

1 IPP Notification New Model

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5 This document is a new proposal to simplify the IPP Notification Model. It uses Harry Lewis's suggested
6 terminology of Per-Job subscriptions and Per-Printer subscriptions. The Subscription object is defined only
7 for use as Per-Printer subscriptions. Per-Job subscriptions are done entirely with Job attributes and use an
8 exclude event mask (like SNMPv3 trap subscriptions) in order to allow different recipients to get different
9 events. I've also added conformance requirements for operations and attributes, so that we can more
10 properly reason about the model, before updating the specification document.

11 This document also includes the results of the 8/4/99 IPP telecon.

12 **There are 17 issues highlighted like this that need to be resolved.**

13 This paper uses object modeling techniques to describe the current IPP Notification Specification object
14 model (July 22, 1999):

15 ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/ipp-notification-990722.pdf

16 Review of this object model before writing the complete spec will help speed up the production of the spec
17 and will also help with the understanding of the semantics. I suggest that this modeling be kept in the final
18 spec in some form similar to this paper.

19 This paper also gives an outline of how the final spec might be presented, including being divided into two
20 parts. After describing the additional object attributes for the Job, Printer, and Subscription objects, the
21 order of the spec is suggested to be:

- 22 1. the REQUIRED first part (sections 5, 6, and 7) defines the extensions to the Job and Printer object
23 and its operations for Per-Job subscriptions of Job and Printer events and their notification content.
- 24 2. the OPTIONAL second part (section 8) defines the Per-Printer subscription mechanism and the
25 Subscription object and its operations and attributes.

26 ***NOTE - Throughout this model document, the notation [] indicates that the sender (client in a
27 request, IPP object in a response, notification sender in a notification) MAY omit the attribute
28 inside the square brackets if there is not data to send. In addition, IPP Printer conformance
29 requirements for operation and attribute support are indicated in this document with the words and
30 codes:***

31 ***REQUIRED (R) to support notification at all***

32 ***CONDITIONALLY REQUIRED (C) - REQUIRED if Per-Printer subscription is supported***

33 ***OPTIONAL (O) - not required for either Per-Job or Per-Printer Subscriptions.***

34 ***Therefore, the [] do NOT mean OPTIONAL support and should not be confused with support
35 requirements.***

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68 1 Current IPP Notification Operations

69 The current IPP Notification specification (July 22, 1999) consists of the Job object and the Printer object.
70 A Job object contains zero or one Per-Job Subscription which specifies Job and/or Printer events. The Job
71 events apply only to this Job. The Printer events apply no matter which job. A Printer object contains zero
72 or more Per-Printer Subscriptions which specify Job and/or Printer events. The Job and Printer events
73 apply no matter which job.

74 The following operations are defined for Per-Job Subscriptions and Per-Printer Subscriptions:

75 1.1 Per-Job Subscriptions - previous model

Job object related:	salient inputs besides printer-uri:
job creation operations	recipients, [events,] [user-data]
Subscribe-Job	job-id, recipients, [events]
Get-Job-Attributes	job-id, [requested-attributes]
Unsubscribe-Job	job-id, subscription-id

76 1.2 Per-Printer Subscriptions - previous model

Printer object related:	salient inputs beside printer-uri:
Get-Printer-Attributes	[requested-attributes]
Renew-Printer-Subscription	[lease time]
Get-Printer-Subscriptions	[my-subscriptions]

77 2 New IPP Notification Operations

78 This new proposed IPP object model add the Subscription object (to the Job and Printer objects), but only
79 for the Per-Printer subscriptions.

80 The following operations are defined for Per-Job Subscriptions and Per-Printer Subscriptions:

81 2.1 Per-Job Subscriptions - new model

Job object related:	salient inputs besides printer-uri
job creation operations	recipients, [events,] [user-data,] [exclude-event-mask]
Get-Job-Attributes	job-id, [requested-attributes]
Replace-Job-Subscription	job-id, [recipients,] [events,] [user-data,] [exclude-event-mask]

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83 **2.2 Per-Printer Subscriptions - new model**

