 enum)	REQUIRED	[ipp-mod] 4.3.7
job-state-reasons (1setOf type2 keyword)	OPTIONAL	[ipp-mod] 4.3.8
job-impressions-completed (integer(0:MAX))	OPTIONAL	[ipp-mod] 4.3.21

479 ~~job-printer-uri (uri) — see [ipp-mod] section 4.3.3~~
 480 ~~job-id (integer(1:MAX)) — see [ipp-mod] section 4.3.2~~
 481 ~~job-trigger-event (type2 keyword) — see section 6.1~~
 482 ~~job-trigger-date-time (dateTime) — see section 6.3~~
 483 ~~status-message (text(255)) — see [ipp-mod] section 3.1.6~~
 484 ~~job-state (type1 enum) — see [ipp-mod] section 4.3.7~~
 485 ~~job-state-reasons (1setOf type2 keyword) — see [ipp-mod] section 4.3.8~~
 486 ~~job-impressions-completed (integer(0:MAX)) — see [ipp-mod] section 4.3.21~~

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

491 ~~ISSUE 11 — Which of the above attributes are sent as Operation Attributes and which are included as Job~~
 492 ~~Attributes in the Get Job Attributes response format?~~

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

496 ~~ISSUE 13 — The data type of "job-trigger-date-time" (dateTime) is needed, so that there is no ambiguity~~
 497 ~~when relaying notifications from server to server which may cross time zones? Proper date and time is~~

498 ~~especially important when notification is used with IFAX. However, for low end implementations,~~
499 ~~knowing the date is a burden, even though the date is sent by the client in every HTTP request header.~~

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

503 ~~If "status-message" is supported as an Operation attribute in operation responses, then #~~job-trigger-
504 message~~" MUST be supported in the event report content. If "job-impressions-completed" is supported~~
505 ~~as a Job Description attribute, then it MUST be supported in event report content. If "status-message"~~
506 ~~and/or "job-impressions-completed" are not supported, then they are omitted from the event report~~
507 ~~content.~~

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

511 ~~ISSUE 14: Do we agree to this small sub-set of attributes that MUST be sent in any event report~~
512 ~~content?~~

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

515 **5.2 Basic device event report content**

516 This section lists the attributes that ~~MUST be~~are included in any event report content for each device
517 event group. Additional device event groups can be registered which include additional attributes.
518 However, all device event groups MUST include the following REQUIRED "basic" attributes and MAY
519 include the following OPTIONAL "basic" job object attributes in any device event report. All device
520 event reports MUST use the Get-Printer-Attributes response syntax. ~~In order to claim conformance to~~
521 ~~this notification specification, an IPP Printer MUST support all of the following Printer Description~~
522 ~~attributes, except "status-message"~~The following "basic" Printer object attributes are sent in the device
523 event report as Printer Attributes in any order:

524	+-----+-----+-----+
525	Printer object attribute REQUIRED? reference
526	+-----+-----+-----+
527	printer-uri-supported (uri) REQUIRED [ipp-mod] 4.4.1
528	+-----+-----+-----+
529	device-trigger-events REQUIRED 7.1
530	(1setOf type2 keyword)
531	+-----+-----+-----+
532	device-trigger-message (text(255)) OPTIONAL 7.2
533	+-----+-----+-----+
534	device-trigger-time REQUIRED 7.3
535	(integer(1:MAX))
536	+-----+-----+-----+
537	device-trigger-date-time (dateTime) OPTIONAL 7.4
538	+-----+-----+-----+
539	printer-state (type1 enum) REQUIRED [ipp-mod] 4.4.10
540	+-----+-----+-----+
541	printer-state-reasons OPTIONAL [ipp-mod] 4.4.11
542	(1setOf type2 keyword)
543	printer-is-accepting-jobs (boolean) REQUIRED [ipp-mod] 4.4.20
544	+-----+-----+-----+

