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8 **Internet Printing Protocol (IPP):**
9 **The 'indp' Delivery Method for Event Notifications and Protocol/1.0**

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20 **Abstract**

21 The IPP notification extension document [ipp-ntfy] defines operations that a client can perform in order to create
22 *Subscription Objects* in a Printer and carry out other operations on them. The Subscription Object specifies that
23 when one of the specified *Events* occurs, the Printer sends an asynchronous *Event Notification* to the specified
24 *Notification Recipient* via the specified *Delivery Method* (i.e., protocol).

25 The notification extension document [ipp-ntfy] specifies that each Delivery Method is defined in another document.
26 This document is one such document, and it specifies the 'indp' Delivery Method and Protocol. This Delivery
27 Method is a simple protocol consisting of a single operation: the Send-Notifications operation which uses the same
28 encoding and transport as IPP. This document defines version '1.0' of the protocol.

29 For this Delivery Method, when an Event occurs, the Printer immediately sends (pushes) an Event Notification via
30 the Send-Notifications operation to the Notification Recipient specified in the Subscription Object. The Event
31 Notification content consists of Machine Consumable attributes and a Human Consumable "notify-text" attribute.
32 The Notification Recipient returns a response to the Printer.

33

33 The full set of IPP documents includes:

- 34 Design Goals for an Internet Printing Protocol [RFC2567]
- 35 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
- 36 Internet Printing Protocol/1.1: Model and Semantics [ipp-mod]
- 37 Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]
- 38 Internet Printing Protocol/1.1: Implementer's Guide [ipp-üig]
- 39 Mapping between LPD and IPP Protocols [RFC2569]
- 40 Internet Printing Protocol (IPP): IPP Event Notification Specification [ipp-ntfy]

41 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
42 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included in a
43 printing protocol for the Internet. It identifies requirements for three types of users: end users, operators, and
44 administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A few OPTIONAL
45 operator operations have been added to IPP/1.1.

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

49 The "Internet Printing Protocol/1.1: Model and Semantics" document describes a simplified model with abstract
50 objects, their attributes, and their operations that are independent of encoding and transport. It introduces a Printer
51 and a Job object. The Job object optionally supports multiple documents per Job. It also addresses security,
52 internationalization, and directory issues.

53 The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the abstract
54 operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the encoding rules
55 for a new Internet MIME media type called "application/ipp". This document also defines the rules for transporting
56 a message body over HTTP whose Content-Type is "application/ipp". This document defines a new scheme
57 named 'ipp' for identifying IPP printers and jobs.

58 The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to implementers of
59 IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of the considerations that
60 may assist them in the design of their client and/or IPP object implementations. For example, a typical order of
61 processing requests is given, including error checking. Motivation for some of the specification decisions is also
62 included.

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

65 The "Internet Printing Protocol (IPP): IPP Event Notification Specification" document defines the semantics for
66 Subscription Creation Operations and the requirements for other Delivery Method documents to define a Delivery
67 Method to carry an Event Notifications to a Notification Recipient.

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117 **1 Introduction**

118 The notification extension document [ipp-ntfy] defines operations that a client can perform in order to create
119 *Subscription Objects* in a Printer and carry out other operations on them. A Subscription Object represents a
120 Subscription abstraction. The Subscription Object specifies that when one of the specified *Events* occurs, the
121 Printer sends an asynchronous *Event Notification* to the specified *Notification Recipient* via the specified
122 *Delivery Method* (i.e., protocol).

123 The notification extension document [ipp-ntfy] specifies that each Delivery Method is defined in another document.
124 This document is one such document, and it specifies the 'indp' Delivery Method. This Delivery Method is a
125 simple protocol consisting of a single operation: the Send-Notifications operation which uses the same encoding
126 and transport as IPP. This document defines version '1.0' of the protocol.