Printer object related:	salient inputs beside printer-uri:
Get-Printer-Attributes	[requested-attributes]
Subscription object related:	salient inputs besides printer-uri:
Create-Printer-Subscription	recipients, [events,] [user-data,] [exclude-event-mask,] [lease-time]
Get-Printer-Subscription-Attributes	subscription-id, [requested-attributes]
Get-Printer-Subscriptions	[my-printer-subscriptions,] [requested-attributes]
Renew-Printer-Subscription	subscription-id, [lease time]
Cancel-Printer-Subscription	subscription-id

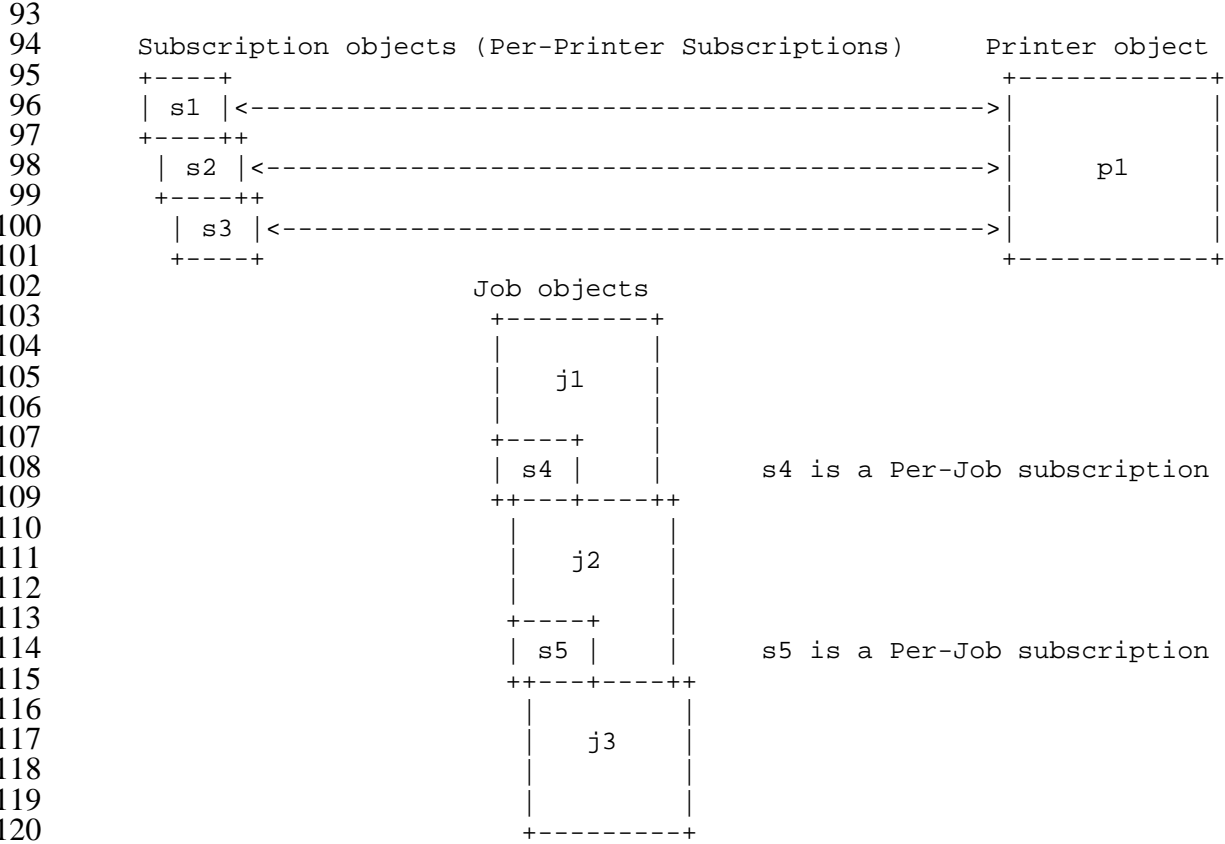
84

85 **3 Job, Printer, and Subscription object relationships**

86 This section describes the new notification object model that adds a Subscription object which together
87 with the Job and Printer object provide the complete notification semantics. The Subscription object is
88 OPTIONAL. The Subscription object MUST be supported if Per-Printer subscriptions are supported and
89 vice-versa.

90 Per-Job subscriptions do not use the Subscription object. Instead, a Job can have one Per-Job subscription
91 which is represented entirely as Job attributes.

92 The object relationships can be seen pictorially as:



121 s1, s2, and s3 are Per-Printer Subscription objects and can identify Printer and/or Job events.