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

547 ~~printer-uri-supported (uri) — see [ipp-mod] section 4.4.1~~

548 ~~job-id (integer(1:MAX)) — the job id of the current job processing on the printer.~~

549 ~~device-trigger-event (keyword) — the event that caused this notification —~~

550 ~~device-trigger-date-time (dateTime) — see section 7.1~~

551 ~~printer-state (type1 enum) — see [ipp-mod] section 4.4.10~~

552 ~~printer-state-reasons (type2 keyword) — see [ipp-mod] section 4.4.11 which includes most of the~~

553 ~~Printer MIB alert codes represented as keywords~~

554 ~~printer-is-accepting-jobs (boolean) — see [ipp-mod] section 4.4.20~~

555 ~~status-message (text(255)) — see [ipp-mod] section 3.1.6~~

556

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

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

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

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

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

572 If "status-message" is supported as an Operation attribute in operation responses, then ~~it~~ **"device-trigger-**
573 **message"** MUST be supported in the event report content. ~~If "status-message" is not supported, then it~~
574 ~~is omitted from the event report content.~~

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

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

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

582 ~~ISSUE 22—Do we agree to this small sub-set of attributes that MUST be sent in any event report~~
583 ~~content?~~

584 ~~ISSUE 23—Do we agree to the ones that are REQUIRED for an IPP Printer to support if it supports~~
585 ~~notification at all?~~

586 6 Job Description Attributes

587 ~~In order to claim conformance to this notification specification,~~ The following Job Description attributes
588 are **REQUIRED** to be supported defined for use with notification:

589 6.1 ***notify-recipients (1setOf uri)***

590 This REQUIRED attribute describes both where (the address) and how (the delivery method) event
591 reports are to be delivered when any of the events specified in the "notify-event-groups" attribute occur.
592 The Printer object MUST populate this Job Description attribute from the corresponding Operation
593 attribute supplied by the client in the create request. See section 4.1.1 for more description of this
594 attribute.

595 6.2 ***notify-event-groups (1setOf type2 keyword)***

596 This REQUIRED attribute identifies the event groups for which a notification event report is desired for
597 this job. The Printer object MUST populate this Job Description attribute from the corresponding
598 Operation attribute supplied by the client in the create request. If the client does not supply this attribute
599 in a create request, but does supply the "notify-recipients" attribute, the Printer object populates this
600 attribute with the 'job-completions-basic' event group value. See section 4.1.2 for more description of
601 this attribute.

602 6.3 ***job-trigger-events (type2 keyword)***

603 This **REQUIRED** attribute indicates the most recent job event(s) that ~~has~~ occurred for this job. Multiple
604 values MAY be used when more than one event occurs at the same time. In order to claim conformance
605 to this notification specification, the Printer object MUST support this Job Description attribute. The

606 Printer object supplies a copy of this attribute in every job event report that it sends to a notification
607 recipient. This attribute is also available to any client using a Get-Job-Attributes or Get-Jobs operation
608 for this job. The first job event for a job is the 'job-received' event, so this Job Description attribute
609 always has a value.

610 The standard keyword values are:

611 'job-received': when the Printer object accepts the create operation (i.e., when the job is created no
612 matter whether in the 'pending' or 'pending-held' states).

613 'job-held': when the job enters the 'pending-held' state using some protocol operation, such as Hold-
614 Job (see [ipp-ops-set1]), or the system or device holds the job because of some requirement that
615 cannot be met and other jobs could be processed, if there are any.

616 'job-released': when the job leaves the 'pending-held' state and enters the 'pending' or 'processing'
617 states due to the user, operator, or system releasing the held job using some protocol operation,
618 such as Release-Job (see [ipp-ops-set1]), or some internal or local operation.

619 'job-started-processing': the Printer starts processing the Job (i.e., when the job leaves the 'pending'
620 or other state and enters the 'processing' state).

621 'job-stopped': The Printer stopped processing the job and the job entered the 'processing-stopped'
622 state.

623 'job-continued': The Printer continues processing the job, i.e., the job leaves the 'processing-stopped'
624 state and re-enters the 'processing' state.

