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17
18 Internet Printing Protocol/1.0 & 1.1: Job Independent Subscriptions for IPP

19 Version 0.543

20 **Abstract**

21 This document describes an extension to the IPP Event Notification Proposal [ipp-not]. Three new
22 Printer operations are specified: -Subscribe, Renew-Subscription, and Unsubscribe. The basic idea
23 semantics of the two subscription Operation attributes ("notify-event-~~group~~" and "notify-recipients")
24 used in create operations is preserved. These two subscription attributes are supplied by the client as
25 operation attributes in this new Subscribe operation, along with a new "notify-lease-time" operation
26 attribute.

27 A client can remove a subscription explicitly using the Unsubscribe operation or can let the lease time
28 expire. A client can extend the lease time for a subscription using the Renew-Subscription.

29 Subscriptions sent to the IPP object using a job submission operation are called "Job Submission
30 Subscriptions." Subscriptions sent to the IPP object using the new "Subscribe" operation are called "Job
31 Independent Subscriptions". The semantic differences between job submission subscriptions and job
32 independent subscriptions are presented.

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65

66 **1 Summary of the proposal**

- 67 1. If this "Job Independent Subscription" specification is supported, the IPP Printer MUST support
68 three new Printer operations: -Subscribe, Renew-Subscription, and Unsubscribe. These operations
69 allow a client that is not submitting a job to subscribe, renew a subscription, and to unsubscribe
70 independently from job submission~~using a job independent subscription.~~
- 71
- 72 2. The Subscribe operation uses the following two **REQUIRED** subscription operation attributes:
73 "notify-recipients" (1setOf uri)
74 "notify-event~~groups~~" (1setOf type2 keyword)
75 These are the same operation attributes used to subscribe for notifications in the create operations
76 [ipp-not].
- 77
- 78 3. A third **REQUIRED** operation attribute, "notify-lease-time", specifies the length of time in ~~minutes~~
79 seconds that the subscription is to be in effect, after which the subscription is automatically canceled.
- 80
- 81 4. A fourth REQUIRED operation attribute, "subscription-id", allows a client to maintain a reference to
82 the applicable subscriptions made and know which event report were generated as a result of this
83 subscription.
- 84
- 85 5. The subscription created by a Subscribe operation is called a "Job Independent Subscription". Just
86 like Job Submission Subscriptions, this subscription can include job and/or device events.
87 Subscriptions for Job Events in this type apply to all jobs. For these types of subscriptions, it is most
88 likely that the subscribing entity is either a server-based device management application submitting
89 jobs to a device which has IPP embedded in it or an accounting application collecting accounting
90 data.
91

143 3 Job Independent Subscription Semantics

144 There are semantic differences between job submission subscriptions and job independent subscriptions.
 145 A "Job Submission Subscription" is established between the client and the device when a job create
 146 request is made. The attributes as specified in [ipp-not] are sent to the device and the response includes
 147 attributes telling the client if the subscription was successful or not. A "Job Independent Subscription"
 148 is established between a client and a device using the three new operations defined herein. These
 149 Some specific differences are:

- 150 1. Any ~~Either type of~~ subscription can register ~~for interest to receive event reports via the "notify-~~
 151 ~~events" attributes using in~~ job event ~~groups~~, printer event ~~groups~~, or both.
- 152 2. For "Job Submission Subscriptions", the subscription is only valid while the job is "~~active~~not-
 153 complete" (see [ipp-not] section 4).
- 154 3. For "Job Independent Subscriptions", the subscription is valid until it is explicitly canceled with an
 155 Unsubscribe operation or the time (in seconds) that was specified in the "notify-lease-time"
 156 operation attribute(~~in minutes~~) expires, whichever occurs first.
- 157 4. Job Events in a "Job Submission Subscription" apply only to "this job" (the Job object created
 158 because of the job create operation).
- 159 5. Job Events in a "Job Independent Subscription" apply to ALL jobs contained in the IPP Printer
 160 object. There is no way to use a Job Independent Subscription to subscribe to job events on a
 161 specific job. Only a "Job Submission Subscription" applies to a specific job (the submitted job).~~In~~
 162 ~~other words, once a job object has been created, there is no way to subscribe to Job Events only on~~
 163 ~~that job and no other job.~~
- 164 6. Printer Events in both "Job Submission Subscriptions" and "Job Independent Subscriptions" apply
 165 no matter which job is being processed.