122 s4 and s5 are Per-Job subscriptions (not objects) and can identify Printer and/or Job events.

123 The object relationships can be stated as follows:

- 124 1. The Printer object contains zero or more Subscription objects (p1 contains s1-s3 Subscription objects).
- 125
- 126 2. Each Subscription object (s1, s2, and s3) is contained in one Printer object (p1).
- 127
- 128 3. Each Subscription object (s1, s2, and s3) represents one Per-Printer subscription.
- 129
- 130 4. Each "per-Printer" Subscription object identifies one or more Job and/or Printer events. Such Job events are for *all* jobs on the Printer. Such Printer events are for *any* Printer event, no matter which job is processing.
- 131
- 132 5. The "per-Job" subscription (not an object) identifies one or more Job and/or Printer events. Such Job events are only for *this* job (different than "per-Printer" Subscriptions). Such Printer events are for *any* Printer event, no matter which job (same as for "per-Printer" Subscriptions).
- 133

134 6. A Job object contains zero or one Per-Job subscriptions (not an object)(Job j1 contains Per-Job
 135 subscription s4 Job j2 contains Per-Job subscription s5, Job j3 does not contain a Per-Job
 136 subscription.

137 7. A Subscription object cannot be contained in or associated with more than one Printer object

138 4 Object attributes defined for Notification

139 The following notification attributes are defined for each of the Printer, Job, and (new, but OPTIONAL)
 140 Subscription objects. The explanations about some of the object attributes are collected here so that they
 141 can be referred to from the operations that set them. All Job, Printer, and Subscription object attributes are
 142 READ-ONLY, i.e., they MUST NOT be settable with the Set-Job-Attributes or Set-Printer-Attributes
 143 operations. Instead, all of them are set as a side effect of another operation or when an event notification is
 144 delivered. Attributes and objects not in the current, July 22, spec are labeled as "new":

145 4.1.1 Job object attributes related to notification

Job object attributes:	Printer support	READ-ONLY, set by:
notify-recipients (1setOf uri)	R	job creation operation
notify-events (1setOf type2 keyword)	R	job creation operation
notify-user-data (octetString(255))	R	job creation operation
notify-exclude-event-masks (1setOf octetString(8))	O	job creation operation

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job-trigger-event (type2 keyword)	Printer support	Printer - event occurring
job-trigger-message (text(255))	R	Printer - event occurring
job-trigger-time (integer(MIN:MAX))	R	Printer - event occurring
job-trigger-date-time (dateTime)	O	Printer - event occurring
previous-job-state (type1 enum)	R	Printer - event occurring
job-state-reasons-added (1setOf type2 keyword)	R	Printer - event occurring
job-state-reasons-deleted (1setOf type2 keyword)	R	Printer - event occurring

147 Attribute Notes:

148 notify-user-data (octetString(255)) - information being sent from the Subscriber to the Notification
 149 Recipient(s). This information could identify the real recipient, in case the Notification Recipient is
 150 a general recipient tool, such as Tool Talk or an Instant Message Service.
 151 **ISSUE 1 - is 255 octets too long for "notify-user-data (octetString(255))", since it also has to be sent**
 152 **in the notification content? How about 64 octets?**

153 notify-exclude-event-masks (1setOf octetString(8)) - an OPTIONAL per-recipient event mask whose
 154 values are parallel to the "notify-recipients" attribute. Each 1 bit indicates that the corresponding
 155 recipient is not to receive the 'i'-th event specified in the "notify-events" attribute. The first event in
 156 "notify-events" is numbered '1' which corresponds to the first bit (Big Endian network order) of the
 157 event mask octetString. If an implementation only supports n events, then the maximum number of
 158 octets that an implementation need support for this attribute is not really 8 octets, but is n mod 8.