625 'job-warning': when the job encounters a condition which does not abort the job and does not require
626 human intervention, such as the interpreter encountering a request for a missing font, but for
627 which it is able to perform font substitution. A device warning, such as 'toner-low', is a 'device-
628 warning', NOT a 'job-warning'.

629 'job-completed': when the job completes processing (with or without errors or warnings) and enters
630 the 'completed' state.

631 'job-aborted': when the job was aborted by the system while in the 'processing' or 'processing-
632 stopped' state, due to some encountered problem that cannot be remedied by human intervention.

633 'job-canceled': when the job was canceled by the user or operator using the Cancel-Job operation
634 while the job was in any state.

635

636 **ISSUE 7 - which events are REQUIRED besides 'job-completed'?**

637 **1.26.4 job-trigger-message (text(255))**

638 This OPTIONAL attribute provides a short textual description of the event. The "job-trigger-events"
639 attribute is intended for use by automata, and the "job-trigger-message" is intended for the human end
640 user.

641 **ISSUE 8 - Ok if "job-trigger-message" stays as a single value while "job-trigger-event" is multi-valued?**
642 **When there are multiple codes, the message contains the concatenation of the messages.**

643 If the Printer object supports the "job-trigger-message" Job Description attribute, the Printer object
644 MUST be able to generate this message in any of the natural languages identified by the Printer object's
645 "generated-natural-language-supported" attribute (see the "attributes-natural-language" operation
646 attribute specified in [ipp-mod] section 3.1.4.1). As described in [ipp-mod] section 3.1.4.1 for any
647 returned 'text' attribute, if there is a choice for generating this message, the Printer object uses the natural
648 language indicated by the value of the "attributes-natural-language" in the client create request if

649 supported, otherwise the Printer object uses the value in the Printer object's own "natural-language-
650 configured" attribute.

651 **4.26.5 job-trigger-time (integer(1:MAX))**

652 This REQUIRED attribute indicates the point in time at which the most recent job event occurred for
653 this job. In order to populate this attribute, the Printer object uses the value in its "printer-up-time"
654 attribute at the time the event occurred.

655 In order to claim conformance to this notification specification, the Printer object MUST support this
656 Job Description attribute. The Printer object MUST supply a copy of this attribute in every event report
657 that it sends to a notification recipient. This attribute is also available to any client using a Get-Job-
658 Attributes or Get-Jobs operation for this job. The first job event for a job is the 'job-received' event
659 when the job is created. Therefore, this job attribute always has a value.

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

663 **4.36.6 job-trigger-date-time (dateTime)**

664 This OPTIONAL attribute indicates the point in time at which the most recent job event occurred for
665 this job. In order to claim conformance to this notification specification, the Printer object MUST
666 support this Job Description attribute if it also supports the "printer-current-time" Printer Description
667 attribute (which also requires a date). The Printer object MUST supply a copy of this attribute in
668 every event report that it sends to a notification recipient, if it supports this attribute. This attribute is
669 also available to any client using a Get-Job-Attributes or Get-Jobs operation for this job. The first job
670 event for a job is the 'job-received' event when the job is created. Therefore, this job attribute always
671 has a value.

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

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

679 **6.7 job-trigger-message (text(255))**

680 This OPTIONAL attribute provides a short textual description of the event. The "job-trigger-events"
681 attribute is intended for use by automata, and the "job-trigger-message" is intended for the human end
682 user.

683 If the Printer object supports the "job-trigger-message" Job Description attribute, the Printer object
684 MUST be able to generate this message in any of the natural languages identified by the Printer object's
685 "generated-natural-language-supported" attribute (see the "attributes-natural-language" operation
686 attribute specified in [ipp-mod] section 3.1.4.1). As described in [ipp-mod] section 3.1.4.1 for any
687 returned 'text' attribute, if there is a choice for generating this message, the Printer object uses the natural

688 language indicated by the value of the "attributes-natural-language" in the client request if supported,
689 otherwise the Printer object uses the value in the Printer object's own "natural-language-configured"
690 attribute.