166 4 The Subscribe, Renew-Subscription, and Unsubscribe Operations

167 The Subscribe, Renew-Subscription, and Unsubscribe operations are like any other IPP operation with
 168 respect to common operation attributes (target, charset, "requesting-user-name", natural language,
 169 unsupported attributes, etc.).

170 4.1 Subscribe Operation

171 If Job Independent Subscription is implemented, this operation is REQUIRED to be supported by the
 172 device. This operation allows a client to receive event reports from a specified device regarding it's own
 173 events and all the jobs associated with it. If a notification recipient has already done a subscribe
 174 operation, a subsequent subscribe will renew his subscription and update the events list and lease-time.

175 **ISSUE 1: Who filters out duplicate subscriptions? Client or Printer? If it is the client, then the**
 176 **Subscription list needs to be made available to it. If it is the Printer, how are duplicate subscriptions**
 177 **defined? If a Subscribe operation is performed and the "notify-recipient" and "notify-events" match a**
 178 **subscription already granted (whose lease time has not expired), does the IPP Printer just update the**
 179 **subscription's "notify-events" and "lease-time"? How defend against malicious clients? If the Printer**
 180 **filters out duplicates, then can we get rid of the Renew-Subscription operation?**

181 If the Printer has a bounded set of concurrent subscriptions (for the specified events or any events), it
182 rejects the operation and returns the 'server-error-too-many-subscriptions' status code. The client
183 SHOULD try again later.

184 4.1.1 Subscribe Request

185 The following groups of attributes are part of the Subscribe Request:

186 Group 1: Operation Attributes

187 Natural Language and Character Set:

188 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
189 section 3.1.4.1.

190 Target:

191 The "printer-uri" (uri) operation attribute which is the target for this operation as described in
192 [ipp-mod] section 3.1.5.

193 Requesting User Name:

194 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
195 described in [ipp-mod] section 8.3.

196

197 ~~In a Subscribe Request, the client MUST supply the three subscription operation attributes (it would be~~
198 ~~meaningless for a client to use the Subscribe operation to subscribe to nothing):~~

199 "notify-recipients" (1setOf uri):

200 The client MUST supply this attribute. If Job Independent Subscription is implemented, the
201 printer object MUST support this attribute. It describes both where (the address) and how (the
202 delivery method) event reports are to be delivered when any of the events specified in the
203 "notify-events" attribute occur. See [ipp-not] section 4.1.1.

204

205 "notify-event-groups" (1setOf type2 keyword):

206 The client OPTIONALLY supplies this attribute. If Job Independent Subscription is
207 implemented, the printer object MUST support this attribute. If the client does not supply the
208 attribute, then the Printer object uses its ~~the~~ "notify-events-default" attribute value. See [ipp-not]
209 section 4.1.3.

210

211 "notify-lease-time" (integer(0:MAX)):

212 The client OPTIONALLY supplies this attribute. If Job Independent Subscription is
213 implemented, the printer object MUST support this attribute. This attribute ~~refers to~~ requests a
214 lease time for the subscription, i.e., the number of seconds before the subscription expires.

215

216 There is no way to query the outstanding subscriptions. Instead, every subscription has a lease
217 time, so that no subscription can be carried too long and become a dead subscription because the
218 Notification Recipient has gone away.

219

220 ~~If the value is 0, the subscription is valid forever and an Unsubscribe operation must be used to~~
221 ~~remove the subscription. If the client does not supply this attribute in the request is unspecified,~~
222 ~~then the Printer object uses its~~the~~ "notify-lease-time-default" attribute value.~~

223 ~~ISSUE 4: In Jini, Lease time 'forever' is defined as MAX and Lease time 'any' (whatever is convenient~~
224 ~~for the printer) is defined as 1. Do we want to copy these meanings for IPP? Or leave zero to mean~~
225 ~~'forever'? Should we support 'any' using "notify lease time default"?~~

226 **4.1.2 Subscribe Response**

227 The following groups of attributes are part of the Subscribe Response:

228 Group 1: Operation Attributes

229 Status Message:

230 In addition to the REQUIRED status code returned in every response, the response
231 OPTIONALLY includes a "status-message" (text) operation attribute as described in [ipp-mod]
232 section 3.1.6.