159 **ISSUE 2 - Should "notify-exclude-event-masks (1setOf octetString(8))" be REQUIRED if the**
 160 **number of Notification Recipients supported in a Per-Job (or Per-Printer) Subscription in greater**
 161 **than 1 (as specified in the Printer's "max-notification-recipients-supported" attribute)?**

162 job-state-reasons-added (1setOf type2 keyword) and job-state-reasons-deleted (1setOf type2 keyword) -
 163 **ISSUE 3 - why not just "previous-job-state-reasons" instead of "job-state-reasons-added" and "job-**
 164 **state-reasons-deleted" attributes as Job Description attributes?**

165 4.1.2 Printer object attributes related to notification

Printer object attributes:	Printer support	READ-ONLY, set by:
notify-schemes-supported (1setOf uriScheme)	R	Administrator/implementation
max-notification-recipients-supported (integer(1:MAX))	R	Administrator/implementation
notify-events-default (1setOf type2 keyword)	R	Administrator/implementation
notify-events-supported (1setOf type2 keyword)	R	Administrator/implementation
max-events-supported (integer(5:MAX))	R	Administrator/implementation
notify-lease-time-supported (rangeOfInteger(0:MAX))	C	Administrator/implementation
notify-lease-time-default (integer(0:MAX))	C	Administrator/implementation
max-printer-subscriptions-supported (integer(0:MAX))	C	Administrator/implementation

166 Attribute Notes:

167 notify-schemes-supported (1setOf uriScheme) - the schemes that are supported in Per-Job and Per-Printer
 168 "notify-recipients" operation attributes.

169 max-notification-recipients-supported (integer(1:MAX)) - the maximum number of Notification Recipients
 170 that are supported in a Per-Job Subscription. If Per-Printer subscriptions are supported this same
 171 number applies. An implementation **MUST** support at least 1.

172 max-events-supported (integer(5:MAX)) - the maximum number of events that are supported in a Per-Job
 173 Subscription. If Per-Printer subscriptions are supported this same number applies. An
 174 implementation **MUST** support at least 5.

175 notify-lease-time-supported (rangeOfInteger(0:MAX)) - the minimum and maximum lease times
 176 supported. When the lease time expires for a Per-Printer Subscription without renewing, the Printer
 177 **MUST** delete the Subscription object. A value of 0 indicates an infinite amount of time, i.e., no
 178 lease. No lease **MAY** require authorization.

179 max-printer-subscriptions-supported (integer(0:MAX)) - the maximum number of Per-Printer subscription
 180 supported. 0 means there is no limit.

181 4.1.3 Subscription object attributes (new and OPTIONAL)

Subscription object attributes:	Printer support	READ-ONLY, set by:
notify-recipients (1setOf uri)	C	client - Create-Printer-Subscription
notify-events (1setOf type2 keyword)	C	client - Create-Printer-Subscription
notify-user-data (octetString(255))	C	client - Create-Printer-Subscription
notify-exclude-event-mask (1setOf octetString(8))	O	client - Create-Printer-Subscription
notify-lease-time (integer(0:MAX))	C	client - Create-Printer-Subscription

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notify-lease-time-remaining (integer(0:MAX))	C	Printer - Create-Printer-Subscription
subscriber-user-name (name(MAX))	C	Printer - Create-Printer-Subscription

183

most-recent-request-id (1setOf integer(0:MAX))	C	Printer - event occurring
delivery-failure-count (integer(0:MAX))	C	Printer - event occurring

184 Attribute Notes:

185 "notify-user-data" (octetString(255)) - same as the "notify-user-data" Job Description attribute.

186 "notify-exclude-event-mask" (1setOf octetString(8)) - same as the "notify-exclude-event-mask" Job
187 Description attribute.

188 "notify-lease-time" - the number of seconds granted for the subscription. It is used to restore the
189 subscription on the Restart-Job and Reprocess-Job operations. A 0 value indicates infinite time.

190 "notify-lease-time-remaining" - the number of seconds remaining in the lease. When the Printer counts the
191 value down to 0, the Printer MUST delete the Per-Printer Subscription object. A client is able to
192 extend a lease using the Renew-Printer-Subscription operation (see section 8.4). Internally, the
193 implementation may have a more absolute representation of when the lease expires, but this relative
194 value is returned to help the client know how much more time is remaining in the lease. A value of
195 0 indicates an infinite name, if such a policy is supported as indicated in the "notify-lease-time-
196 supported (integer(0:MAX)) Printer Description attribute.

197 "subscriber-user-name (name(MAX)) - the printable name of the most authenticated user that created the
198 Per-Printer Subscription (analogous to "job-originating-user-name" for Job objects).