691 7 Printer Description Attributes

692 ~~In order to claim conformance to this notification specification,~~ The following Printer Description
693 attributes are ~~REQUIRED to be supported~~ defined for use with notification:

694 7.1 *device-trigger-events* (1setOf type 2 keyword)

695 This attribute indicates the most recent device event(s) that ~~has~~ occurred for this device. Multiple values
696 MAY be used when more than one event occurs at the same time. In order to claim conformance to this
697 notification specification, the Printer object MUST support this Printer Description attribute. The
698 Printer object supplies a copy of this attribute in every device event report that it sends to a notification
699 recipient. This attribute is also available to any client using a Get-Printer-Attributes request for this
700 Printer object. The first device event for a device is 'powered-up', so this printer attribute always has a
701 value.

702 The standard keyword values are:

703 Device-report events include:

704 'started-processing' - when the Printer object enters the 'processing' state.

705 'became-idle' - when the Printer object enters the 'idle' state

706 'device-state-reason-removed' - when any value is removed from the Printer's "printer-state-
707 reasons" attribute, such as 'toner-low-warning' or 'media-jam'

708 'accepting-jobs' - when the Printer starts accepting jobs, i.e., when the value of the Printer
709 object's "printer-is-accepting-jobs" attribute changes to 'true'

710 'powered-up' - when the device is powered up.

711

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

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

721

722 Device-warning events include:

723 'device-state-reason-warning-added' - when a warning value is added to the Printer's "printer-
724 state-reasons" attribute, such as 'media-low-warning', i.e., any 'xxx-warning' value'

725 'not-accepting-jobs' - when the Printer ceases to accept jobs, i.e., when the value of the Printer's
726 "printer-is-accepting-jobs" attribute changes to 'false'

727

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

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

732
733 Device-error events include:

734 **'device-stopped'** - when the Printer object enters the 'stopped' state

735 **'device-state-reason-error-added'** - when an error value is to the Printer's "printer-state-
736 reasons" attribute, such as 'media-empty-error', 'media-empty', or 'media-jam'. Note: [ipp-
737 mod] section 4.4.11 indicates that the 'error' suffix MAY be omitted for errors.

738 **'powering-down'** - when the device is being powered down.
739

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

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

745 **ISSUE 9 - Events still needs work to reflect the agreements at the meeting and comparison with Printer**
746 **MIB and "printer-state-reasons" and other sources of events.**

747 **7.2 *device-trigger-message (text(255))***

748 This OPTIONAL attribute provides a short textual description of the event. The "device-trigger-events"
749 attribute is intended for use by automata, and the "device-trigger-message" is intended for the human
750 end user.

751 **ISSUE 10 - Ok if "device-trigger-message" stays as a single value while "device-trigger-event" is multi-**
752 **valued? When there are multiple codes, the message contains the concatenation of the messages.**

753 If the Printer object supports the "device-trigger-message" Printer Description attribute, the Printer
754 object MUST be able to generate this message in any of the natural languages identified by the Printer
755 object's "generated-natural-language-supported" attribute (see the "attributes-natural-language"
756 operation attribute specified in [ipp-mod] section 3.1.4.1). As described in [ipp-mod] section 3.1.4.1 for
757 any returned 'text' attribute, if there is a choice for generating this message, the Printer object uses the
758 natural language indicated by the value of the "attributes-natural-language" in the client create request if
759 supported, otherwise the Printer object uses the value in the Printer object's own "natural-language-
760 configured" attribute.

761 **~~4.27.3~~ *device-trigger-time (integer(1:MAX))***

762 This REQUIRED attribute indicates the point in time at which the most recent printer event occurred for
763 this device. In order to populate this attribute, the Printer object uses the value in its "printer-up-time"
764 attribute at the time the event occurred.