233

234 Natural Language and Character Set:

235 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
236 section 3.1.4.1.

237

238 ~~In the Subscribe Response, the error code and message indicate the success or failure during the~~
239 ~~processing of the operation request. Also included in the response is a~~

240 ~~"subscription-id" (integer(1:MAX)):~~

241 The Printer object MUST support this -attribute and return it in the response. It ~~that~~ contains an
242 integer subscription identifier assigned by the Printer object for use in event reports and Renew-
243 Subscription/Unsubscribe operations.

244

245 "notify-lease-time" (integer(0:MAX)):

246 The Printer object MUST support this attribute and return it in the response. It contains the
247 actual lease time granted, which MUST be in the range specified by the Printer's "notify-lease-
248 time-supported" attribute. If the client supplied a value that is less than the minimum or greater
249 than the maximum, the Printer sets the actual lease time to the minimum or maximum value,
250 respectively, but otherwise accepts and performs the operation normally and no special status
251 code is returned. It is up to the client to check this returned value, if it cares.

252

253 Group 2: Unsupported Attributes

254 See section 3.1.7 for details on returning Unsupported Attributes.

255 ~~This is a set of Operation attributes supplied by the client (in the request) that are not supported~~
256 ~~by the Printer object or that conflict with one another (see [ipp-mod] sections 3.2.1.2 and 16).~~

257 ~~There is no way to query the outstanding subscriptions. Instead, every subscription has a lease~~
258 ~~time, so that no subscription can be carried too long can become a dead subscription because the~~
259 ~~notification recipient has gone away.~~

260 **4.2 Renew-Subscription**

261 If Job Independent Subscriptions is implemented, this operation is REQUIRED to be supported by the
262 device. This operation allows a client to renew the lease time on an already established subscription.
263 The client supplies the "subscription-id" for this operation.

264

265 **4.2.1 Renew-Subscription Request**

266 The following groups of attributes are part of the Subscribe Request:

267 Group 1: Operation Attributes

268 Natural Language and Character Set:

269 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
270 section 3.1.4.1.

271 Target:

272 The "printer-uri" (uri) operation attribute which is the target for this operation as described in
273 [ipp-mod] section 3.1.5.

274 Requesting User Name:

275 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
276 described in [ipp-mod] section 8.3.

277 "subscription-id" (integer(1:MAX)):

278 The client MUST supply this attribute. The printer object MUST support this attribute. It
279 identifies the subscription to be renewed, i.e., it is the ~~contains an~~ integer subscription identifier
280 ~~assigned~~ returned by the Printer object in a previous Subscribe or Renew-Subscription
281 ~~operation that is used to specify which subscription to renew.~~

282 The Printer returns a 'client-error-not-found' status code ~~is returned~~, if the subscription id is not
283 found (or has expired).

284 "notify-lease-time" (integer(0:MAX)):

285 See the description of "notify-lease-time" for the Subscribe operation request in Section .4.1.1.
286 The client MUST supply this attribute. If Job Independent Subscription is implemented, the
287 printer object MUST support this attribute. This attribute refers to the number of seconds before
288 the subscription expires. If the value is 0, the subscription is valid forever and an Unsubscribe
289 operation must be used to remove the subscription. There is no way to query the outstanding
290 subscriptions. Instead, every subscription has a lease time, so that no subscription can be carried
291 too long can become a dead subscription because the notification recipient has gone away.

292 **4.2.2 Renew-Subscription Response**

293 The following groups of attributes are part of the Subscribe Response:

294 Group 1: Operation Attributes

295 Status Message:

296 In addition to the REQUIRED status code returned in every response, the response
297 OPTIONALLY includes a "status-message" (text) operation attribute as described in [ipp-mod]
298 section 3.1.6.