199 "most-recent-request-id" (1setOf integer(0:MAX)) - the request-id that was delivered in the most recent
200 notification for the subscription for the recipient in the corresponding parallel "notify-recipients"
201 (1setOf uri) attribute. The reason to have a separate request-id for each recipient is so that when
202 more than one Notification Recipient is specified in a subscription, each recipient will have its own
203 monotonically increasing set of request-ids, i.e., no gaps, in order to be able to detect a missing
204 notification. If an implementation doesn't support more than one Notification Recipient then this
205 attribute only has one value as well.

206 "delivery-failure-count" (integer(0:MAX)) - the number of transport delivery failures in delivering a
207 notification to any of the "notify-recipients" using the transport indicated. Note: for the current
208 delivery methods envisioned (see Notification Requirements [ipp-req], Notification Recipients do
209 not respond to the Notification Source, so this count is not the number of unacknowledged
210 notifications.

211 5 Events

212 Events are defined to be non-overlapping. So for example, 'job-state-changed' doesn't include creating the
213 job or completing the job. This reduces the need to batch events together, since events tends to happen at
214 different times by definition.

215 Both Job and/or Printer events may be specified for Per-Job or Per-Printer subscriptions:

216 Job events in a Per-Job subscription indicate Job events for *this* job only

217 Job events in a Per-Printer subscription indicates Job events for *all* jobs

218 Printer events in a Per-Job subscription indicate Printer events for *any* job

219 Printer events in a Per-Printer subscription indicate Printer events for *any* job

220 **ISSUE 4** - Should we disambiguate the 'job-xxx' events and double the number by renaming to 'my-
221 job-xxx' and 'all-job-xxx' events for use in both Per-Job and Per-Printer subscriptions?

222 5.1 Job events

223 '**none**': REQUIRED - no notifications of any events

224 **ISSUE 5** - Add a 'job-announce' event which is sent to the Notification Recipient(s) when the
225 subscription is accepted to prepare/warn them?

226 '**job-created**': REQUIRED - the Printer object has accepted Create-Job, Print-Job, or Print-URI.

227 '**job-completed**': REQUIRED - the job has reached 'completed', 'aborted', or 'canceled'.

228 '**job-state-changed**': REQUIRED - any job state or state-reason changed, except when the job is
229 created or when the job moves to 'completed', 'aborted', or 'canceled'.

230 '**job-config-changed**' - "job-message-from-operator" or any of the non-READ-ONLY Job attributes
231 changed, typically through the Set-Job-Attributes operation.

232 '**job-purged**' - Job-Purged operation on a 'non-completed' job.

233

234 '**job-progress**' - sheet or copy completed. See separate [ipp-prog] spec.

235 5.2 Printer events

236 '**none**' - REQUIRED - no notification of any events

237 **ISSUE 6** - Add a 'printer-announce' event which is sent to the Notification Recipient(s) when the
238 subscription is accepted to prepare/warn them?

239 '**printer-restarted**' - device powered up or Restart-Printer operation is performed (see [ipp-adm]).

240 '**printer-shutdown**' - device is being powered down or the Shutdown-Printer operation [ipp-adm]).

241 '**printer-state-changed**' - REQUIRED - "printer-state", "printer-state-reasons", and/or "printer-is-
242 accepting-jobs" attributes changed, except when the Printer starts up or is shutdown.

243 '**printer-media-changed**' - when the media loaded ("media-ready") on a printer has been changed.

244 **'printer-config-changed'** – "printer-message-from-operator" or any non-READ-ONLY Printer
245 attributes changed, except for "media-ready" (which has its own event), whether through the
246 Set-Printer-Attributes operation or by other means and whether initiated by a human or not.
247 **'printer-no-longer-full'** – Printer may still be printing but has acquired more buffer space to accept
248 jobs. This event only occurs when the Printer did not have room to accept jobs previously and
249 rejected a Print-Job, Print-URI, Create-Job, Send-Document, or Send-URI operation from any
250 client (desktop or Server).
251 **'printer-almost-idle'** – Printer needs another Job in order to stay busy. Typically sent to a Server
252 that has subscribed.