765 In order to claim conformance to this notification specification, the Printer object MUST support this
766 Printer Description attribute. The Printer object MUST supply a copy of this attribute in every event
767 report that it sends to a notification recipient. This attribute is also available to any client using a Get-

768 Printer-Attributes request for this Printer object. The first printer event for a Printer is when it is
769 powered up. Therefore, this printer attribute always has a value.

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

773 **4.37.4 device-trigger-date-time (dateTime)**

774 This **OPTIONAL** attribute indicates the point in time at which the most recent printer event occurred for
775 this **printerdevice**. In order to claim conformance to this notification specification, the Printer object
776 MUST support this Printer Description attribute **if it also supports the "printer-current-time" Printer**
777 **Description attribute (which also requires a date)**. The Printer object **MUST** supply**ies** a copy of this
778 attribute in every event report that it sends to a notification recipient, **if it supports this attribute**. This
779 attribute is also available to any client using a Get-Printer-Attributes request for this Printer object. The
780 first printer event for a Printer is when it is powered up. Therefore, this printer attribute always has a
781 value.

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

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

789 **4.47.5 notify-recipients-schemes-supported (1setOf uriScheme)**

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

793 **4.57.6 notify-event-groups-supported (1setOf type2 keyword)**

794 This attribute describes the event groups supported by this Printer object. In order to claim conformance
795 to this notification specification, the Printer object MUST support this Printer Description attribute.
796 Standard values are defined in Section 4.1.2)

797 **8 References**

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804 Bergman, R., Hastings, T., Herriot R., Moore, P., "Internet Printing Protocol/1.0: Additional
805 Optional Operations - Set 1", <ipp-ops-set1-981023.txt>, work in progress, October 23, 1998.
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808 notification-printer-980701>, work in progress, July 1, 1998.
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- 812 [RFC2046]
813 Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types. N. Freed & N.
814 Borenstein. November 1996. (Obsoletes RFC1521, RFC1522, RFC1590), RFC 2046.
- 815 [RFC2119]
816 S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119 , March
817 1997
- 818 [sense]
819 Martin, J. et al., "System Event Notification System Environment (SENSE)",
820 ftp://ftp.pwg.org/pub/pwg/sense/, work in progress, Spring 1996.

821

822 **9Issues**

- 823 ~~26.Do we want a Mixed Format for event reports? If so we can add 'multi-part/alternative' back in as a~~
824 ~~supported format.~~
- 825
- 826 ~~27.Do we want to extended the list of uriScheme values defined for standard delivery methods to~~
827 ~~include: 'ftp', 'pager', 'http', etc.? If so, they are easy to add. Should we add them now? Or register~~
828 ~~them later?~~
- 829
- 830 ~~28.Should we make "notify-recipients" and "notify-group-events" also be a Job-Description attributes, so~~
831 ~~that a user can query to determine what subscriptions were supplied (and help an implementation~~
832 ~~remember job-submission-subscriptions on the job object—useful whether the implementation is~~
833 ~~using a notification service or not), as we have done for attributes-charset and attributes-natural-~~
834 ~~language-operation-attributes?~~
- 835
- 836 ~~29.Note: since job-independent-subscriptions have the time-to-live parameter, there is no need to have~~
837 ~~Printer-Description attributes that list the current job-independent-subscriptions, correct?~~
- 838

839 ~~30. Should we combine the "Job Independent Subscription" paper with this paper, or leave them as~~
840 ~~separate specifications?~~

841 **109 Appendix C: Registration of ipp-tcp-notify scheme for use with IPP**

842 This appendix contains the information that IANA requires for registering a URL scheme for use with
843 the "application/ipp" MIME media type. The information following this paragraph will be forwarded to
844 IANA to register 'ipp-tcp-notify' whose contents are defined in Section 4.1.1 "notify-recipients (1setOf
845 uri)" in this document:

846 **TBD**

847

848 **Required parameters: none**

849 **Optional parameters: none**

850 **Encoding considerations:**

851 **Security considerations:**

852 IPP/1.0 protocol requests/responses do not introduce any security risks not already inherent in the
853 underlying transport protocols. Protocol mixed-version interworking rules in [ipp-mod] as well as
854 protocol encoding rules in [ipp-pro] are complete and unambiguous.