127 For the 'indp' Delivery Method, an IPP Printer sends (pushes) a Send-Notifications operation request containing
128 one or more Event Notifications to the Notification Recipient specified in the Subscription Object. The Event
129 Notification content consists of Machine Consumable attributes and a Human Consumable "notify-text" attribute.

130 The Notification Recipient receives the Event Notification as a Send-Notifications operation, in the same way as an
131 IPP Printer receives IPP operations. The Notification Recipient returns a response to the Printer.

132 **2 Terminology**

133 This section defines the following terms that are used throughout this document:

134 Terms such as attributes, keywords, and support. These terms have special meaning and are defined in the
135 model terminology [ipp-mod] section 12.2.

136 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED
137 NOT, and OPTIONAL, have special meaning relating to conformance as specified in RFC 2119
138 [RFC2119] and [ipp-mod] section 12.1. These terms refer to conformance to this document, if this
139 document is implemented.

140 Capitalized terms, such as Notification Recipient, Event Notification, Printer, etc., that are defined in [ipp-ntfy]
141 with the same meanings and are not reproduced here.

142 **Event Notification Attributes Group** – The attributes group in a request that contains Event Notification
143 Attributes in a request or response.

144 3 Model and Operation

145 See [ipp-ntfy] for the description of the Event Notification Model and Operation. This Delivery Method takes
146 advantage of combining several Event Notifications into a single Compound Event Notification that is delivery by a
147 single Send-Notification operation to a single Notification Recipient.

148 When creating each Subscription object, the client supplies the "notify-recipient" (uri) Subscription Template
149 attribute. The "notify-recipient" attribute specifies both a single Notification Recipient that is to receive the
150 Notifications when subsequent events occur and the method for notification delivery that the IPP Printer is to use.
151 For the Notification Delivery Method defined in this document, the notification method is 'indp' and the rest of the
152 URI is the address of the Notification Recipient to which the IPP Printer will send the Send-Notifications
153 operation.

154 The 'indp' Notification Delivery Method defined in this document uses a client/server protocol paradigm. The
155 "client" in this relationship is the Printer described in [ipp-ntfy] while the "server" is the Notification Recipient. The
156 Printer invokes the Send-Notifications operation to communicate IPP Event Notification contents to the
157 Notification Recipient. The Notification Recipient only conveys information to the Printer in the form of responses
158 to the operations initiated by the Printer.

159 Printers that implement the 'indp' Notification Delivery Method will need to include an HTTP client stack while
160 Notification Recipients that implement this Delivery Method will need to support an HTTP server stack. See
161 section 10.2 for more details.

162 If the client wants the Printer to send Event Notifications via the 'indp' Delivery Method, the client MUST choose
163 a value for "notify-recipient-uri" attribute which conforms to the rules of section 5.2.1.

164 When an Event occurs, the Printer MUST immediately:

- 165 1. Find all pertinent Subscription Objects P according to the rules of section 9 of [ipp-ntfy], AND
- 166 2. Find the subset M of these Subscription Objects P whose "notify-recipient-uri" attribute has a scheme
167 value of 'indp', AND
- 168 3. For each Subscription Object in M, the Printer MUST
 - 169 a) generate a Send-Notifications request as specified in section 8.1.1 AND
 - 170 b) send the Send-Notifications request to the Notification Recipient specified by the address part of the
171 "notify-recipient-uri" attribute value (see section 5.2.1).

172 If several events occur sufficiently close to one another for the same or different Subscription objects, but with the
173 same Notification Recipient, the Printer MAY combine them into a single Send-Notifications request using a
174 separate Event Notification Attributes group for each event (see section 8.1.1).