253 **6 Notification Content**

254 **ISSUE 7** - How is the User Friendly notification represented, such as is used with the 'mailto:' notification
255 delivery scheme? What parts gets translated into the Natural Language of the subscriber (presumed to be
256 the same as the recipient), besides the "job-trigger-message" and "printer-trigger-message"? The idea of
257 using multipart/report has problems going through firewalls because of attachments, so maybe we need a
258 single text message that can be read by humans, and still be parsed by programs for some of the (un-
259 translated) keywords attribute names. Perhaps, the trigger-message contains user friendly stuff like job-
260 name, printer-name, and the translated job-state and state-reasons values and the rest of the message is a
261 series of lines of the form:

262 **keyword: text**

263 where 'keyword' is the un-translated (i.e, U.S. English) attribute keyword name and the text is the
264 representation of the attribute values. Which attributes would be required beside the "job-trigger-message"
265 and "printer-trigger-message"?

266 The notification content is the same for the current and new models. All attributes indicated are
267 REQUIRED for *all* events, unless inside [] or the comment indicates otherwise:

268 **6.1 Job Event Notification content**

269 The following notification content is sent for both Per-Job and Per-Printer Subscriptions when a Job event
270 occurs (see section 5.1 for Job events):

271 **ISSUE 8 - Most transports only allow 500 to 1000 octets in a packet we have too much stuff.**
272 version-number (integer (0:32767))
273 status-code (integer (0:32767)) - with the value: basic-job-event(600)
274 request-id (integer (1:MAX)) - used as notification delivery sequence number for each recipient
275 job-printer-uri (uri)
276 job-id (integer(1:MAX))
277 job-trigger-event (type2 keyword)
278 [job-trigger-message (text(255))]
279 **ISSUE 9 - is 255 too long for "job-trigger-message (text(255))", since it also has to be sent in the**
280 **notification content?**
281 **ISSUE 10 - How to include user friendly data, like job-name, job-owner, printer-name, date, time,**
282 **and event name in a Job event notification?**
283 **ISSUE 11 - Should we REQUIRE the "printer-trigger-message" to contain the user friendly data**
284 **localized information about this event, namely: like job-name, job-owner, printer-name, date, time,**
285 **and event name and REQUIRE "printer-trigger-message"?**
286 job-trigger-time (integer(1:MAX))
287 [job-trigger-date-time (dateTime)]
288 job-state (type1 enum)
289 previous-job-state (type1 enum) not for 'job-completed' event
290 job-state-reasons (1setOf type2 keyword)
291 job-state-reasons-added (1setOf type2 keyword) not for 'job-completed' event
292 job-state-reasons-deleted (1setOf type2 keyword) not for 'job-completed' event
293 **ISSUE 12 - in a Job notification why not just "previous-job-state-reasons" instead of "job-state-**
294 **reasons-added" and "job-state-reasons-deleted"?**
295 [job-impressions-completed (integer(0:MAX))] only for 'job-completed' event
296 [job-media-sheets-completed (integer(0:MAX))] only for 'job-completed' event
297 job-collation-type (type2 enum) only for 'job-progress' event
298 sheet-completed-copy-number (integer(-2:MAX)) only for 'job-progress' event
299 sheet-completed-document-number(integer(-2:MAX)) only for 'job-progress' event
300 impressions-interpreted (integer(-2:MAX)) only for 'job-progress' event
301 impressions-completed-current-copy (integer(-2:MAX)) only for 'job-progress' event
302 [subscription-id (integer(1:MAX))] MUST if from a Per-Printer
303 subscription

304 **6.2 Printer Event Notification content:**

305 The following notification content is sent for both Per-Job and Per-Printer Subscriptions when a Job event
306 occurs (see section 5.2 for Printer events):

307 ISSUE 13 - Most transports only allow 500 to 1000 octets in a packet so we have too much stuff
308 here.

309 version-number (integer (0:32767))
310 status-code (integer (0:32767)) - with the value: basic-job-event(601)
311 request-id (integer (1:MAX)) - used as notification delivery sequence number for each recipient
312 printer-uri (uri)
313 printer-trigger-event (type2 keyword)
314 [printer-trigger-message (text(255))]

315 ISSUE 14 - is 255 too long for "printer-trigger-message (text(255))", since it also has to be sent in
316 the notification content?

317 ISSUE 15 - How to include user friendly data, like printer-name, date, time, and event name in a
318 Printer event notification?

319 ISSUE 16 - Should we REQUIRE the "printer-trigger-message" to contain the user friendly data
320 localized information about this event, namely: printer-name, date, time, and event name and
321 REQUIRE "printer-trigger-message"?