855 **Interoperability considerations:**

856 **TBD**

857

858 **Published specification:**

859 [ipp-not] Isaacson, S., Martin, J., deBry, R., Hastings, T., "Internet Printing Protocol/1.0: Event
860 Notification" draft-ietf-ipp-notification-00.txt, January, 1999.

861 **Applications which use this URL scheme:**

862 **TBD**

863 **Person & email address to contact for further information:**

864 Thomas N. Hastings
865 Xerox Corporation
866 737 Hawaii St.
867 El Segundo, CA 90245

868

869 Phone: (310) 333-6413

870 Fax: (310) 333-5514

871 Email: hastings@cp10.es.xerox.com

872 **11.10 Appendix D: Registration of ipp-udp-notify scheme for use with IPP**

873 This appendix contains the information that IANA requires for registering a URL scheme for use with
874 the "application/ipp" MIME media type. The information following this paragraph will be forwarded to
875 IANA to register 'ipp-udp-notify' whose contents are defined in Section 4.1.1 "notify-recipients (1setOf
876 uri)" in this document:

877 **TBD**

878

879 **Required parameters: none**

880 **Optional parameters: none**

881 **Encoding considerations:**

882 **Security considerations:**

883 IPP/1.0 protocol requests/responses do not introduce any security risks not already inherent in the
884 underlying transport protocols. Protocol mixed-version interworking rules in [ipp-mod] as well as
885 protocol encoding rules in [ipp-pro] are complete and unambiguous.

886 **Interoperability considerations:**

887 **TBD**

888

889 **Published specification:**

890 [ipp-not] Isaacson, S., Martin, J., deBry, R., Hastings, T., "Internet Printing Protocol/1.0: Event
891 Notification" draft-ietf-ipp-notification-00.txt, January, 1999.

892 **Applications which use this URL scheme:**

893 **TBD**

894 **Person & email address to contact for further information:**

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899

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903 **11 Appendix E: Full Copyright Statement**

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Isaacson, Martin, deBry, Hastings

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920 PARTICULAR PURPOSE.

921 **1012 Appendix E: Change History**

922 Changes are listed in reverse chronological order:

923 **12.1 Changes to the January 18, 1999 to make the January 20, 1999 version**

924 The following changes were made to the January 18, 1999 to make the January 20, 1999 version:

- 925 1. Made this an INTERNET-DRAFT.
- 926 2. Indicated that a new default port is needed for the delivery methods.
- 927 3. Added Appendices in which to put the registration information for the URL schemes for each
928 delivery method.
- 929 4. Clarified which parameters, Operation attributes, and Job/Printer attributes are supplied in an event
930 content: the request-id is 0, the status-code is new 'job-event' 0x600 or 'device-event' 0x601.
- 931 5. Changed "job-trigger-event" and "device-trigger-event" to be 1setOf so that multiple events that
932 occur at the same time MAY be send as one event content.
- 933 6. Added "job-trigger-time" as a REQUIRED Job Description and event content attribute which is in
934 seconds since power up.
- 935 7. Changed "job-trigger-date-time" and "job-state-reasons" to OPTIONAL.
- 936 8. Changed "status-message" to be an OPTIONAL "job-trigger-message" event content attribute and
937 also made it a Job Description attribute.
- 938 9. Added "device-trigger-time" as a REQUIRED Printer Description and event content attribute which
939 is in seconds since power up.
- 940 10. Changed "device-trigger-date-time" and "printer-state-reasons" to OPTIONAL.

941 11. Changed "status-message" to be an OPTIONAL "device-trigger-message" event content attribute
942 and also made it a Printer Description attribute.

943 12. Removed the "job-id" attribute from the device event content.