175 **4 General Information**

176 If a Printer supports this Delivery Method, Table 1 lists its characteristics.

177 **Table 1 - Information about the Delivery Method**

Document Method conformance requirement	'indp' realization
1. What is the URL scheme name for the Delivery Method?	indp
2. Is the Delivery Method is REQUIRED, RECOMMENDED, or OPTIONAL for an IPP Printer to support?	RECOMMENDED
3. What transport and delivery protocol does the Printer use to deliver the Event Notification content, i.e., what is the entire network stack?	A Printer MUST support a complete HTTP/1.1 stack [rfc2616]
4. Can several Event Notifications be combined into a Compound Event Notification?	A Printer implementation MAY combine several Event Notifications into a single Event Notifications request as separate Event Notification Attributes Groups, see section 8.1.1
5. Is the Delivery Method initiated by the Notification Recipient (pull), or by the Printer (push)?	This Delivery Method is a push.
6. Is the Event Notification content Machine Consumable or Human Consumable?	Machine Consumable with the "notify-text" attribute being Human Consumable
7. What section in this document answers the following question? For a Machine Consumable Event Notification, what is the representation and encoding of values defined in section 9.1 of [ipp-ntfy] and the conformance requirements thereof? For a Human Consumable Event Notification, what is the representation and encoding of pieces of information defined in section 9.2 of [ipp-ntfy] and the conformance requirements thereof?	The representation and encoding is the same as IPP. See section 8.1.1
8. What are the latency and reliability of the transport and delivery protocol?	Same as for IPP/1.0 or IPP/1.1 itself (see [ipp-mod]).

Document Method conformance requirement	'indp' realization
9. What are the security aspects of the transport and delivery protocol, e.g., how it is handled in firewalls?	See section 14
10. What are the content length restrictions?	They are the same as for IPP/1.0 and IPP/1.1 itself (see [ipp-mod]).
11. What are the additional values or pieces of information that a Printer sends in an Event Notification and the conformance requirements thereof?	A new Event Notifications attribute group (see section 10.1) and additional status codes for use in the response (see section 9)
12. What are the additional Subscription Template and/or Subscription Description attributes and the conformance requirements thereof?	None
13. What are the additional Printer Description attributes and the conformance requirements thereof?	None

178 The remaining sections of this document parallel the sections of [ipp-ntfy].

179 **5 Subscription object attributes**

180 This section defines the Subscription object conformance requirements for Printers.

181 **5.1 Subscription Template Attribute Conformance**

182 The 'indp' Delivery Method has the same conformance requirements for Subscription Template attributes as
183 defined in [ipp-ntfy]. The 'indp' Delivery Method does not define any addition Subscription Template attributes.

184 **5.2 Additional Information about Subscription Template Attributes**

185 This section defines additional information about Subscription Template attributes defined in [ipp-ntfy].

186 **5.2.1 notify-recipient-uri (uri)**

187 This section describes the syntax of the value of this attribute for the 'indp' Delivery Method. The syntax for values
188 of this attribute for other Delivery Method is defined in other Delivery Method Documents.

189 In order to support the 'indp' Delivery Method and Protocol, the Printer MUST support the following syntax:

190 The 'indp://' URI scheme. The remainder of the URI indicates the host and address of the Notification
191 Recipient that is to receive the Send-Notification operation.

192 **5.3 Subscription Description Attribute Conformance**

193 The 'indp' Delivery Method has the same conformance requirements for Subscription Description attributes as
194 defined in [ipp-ntfy]. The 'indp' Delivery Method does not define any addition Subscription Description attributes.

195 **6 Printer Description Attributes**

196 This section defines the Printer Description Attributes conformance requirements for Printers.

197 **6.1 Printer Description Attribute Conformance**

198 The 'indp' Delivery Method has the same conformance requirements for Printer Description attributes as defined in
199 [ipp-ntfy]. The 'indp' Delivery Method does not define any addition Printer Description attributes.

200 **6.2 New Values for Existing Printer Description Attributes**

201 This section defines additional values for existing Printer Description attributes.

202 **6.2.1 notify-schemes-supported (1setOf uriScheme)**

203 The following "notify-schemes-supported" value is added in order to support the new Delivery Method defined in
204 this document:

205 'indp': - The IPP Notification Delivery Method defined in this document.