299

307 Natural Language and Character Set:
 308 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
 309 section 3.1.4.1.
 310
 311 "subscription-id" (integer(1:MAX)):
 312 See the description of "subscription-id" for the Subscribe operation response in Section 4.1.2.
 313 The value returned in the response MAY be different than the value supplied in the request, i.e.,
 314 the implementation MAY assign a new subscription ID to the renewed subscription. The printer
 315 object MUST support this attribute. It contains an integer subscription identifier assigned by the
 316 Printer object.

318 **ISSUE 2 - Ok to permit an implementation to assign a new Subscription ID on a Renew-**
 319 **Subscription or should we require the ID to remain the same (and not be returned in the**
 320 **response)?**

321
 322 "notify-lease-time" (integer(0:MAX)):
 323 See the description of "notify-least-time" for the Subscribe operation response in Section 4.1.2.
 324

325 Group 2: Unsupported Attributes

326 See section 3.1.7 for details on returning Unsupported Attributes.
 327 This is a set of Operation attributes supplied by the client (in the request) that are not supported
 328 by the Printer object or that conflict with one another (see [ipp-mod] sections 3.2.1.2 and 16).
 329

330 **4.3 Unsubscribe**

331 If Job Independent Subscription is implemented, this operation is REQUIRED to be supported by the
 332 device. This operation allows a client to unsubscribe from the notification service. The "subscription-
 333 id" is required to perform this operation. Once a client performs an Unsubscribe operation, the printer
 334 should immediately stop sending event reports to that client the associated Notification Recipient(s)
 335 regarding for that subscription request.

337 **4.3.1 Unsubscribe Request**

338 The following groups of attributes are part of the Subscribe Request:

339 Group 1: Operation Attributes

340 Natural Language and Character Set:
 341 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
 342 section 3.1.4.1.
 343
 344 Target:
 345 The "printer-uri" (uri) operation attribute which is the target for this operation as described in
 346 [ipp-mod] section 3.1.5.
 347

348 Requesting User Name:
 349 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
 350 described in [ipp-mod] section 8.3.

351
 352 "subscription-id" (integer(1:MAX)):
 353 The client MUST supply this attribute. The printer object MUST support this attribute. It
 354 identifies the subscription to be removed, i.e., it is the integer subscription identifier returned by
 355 the Printer object in a previous Subscribe or Renew-Subscription operation.

356
 357 The Printer returns a 'client-error-not-found' status code, if the subscription id is not found (or
 358 has expired).

359
 360 ~~The client MUST supply this attribute. The printer object MUST support this attribute. It~~
 361 ~~contains an integer subscription identifier assigned by the Printer object that is used to specify~~
 362 ~~which subscription to delete. A 'client-error-not-found' status code is returned if the subscription~~
 363 ~~id is not found (or has expired).~~

364 365 **4.3.2 Unsubscribe Response**

366 The following groups of attributes are part of the Subscribe Response:

367 Group 1: Operation Attributes

368 Status Message:

369 In addition to the REQUIRED status code returned in every response, the response
 370 OPTIONALLY includes a "status-message" (text) operation attribute as described in [ipp-mod]
 371 section 3.1.6.

372 373 Natural Language and Character Set:

374 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
 375 section 3.1.4.1.

376 377 Group 2: Unsupported Attributes

378 See section 3.1.7 for details on returning Unsupported Attributes.

379 ~~This is a set of Operation attributes supplied by the client (in the request) that are not supported~~
 380 ~~by the Printer object or that conflict with one another (see [ipp-mod] sections 3.2.1.2 and 16).~~

381
 382 ~~In the Renew-Subscription and Unsubscribe Requests, the client MUST supply one subscription~~
 383 ~~identifier in a "subscription-identifier" operation attribute. In the Renew-Subscription Request, the~~
 384 ~~client MUST also supply the "notify-lease-time" operation attribute specifying the new lease time for the~~
 385 ~~subscription. In the Renew-Subscription and Unsubscribe Response, the error code and message~~
 386 ~~indicate the success or failure during the processing of the operation request. A 'client-error-not-found'~~
 387 ~~status code is returned if the subscription id is not found (or has expired). A 'server-error-temporary-~~
 388 ~~error' is returned if the Printer or subscription service is full or cannot otherwise accept the subscription~~
 389 ~~due to a condition that is likely to go away soon enough that the client should try again shortly.~~