944 ~~13.1~~**12.2 Changes to the December 10, 1998 to make the January 18, 1999 version**

945 The following changes were made to the December 10, 1998 to make the January 18, 1999 version:

- 946 1. Changed the names of the REQUIRED notify-recipient keywords from: 'ipp-tcp-socket' and 'ipp-
947 udp-socket' to 'ipp-tcp-notify' and 'ipp-udp-notify'.
- 948 2. Added '-notify' to the OPTIONAL 'snmpv1', 'snmpv2', and 'snmpv3' delivery method names.
- 949 3. Changed the OPTIONAL 'sense-datagram' to 'sense-notify' to be consistent.
- 950 4. Added 'ndps-notify' as an OPTIONAL keyword.
- 951 5. Deleted the 'all-basic', 'all-job-events-basic', and 'all-device-events-basic'. Clients should be explicit
952 about which groups they want. If new groups are added, the clients won't know what to do with
953 them, if they had subscribed to 'all-xxx' groups.
- 954 6. Changed the names of "job-last-event" and "job-last-date-time-of-event" to "job-trigger-event" and
955 "job-trigger-date-time" events, since the events trigger the notification delivery, but the attribute
956 values remain after the event has been delivered.
- 957 7. Added "status-message" as an OPTIONAL event report content attribute.
- 958 8. Changed "job-impressions-completed" to OPTIONAL.
- 959 9. Indicated that OPTIONAL attributes are not sent in the event report content if they are not
960 supported.
- 961 10. Required that "status-message" and/or "job-impressions-completed" be sent in an event report
962 content if they are supported as an Operation attribute and a Job Description attribute, respectively.
- 963 11. Added REQUIRED "device-trigger-event", REQUIRED "job-id", and OPTIONAL "status-message"
964 to the device event report content.
- 965 12. Specified the "device-trigger-event" Printer Description attribute, naming each event.
- 966 13. Deleted the 'sheet-completed' and 'collated-copy-completed', since these events are not part of any
967 'xxx-basic' event group. They can be added back when we have an event group that uses them.

968 ~~13.2~~**12.3 Changes to the July 1, 1998 to make the December 10, 1998 version**

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

- 970 1. Clarified the terminology so that an "event" doesn't necessarily mean that a notification report is
971 delivered.
- 972 2. Removed many of the job and printer attributes for being sent in a notification event report, so that
973 we can get agreement on a basic set of event report content. Only attributes really needs are
974 included, including what may be needed for FAX. Changed the names of the event groups by
975 adding the suffix '-basic' to indicate that these event groups return only basic information.

- 976 Additional event groups can be registered in order to get more attributes as needed for accounting
977 and more detailed job monitoring purposes.
- 978 3. Deleted the "job-progress" event group. We can bring it back when we agree to all of the extra
979 attributes. Its not very useful with only the basic attributes.
- 980 4. The printer events are indicted using the "printer-state-reasons" values, instead of the Printer MIB
981 alert codes. Since most of the Printer MIB alert codes, except for the generic ones, have equivalent
982 IPP keyword reason values, this should be a problem and makes IPP more readably implemented in
983 a server that doesn't have the Printer MIB.
- 984 5. Added the "job-last-event" job description attribute to give the job event some persistence.
- 985 6. Changed the job's "time-at-event (integer)" to "job-last-date-time-of-event (dateTime)" to give an
986 absolute date and time, in case events are being relayed back through multiple servers, such as in
987 FAX. Also made it a Job Description attribute to give it persistence.
- 988 7. Changed the printer's "time-at-event(integer)" to "printer-last-date-time-of-event(dateTime)" to give
989 an absolute date and time, in case events are being relayed back through multiple servers, such as in
990 FAX. Also made it a Printer Description attribute to give it persistence.
- 991 8. Added the IPP/1.0 "printer-is-accepting-jobs" to the event report, since changes in its value are really
992 device state changes.
- 993 9. Added the complete semantics for each job event under the "last-job-event" Job Description
994 attribute.