206 **6.2.2 operations-supported (1setOf type2 enum)**

207 Table 2 lists the "operation-id" value added in order to support the new operation defined in this document. The
208 operation-id is assigned in the same name space as other operations that a Printer supports. However, a Printer
209 MUST NOT include this value in its "operations-supported" attribute unless it can accept the Send-Notifications
210 request.

211 **Table 2 – Operation-id assignments**

Value	Operation Name
0x001D	Send-Notifications

212

213 **7 Attributes Only in Event Notifications**

214 No additional attributes are defined only for use in Event Notifications besides those defined in [ipp-ntfy].

215 **8 Operations for Notification**

216 This section defines the operation for Event Notification using the 'indp' Delivery Method.

217 There is only one operation defined: Send-Notifications. Section 6.2.2 assigns of the “operation-id” for the Send-
218 Notifications operation and the following section defined the operation.219 **8.1 Send-Notifications operation**220 This REQUIRED operation allows a Printer to send one or more Event Notifications to a Notification Recipient
221 using HTTP.222 The Printer composes the information defined for an IPP Notification [ipp-ntfy] and sends it using the Sent-
223 Notifications operation to the Notification Recipient supplied in the Subscription object.224 The Send-Notifications operations uses the operations model defined by IPP [rfc2566]. This includes, the use of a
225 URI as the identifier for the target of each operation, the inclusion of a version number, operation-id, and request-id
226 in each request, and the definition of attribute groups. The Send-Notifications operation uses the Operation
227 Attributes group, but currently has no need for the Unsupported Attributes, Printer Object Attributes, and Job-
228 Object Attributes groups. However, it uses a new attribute group, the Event Notification Attributes group.

229

230 The Notification Recipient MUST accept the request in any state. There is no state defined for the Notification
231 Recipient for this Delivery Method.232 Access Rights: Notification Recipient MAY enforce access rights. If the Printer receives a rejection with these
233 status codes: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' status code ,
234 the Printer SHOULD cancel the subscription.

235 8.1.1 Send-Notifications Request

236 Every operation request MUST contains the following parameters (see [ipp-mod] section 3.1.1):

- 237 - a "version-number" '1.0' – the version of the 'indp' protocol is '1.0'.
- 238 - an "operation-id" - the value defined in Table 2
- 239 - a "request-id" - the request id (see [ipp-mod] section 3.1.2).

240 The following groups of attributes MUST be part of the Send-Notifications Request:

241 Group 1: Operation Attributes

242 Natural Language and Character Set:

243 The "attributes-charset" and "attributes-natural-language" attributes as defined in [ipp-mod] section
244 3.1.4.1.

246 The Printer MUST use the values of "notify-charset" and "notify-natural-language", respectively, from one
247 Subscription Object associated with the Event Notifications in this request.

249 Normally, there is only one matched Subscription Object, or the value of the "notify-charset" and "notify-
250 natural-language" attributes is the same in all Subscription Objects. If not, the Printer MUST pick one
251 Subscription Object from which to obtain the value of these attributes. The algorithm for picking the
252 Subscription Object is implementation dependent. The choice of natural language is not critical because
253 'text' and 'name' values can override the "attributes-natural-language" Operation attribute. The Printer's
254 choice of charset is critical because a bad choice may leave it unable to send some 'text' and 'name' values
255 accurately.

257 Target:

258 A copy of the Subscription object's "notification-recipient-uri" (uri) attribute which is the target of
259 this operation as described in [ipp-mod] section 3.1.5, i.e., the URI of the 'indp' Notification
260 Recipient (see section 5.2.1).

262 Group 2 to N: Event Notification Attributes

263 In each group 2 to N, each attribute is encoded using the IPP rules for encoding attributes [ipp-pro] and
264 may be encoded in any order. Note: the Get-Jobs response in [ipp-mod] acts as a model for encoding
265 multiple groups of attributes.