322 printer-trigger-time (integer(1:MAX))
323 [printer-trigger-date-time (dateTime)]
324 printer-state (type1 enum)
325 previous-printer-state (type1 enum)
326 printer-state-reasons (1setOf type2 keyword)
327 printer-state-reasons-added (1setOf type2 keyword)
328 printer-state-reasons-deleted (1setOf type2 keyword)

329 ISSUE 17 - in a Printer notification why not just "previous-printer-state-reasons" instead of "printer-
330 state-reasons-added" and "printer-state-reasons-deleted"?

331 [subscription-id (integer(1:MAX))] MUST if from a Per-Printer
332 subscription

333

334 7 REQUIRED Per-Job Subscription mechanism

335 This section lists the REQUIRED operation requests and response that have some relation to notification,
336 i.e., that are related to Per-Job subscription. Section 8 lists the OPTIONAL operation requests and
337 responses associated with the OPTIONAL Per-Printer subscription and its Subscription object.

338 **7.1 Job Creation Operations (Create-Job, Print-Job, Print-URI) and Validate-Job**

339 As in the current notification spec (July 22, 1999), the usual method for a client to associate one
340 subscription with a Job is to specify the subscription when the job is created. For a Per-Job Subscription,
341 the client supplies the following notification operation attributes with any of the job creation operations
342 (Create-Job, Print-Job, Print-URI), plus Validate-Job (which doesn't create a job or subscription):

343	notify-recipients (1setOf uri)	REQUIRED to support
344	[notify-events (1setOf type2 keyword)]	REQUIRED to support
345	[notify-user-data (octetString(255))]	REQUIRED to support
346	[notify-exclude-event-mask (octetString(8))]	OPTIONAL to support

347 **7.2 Get-Printer-Attributes operation**

348 The Get-Printer-Attributes can be used to request the additional Printer Description attributes that indicate
349 the notification supported. See section 4.1.2.

350 **7.3 Get-Job-Attributes operation**

351 The Get-Job-Attributes can be used to request the additional Job Description attributes that relate to
352 notification. See section 4.1.1.

353 **8 OPTIONAL Per-Printer Subscriptions and the Subscription object**

354 This section lists the operation requests and responses that MUST be supported if the OPTIONAL Per-
355 Printer Subscriptions are supported which REQUIRES that the Subscription object be supported and vice
356 versa.

357 **8.1 Create-Printer-Subscription operation**

358 The Create-Printer-Subscription operation creates a Per-Printer subscription by creating a Per-Printer
359 Subscription object which is added to the Printer object.

360 Request :

Group 1: Operation Attributes	Printer support
"attributes-charset" (charset)	R
"attributes-natural-language" (naturalLanguage)	R
"printer-uri" (uri)	R
["requesting-user-name" (name(MAX))]	RECOMMENDED
"notify-recipients" (1setOf uri)	R
["notify-events" (1setOf type2 keyword)]	R
["notify-user-data" (octetString(255))]	R
["notify-exclude-event-mask" (1setOf octetString(8))]	O
["notify-lease-time" (integer(0:MAX))]	R

361 Response :

Group 1: Operation Attributes	Printer Support
"status-code" (type2 enum)	R
"attributes-charset" (charset)	R
"attributes-natural-language" (naturalLanguage)	R
["status-message" (text(255))]	O
["detailed-status-message" (text(MAX))]	O
"subscription-id" (integer(1:MAX))	R
"notify-lease-time" (integer(0:MAX))	R
"notify-lease-time-remaining" (integer(0:MAX))	R
Group 2: Unsupported Attributes	R

362 Notes: A "notify-lease-time" and "notify-lease-time-remaining" of 0 means infinite, i.e., the Per-Printer
363 Subscription has no lease. Supplying a 0 value MAY require authentication in order to be used when
364 supported at all..

365 The Printer object MUST return the "notify-lease-time" actually granted which may be less than the
366 requester requested if it was greater than the MAX supported or more than the requester requested if it was
367 less than the MIN supported, as indicated in the Printer's "lease-time-supported" (rangeOfInteger(0:MAX))
368 attribute.

369 The Printer object MUST return the "notify-lease-time-remaining" which is the number of seconds
370 remaining in the lease.

371 **8.2 Get-Printer-Subscription-Attributes operation**

372 The Get-Printer-Subscription-Attributes returns the requested attributes of the identified Per-Printer
373 Subscription object. See section 4.1.3.