390 **5 Printer Description Attributes**

391 The following Printer Description attributes are defined for use with job independent subscriptions for
392 notification:

393 **5.1 notify-lease-time-supported (rangeOfInteger(0:MAX))**

394 This REQUIRED Printer attribute specifies the range of values in seconds that are supported for the
395 "notify-lease-time" operation attribute. See section 4.1.2 for the behavior if the client-supplied value is
396 outside this range.

397 ~~ISSUE 1: If the requested notify-lease-time is greater than the supported lease times, does the printer~~
398 ~~reject the request? Or (like Jini) just make the lease time the maximum possible?~~

399 **5.2 notify-lease-time-default (integer(0:MAX))**

400 This REQUIRED Printer attribute specifies the value of the lease time that the Printer object has been
401 configured to assume if the client does not supply a "notify-lease-time" operation attribute in the
402 Subscribe or Renew-Subscription operations.

403 **5.3 subscription-expire-warning-time (integer(0:MAX))**

404 This CONDITIONAL Printer attribute specifies the amount of time in seconds ahead of the subscription
405 expiration time that the Printer will send a 'subscription-about-to-expire' event. This attribute MUST be
406 supported if the 'subscription-about-to-expire' event is supported.

407

408 **6 References**

409 [ipp-mod]

410 R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.1: Model
411 and Semantics", <draft-ietf-ipp-model-v11-02.txt>, work in progress, May, 1999.

412 See also "Internet Printer Protocol/1.0: Model and Semantics", RFC 2566, April 1999.

413 [ipp-not]

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415 1.1: IPP Event Notifications (Very Short)", <ipp-notifications-very-short-980701draft-ietf-ipp-
416 notifications-00.doc>, work in progress, July 1 May 17, 19998.

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463

464 **68 Other Open ISSUES**

465 The following issues need to be addressed:

- 466 3. If the IPP Printer is forwarding Subscribe operations to a notification service which rejects the
467 subscription, is there any way the IPP Printer can return that implementation specific error condition
468 back to the client? Or is it better for the IPP Printer to map the error codes to standard IPP error
469 status codes for interoperability?
- 470 4. Should we allow for an "Unsubscribe ALL" feature in some operation?
- 471 5. Should we define subscription service events? Such as: "subscription-about-to-expire",
472 "subscription-expired", "are-you-alive" notification events? The Notification Recipient would have
473 to know to issue the Renew-Subscription operation, (not the original client). These events would be
474 ones that are available with the Subscribe operation, but not create operations, correct?
- 475 6. What happens when a printer crashes or reboots? Are the subscriptions lost or are they required to be
476 retained or does that depend on implementation? How does rebooting affect lease times?
- 477 7. Jini defines a sequence number for events so that clients can re-order the events if they are received
478 out-of-order. IPP should support this too.
- 479 8. Section 8: Security Considerations of [ipp-mod] needs to be updated to reflect the use of these new
480 operations related to security, especially regarding section 8.5: Operations performed by operators
481 and system administrators. Also malicious clients renewing or unsubscribing subscriptions that do
482 not belong to them.

483 **9 Change History**

484 The following changes were made from the July 7, 1998 to create the May 19, 1999 version:

- 485 1. Added the lease time concept from Jini and SLP event notification mechanisms, where the client
486 requests a lease, but may be granted more or less, depending on the "notify-lease-time-supported
487 (rangeOfInteger) attribute.
- 488 2. Added "notify-lease-time-default" so that the client can request the "usual", if it doesn't care.
- 489 3. Added returning the subscription ID in the Renew-Subscription response in case the implementation
490 needs to change the ID.
- 491 4. Added some issues.

492 **10 Appendix A: Full Copyright Statement**

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