267 Each Event Notification Group MUST contain all of attributes specified in [ipp-ntfy] section 9.1 ("Content
268 of Machine Consumable Event Notifications") with exceptions denoted by asterisks in the tables below.

270 The tables below are copies of the tables in [ipp-ntfy] section 9.1 ("Content of Machine Consumable Event
271 Notifications") except that each cell in the "Sends" column is a "MUST".

273 For an Event Notification for all Events, the Printer sends the following attributes.

274

Table 3 – Attributes in Event Notification Content

Source Value	Sends	Source Object
notify-subscription-id (integer(1:MAX))	MUST	Subscription
notify-printer-uri (uri)	MUST	Subscription
notify-subscribed-event (type2 keyword)	MUST	Event Notification
printer-up-time (integer(MIN:MAX))	MUST	Printer
printer-current-time (dateTime) *	MUST	Printer
notify-sequence-number (integer (0:MAX))	MUST	Subscription
notify-charset (charset)	MUST	Subscription
notify-natural-language (naturalLanguage)	MUST	Subscription
notify-user-data (octetString(63)) **	MUST	Subscription
notify-text (text (MAX))	MUST	Event Notification
attributes from the “notify-attributes” attribute, if any ***	MUST ***	Printer
attributes from the “notify-attributes” attribute, if any ***	MUST ***	Job
attributes from the “notify-attributes” attribute, if any ***	MUST ***	Subscription

275

276

277

* The Printer MUST send “printer-current-time” if and only if it supports the “printer-current-time” attribute on the Printer object.

278

279

280

** If the associated Subscription Object does not contain a “notify-user-data” attribute, the Printer MUST send an octet-string of length 0.

281

282

283

*** If the “notify-attributes” attribute is present on the Subscription Object, the Printer MUST send all attributes specified by the “notify-attributes” attribute. Note: if the Printer doesn’t support the “notify-attributes” attribute, it is not present on the associated Subscription Object and the Printer does not send any client-requested attributes.

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For Event Notifications for Job Events, the Printer sends the following additional attributes shown in Table 4.

289

290

Table 4 – Additional Attributes in Event Notification Content for Job Events

Source Value	Sends	Source Object
job-id (integer(1:MAX))	MUST	Job
job-state (type1 enum)	MUST	Job
job-state-reasons (1setOf type2 keyword)	MUST	Job
job-impressions-completed (integer(0:MAX)) *	MUST	Job

291

292

293

294

* The Printer MUST send the “job-impressions-completed” attribute in an Event Notification only for the combinations of Events and Subscribed Events shown in Table 5.

295

Table 5 – Combinations of Events and Subscribed Events for “job-impressions-completed”

Job Event	Subscribed Job Event
‘job-progress’	‘job-progress’
‘job-completed’	‘job-completed’
‘job-completed’	‘job-state-changed’

296

297

298

For Event Notification for Printer Events, the Printer sends the following additional attributes shown in Table 6.

299

Table 6 – Additional Attributes in Event Notification Content for Printer Events

Source Value	Sends	Source Object
printer-state (type1 enum)	MUST	Printer
printer-state-reasons (1setOf type2 keyword)	MUST	Printer
printer-is-accepting-jobs (boolean)	MUST	Printer

300

301 8.1.2 Send-Notifications Response

302

303

The Notification Recipient MUST return (to the client which is the Printer) the following sets of attributes as part of a Send-Notifications response:

304 Every operation response contains the following REQUIRED parameters (see [ipp-mod] section 3.1.1):

- 305 - a "version-number"
- 306 - a "status-code"
- 307 - the "request-id" that was supplied in the corresponding request

308

309 Group 1: Operation Attributes

310 Status Message:

311 As defined in [ipp-mod].

312

313 The Notification Recipient can return any status codes defined in [ipp-mod] and section 9.1 that applies to
314 all of the Event Notification Attribute groups. The following is a description of the important status codes:

315

316 **'successful-ok'**: the Notification Recipient received all of the Event Notification Attribute Groups and
317 was expecting each of them.