374 Request:

Group 1: Operation Attributes		Printer support
"attributes-charset"		R
"attributes-natural-language"		R
"printer-uri" (uri)		R
["requesting-user-name" (name(MAX))]		RECOMMENDED
"subscription-id" (integer(1:MAX))		R
["requested-attributes" (1setOf type2 keyword)]		R

375 Response:

Group 1: Operation Attributes		Printer support
"status-code" (type2 enum)		R
["status-message" (text(255))]		O
["detailed-status-message" (text(MAX))]		O
"attributes-charset"		R
"attributes-natural-language"		R
Group 2: Unsupported Attributes		R
Group 3: <the requested Subscription object attributes>		R

376 This operation is similar to the Get-Printer-Attributes operation. If the client omits the "requested-
377 attributes" operation attribute, the Printer MUST respond as if the client had supplied the 'all' value, i.e.,
378 return all of the attributes supported for the Subscription object.

379

380 **8.3 Get-Printer-Subscriptions operation**

381 The Get-Printer-Subscriptions operation returns Per-Printer subscriptions, i.e., Subscription objects.

382 Request:

Group 1: Operation Attributes		Printer support
	"attributes-charset"	R
	"attributes-natural-language"	R
	"printer-uri" (uri)	R
	["requesting-user-name" (name(MAX))]	RECOMMENDED
	["limit" (integer(1:MAX))]	R
	["requested-attributes" (1setOf type2 keyword)]	R
	["my-subscriptions" (boolean)]	R

383 Response:

Group 1: Operation Attributes		Printer support
	"status-code" (type2 enum)	R
	"attributes-charset"	R
	"attributes-natural-language"	R
	["status-message" (text)]	O
	["detailed-status-message" (text(MAX))]	O
	Group 2: Unsupported Attributes	R
	Group 3 to N:<the requested Subscription Attributes for each Subscription object in a separate group>	R

384

385 Notes: This operation is similar to the Get-Jobs operation. If the client wants any attributes returned,
386 including the "subscription-id", it must include the attribute keyword name in the "requested-attributes"
387 operation attribute. If the "requested-attributes" operation attribute is omitted, the Printer MUST respond as
388 if the client supplied the value: 'subscription-id'.

389 **8.4 Renew-Printer-Subscription operation**

390 Request :

Group 1: Operation Attributes		Printer support
	"attributes-charset"	R
	"attributes-natural-language"	R
	"printer-uri" (uri)	R
	"requesting-user-name" (name(MAX))	RECOMMENDED
	"subscription-id" (integer(1:MAX))	R
	"notify-lease-time" (integer(0:MAX))	R

391 Response :

Group 1: Operation Attributes		Printer support
	"status-code" (type2 enum)	R
	"attributes-charset"	R
	"attributes-natural-language"	R
	["status-message" (text(255))]	O
	["detailed-status-message" (text(MAX))]	O
	"notify-lease-time" (integer(0:MAX))	R
	"notify-lease-time-remaining" (integer(0:MAX))	R
Group 2: Unsupported Attributes		R

392 Notes: The Printer object MUST return the "notify-lease-time" actually granted which may be less than the
 393 requester requested if it was greater than the MAX supported or more than the requester requested if it was
 394 less than the MIN supported, as indicated in the Printer's "lease-time-supported" (rangeOfInteger(0:MAX))
 395 attribute.

396 The Printer object MUST return the "notify-lease-time-remaining" which is the number of seconds
 397 remaining in the lease.

398 Note: There is no need to renew a Per-Job Subscription, since it is effectively the time that the Job has
 399 documents.

400 **8.5 Cancel-Printer-Subscription operation**

401 Request:

Group 1: Operation Attributes		Printer support
	"attributes-charset"	R
	"attributes-natural-language"	R
	"printer-uri" (uri)	R
	["requesting-user-name" (name(MAX))]	RECOMMENDED
	"subscription-id" (integer(1:MAX))	R

402 Response:

Group 1: Operation Attributes		Printer support
	"status-code" (type2 enum)	R
	"attributes-charset"	R
	"attributes-natural-language"	R
	["status-message" (text(255))]	O
	["detailed-status-message" (text(MAX))]	O
Group 2: Unsupported Attributes		R

403

404 **9 References**

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