318

319 **'successful-ok-ignored-notifications'**: the Notification Recipient was able to consume some, but not
320 all of the Event Notification Attributes Groups sent. The Event Notification Attributes Groups with
321 a "notify-status-code" attribute are the ones that were ignored or are to be canceled.

322

323 **'client-error-ignored-all-notifications'**: the Notification Recipient was unable to consume any of the
324 Event Notification Attributes Groups sent. The Event Notification Attributes Groups with a "notify-
325 status-code" attribute are the ones that were ignored or are to be canceled.

326 Natural Language and Character Set:

327 The "attributes-charset" and "attributes-natural-language" attributes as defined in [ipp-mod] section 3.1.4.1.

328 Group 2 to N: Notification Attributes

329 These groups MUST be returned if and only if the "status-code" parameter returned in Group 1 is anything but
330 the 'successful-ok' status code.

331 "notification-status-code" (type2 enum)

332 Indicates whether the Notification Recipient was able to consume the n-th Notification Report as follows:

333

334 **'successful-ok'** - this Event Notification Attribute Group was consumed
335 **'client-error-not-found'** - this Event Notification Attribute Group was not able to be consumed. The
336 Printer MUST cancel the Subscription and MUST NOT attempt to send any further Event
337 Notifications from the associated Subscription object.
338 **'successful-ok-but-cancel-subscription'** - the Event Notification Attribute Group was consumed, but the
339 Notification Recipient wishes to cancel the Subscription object. The Printer MUST cancel the
340 Subscription and MUST NOT attempt to send any further Event Notifications from the associated
341 Subscription object.

342 **9 Status Codes**

343 This section lists status codes whose meaning have been extended and/or defined for returning in Event Notification
344 Attribute Groups as the value of the "notification-status-code" operation attribute. The code values are allocated in
345 the same space as the status codes in [ipp-mod].

346 **9.1 Additional Status Codes**

347 The following status codes are defined as extensions for Notification and are returned as the value of the "status-
348 code" parameter in the Operation Attributes Group of a response (see [ipp-mod] section 3.1.6.1). Operations in
349 this document can also return the status codes defined in section 13 of [ipp-mod]. The 'successful-ok' status code
350 is an example of such a status code.

351 **9.1.1 successful-ok-ignored-notifications (0x0004)**

352 The Notification Recipient was able to consume some, but not all, of the Event Notifications Attributes Groups sent
353 by the Printer in the Send-Notifications request. See section 8.1.2 for further details.

354 **9.2 Status Codes returned in Event Notification Attributes Groups**

355 This section contains values of the "notify-status-code" attribute that the Notification Recipient returns in a Event
356 Notification Attributes Group in a response when the corresponding Event Notification Attributes Group in the
357 request:

358 4. was not consumed OR

359 5. was consumed, but the Notification Recipient wants to cancel the corresponding Subscription object

360 The following sections are ordered in decreasing order of importance of the status-codes.

361 **9.2.1 client-error-not-found (0x0406)**

362 This status code is defined in [ipp-mod]. This document extends its meaning and allows it to be returned in an
363 Event Notification Attributes Group of a response.

364 The Notification Recipient was unable to consume this Event Notification Attributes Group because it was not
365 expected. See section 8.1.2 for further details.

366 **9.2.2 successful-ok-but-cancel-subscription (0x0006)**

367 The Notification Recipient was able to consume this Event Notification Attributes Group that the Printer sent, but
368 wants the corresponding Subscription object to be canceled none-the-less. See section 8.1.2 for further details.

369 **10 Encoding and Transport**

370 This section defines the encoding and transport used by the 'indp' Delivery Method.

371 **10.1 Encoding of the Operation Layer**

372 The 'indp' Delivery Method uses the IPP operation layer encoding described in [ipp-pro] and the following Event
373 Notification Attributes Group tag allocated by [ipp-ntfy]:

Tag Value (Hex)	Meaning
0x07	“event-notification-attributes-tag”

374

375 **10.2 Encoding of Transport Layer**

376 The 'indp' Notification Delivery Method uses the IPP transport layer encoding described in [ipp-pro].

377 It is REQUIRED that an 'indp' Notification Recipient implementation support HTTP over the IANA assigned Well
378 Known Port assigned to the 'indp' Delivery Method as its default port by IANA (see section 12), though a
379 Notification Recipient implementation MAY support HTTP over some other port as well.

380 **11 Conformance Requirements**

381 This section defines conformance requirements for Printers and Notification Recipients.

382 **11.1 Printer Conformance Requirements**

383 The 'indp' Delivery Method is RECOMMENDED for a Printer to support.

384 If the Printer supports the 'indp' Delivery Method, the Printer MUST:

385 1. meet the conformance requirements defined in [ipp-ntfy].

- 386 2. support the conformance requirements for Subscription object attributes defined in section 5, including the
387 syntax for the "notify-recipient-uri" Subscription Object attribute defined in section 5.2.1.
- 388 3. support the conformance requirements for Printer Description object attributes defined in section 6.
- 389 4. support the 'indp' protocol by sending Event Notifications using the Send-Notifications operation defined in
390 section 8.1.
- 391 5. support sending Event Notification via email with the content specified in section 8.1.1.

392 11.2 Notification Recipient Requirements

393 A Notification Recipient MUST accept Send-Notifications requests and return Send-Notifications responses as
394 defined in sections 8 and 9.

395 12 IANA Considerations

396 The 'indp' URL scheme for the 'indp' Delivery Method and Protocol will be registered with IANA. IANA will
397 assign a default port to use with the 'indp' Delivery Method and Protocol.

398 13 Internationalization Considerations

399 When the client requests Human Consumable form by supplying the "notify-text-format" operation attribute (see
400 [ipp-ntfy]), the IPP Printer (or any Notification Service that the IPP Printer might be configured to use) supplies
401 and localizes the text value of the "human-readable-report" attribute in the Notification according to the charset and
402 natural language requested in the notification subscription.

403 14 Security Considerations

404 The IPP Model and Semantics document [ipp-mod] discusses high level security requirements (Client
405 Authentication, Server Authentication and Operation Privacy). Client Authentication is the mechanism by which the
406 client proves its identity to the server in a secure manner. Server Authentication is the mechanism by which the
407 server proves its identity to the client in a secure manner. Operation Privacy is defined as a mechanism for
408 protecting operations from eavesdropping.

409 The Notification Recipient can cancel unwanted Subscriptions created by other parties without having to be the
410 owner of the subscription by returning the 'successful-ok-but-cancel-subscription' status code in the Send-
411 Notifications response returned to the Printer.

412 14.1 Security Conformance

413 Printers (client) MAY support Digest Authentication [rfc2617]. If Digest Authentication is supported, then MD5
414 and MD5-sess MUST be supported, but the Message Integrity feature NEED NOT be supported.

415 Notification Recipient (server) MAY support Digest Authentication [rfc2617]. If Digest Authentication is
416 supported, then MD5 and MD5-sess MUST be supported, but the Message Integrity feature NEED NOT be
417 supported.

418 Notification Recipients MAY support TLS for client authentication, server authentication and operation privacy. If
419 a Notification Recipient supports TLS, it MUST support the TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA
420 cipher suite as mandated by RFC 2246 [rfc2246]. All other cipher suites are OPTIONAL. Notification recipients
421 MAY support Basic Authentication (described in HTTP/1.1 [rfc2616]) for client authentication if the channel is
422 secure. TLS with the above mandated cipher suite can provide such a secure channel.

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424

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