

1 INTERNET-DRAFT  
2 <draft-ietf-ipp-indp-method-02.txt>

Hugo Parra  
Novell, Inc.  
Tom Hastings  
Xerox Corp.  
July 14, 2000

8 Internet Printing Protocol (IPP):

9 **The 'indp' Notification Delivery Method and Protocol/1.0**

11 Copyright (C) The Internet Society (2000). All Rights Reserved.

12 Status of this Memo

13 This document is an Internet-Draft and is in full conformance with all provisions of Section 10 of  
14 [rfc2026]. Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas,  
15 and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

16 Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or  
17 obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or  
18 to cite them other than as "work in progress".

19 The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/1id-abstracts.txt>

20 The list of Internet-Draft Shadow Directories can be accessed as <http://www.ietf.org/shadow.html>.

21 **Abstract**

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

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

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

35 The full set of IPP documents includes:

36 Design Goals for an Internet Printing Protocol [RFC2567]

37 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]

38 Internet Printing Protocol/1.1: Model and Semantics [ipp-mod]

39 Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]

40 Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]

41 Mapping between LPD and IPP Protocols [RFC2569]

42 Internet Printing Protocol (IPP): IPP Event Notification Specification [ipp-ntfy]

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

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

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

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

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

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

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

71

72

**Table of Contents**

73	1	Introduction .....	5
74	2	Terminology .....	5
75	3	Model and Operation .....	6
76	4	General Information.....	6
77	5	Subscription object attributes .....	8
78	5.1	SUBSCRIPTION TEMPLATE ATTRIBUTE CONFORMANCE.....	8
79	5.2	ADDITIONAL INFORMATION ABOUT SUBSCRIPTION TEMPLATE ATTRIBUTES .....	8
80	5.2.1	<i>notify-recipient-uri (uri)</i> .....	8
81	5.3	SUBSCRIPTION DESCRIPTION ATTRIBUTE CONFORMANCE.....	8
82	6	Printer Description Attributes.....	9
83	6.1	PRINTER DESCRIPTION ATTRIBUTE CONFORMANCE.....	9
84	6.2	NEW VALUES FOR EXISTING PRINTER DESCRIPTION ATTRIBUTES.....	9
85	6.2.1	<i>notify-schemes-supported (1setOf uriScheme)</i> .....	9
86	6.2.2	<i>operations-supported (1setOf type2 enum)</i> .....	9
87	7	Attributes Only in Event Notifications .....	9
88	8	Operations for Notification.....	9
89	8.1	SEND-NOTIFICATIONS OPERATION .....	10
90	8.1.1	<i>Send-Notifications Request</i> .....	10
91	8.1.2	<i>Send-Notifications Response</i> .....	13
92	9	Status Codes .....	14
93	9.1	ADDITIONAL STATUS CODES .....	14
94	9.1.1	<i>successful-ok-ignored-notifications (0x0004)</i> .....	14
95	9.2	STATUS CODES RETURNED IN EVENT NOTIFICATION ATTRIBUTES GROUPS.....	15
96	9.2.1	<i>client-error-not-found (0x0406)</i> .....	15
97	9.2.2	<i>successful-ok-but-cancel-subscription (0x0006)</i> .....	15
98	10	Encoding and Transport.....	15
99	10.1	ENCODING OF THE OPERATION LAYER .....	15
100	10.2	ENCODING OF TRANSPORT LAYER.....	15
101	11	Conformance Requirements .....	16
102	11.1	PRINTER CONFORMANCE REQUIREMENTS .....	16
103	11.2	NOTIFICATION RECIPIENT REQUIREMENTS .....	16
104	12	IANA Considerations .....	16
105	13	Internationalization Considerations.....	16

106	14	Security Considerations .....	17
107	14.1	SECURITY CONFORMANCE.....	17
108	15	References .....	17
109	16	Author's Addresses .....	18
110	17	Full Copyright Statement.....	18
111			
112		<b>Tables</b>	
113		Table 1 - Information about the Delivery Method .....	6
114		Table 2 – Operation-id assignments.....	9
115		Table 3 – Attributes in Event Notification Content .....	11
116		Table 4 – Additional Attributes in Event Notification Content for Job Events.....	12
117		Table 5 – Combinations of Events and Subscribed Events for “job-impressions-completed” .....	12
118		Table 6 – Additional Attributes in Event Notification Content for Printer Events.....	13

119

## 120 **1 Introduction**

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

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

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

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

## 136 **4.2 Terminology**

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

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

140 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY,  
141 NEED NOT, and OPTIONAL, have special meaning relating to conformance as specified in RFC  
142 2119 [RFC2119] and [ipp-mod] section 12.1. These terms refer to conformance to this document, if  
143 this document is implemented.

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

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

### 148 3 Model and Operation

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

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

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

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

### 166 4 General Information

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

168 **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	A Printer implementation MAY combine several Event Notifications into a single Event

Document Method conformance requirement	'indp' realization
Notification?	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]).
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	None

Document Method conformance requirement	'indp' realization
Template and/or Subscription Description attributes and the conformance requirements thereof?	
13. What are the additional Printer Description attributes and the conformance requirements thereof?	None

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

## 170 **5 Subscription object attributes**

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

### 172 **4.45.1 Subscription Template Attribute Conformance**

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

## 176 **5.2 Additional Information about Subscription Template Attributes**

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

### 178 **5.2.1 notify-recipient-uri (uri)**

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

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

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

## 185 **5.3 Subscription Description Attribute Conformance**

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



## 189 6 Printer Description Attributes

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

### 191 6.1 Printer Description Attribute Conformance

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

### 195 6.2 New Values for Existing Printer Description Attributes

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

#### 197 ~~4.1.16.2.1~~ notify-schemes-supported (1setOf uriScheme)

198 The following “notify-schemes-supported” value is added in order to support the new Delivery Method  
199 defined in this document:

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

#### 201 ~~4.1.26.2.2~~ operations-supported (1setOf type2 enum)

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

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

Value	Operation Name
0x001D	Send-Notifications

207

## 208 7 Attributes Only in Event Notifications

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

## 210 8 Operations for Notification

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

212 There is only one operation defined: Send-Notifications. Section 6.2.2 assigns of the “operation-id” for the  
213 Send-Notifications operation and the following section defined the operation.

#### 214 **4.18.1 Send-Notifications operation**

215 This REQUIRED operation allows a Printer to send one or more Event Notifications to a Notification  
216 Recipient using HTTP.

217 The Printer composes the information defined for an IPP Notification [ipp-ntfy] and sends it using the Sent-  
218 Notifications operation to the Notification Recipient supplied in the Subscription object.

219 The Send-Notifications operations uses the operations model defined by IPP [rfc2566]. This includes, the  
220 use of a URI as the identifier for the target of each operation, the inclusion of a version number, operation-  
221 id, and request-id in each request, and the definition of attribute groups. The Send-Notifications operation  
222 uses the Operation Attributes group, but currently has no need for the Unsupported Attributes, Printer  
223 Object Attributes, and Job-Object Attributes groups. However, it uses a new attribute group, the Event  
224 Notification Attributes group.

225

226 The Notification Recipient MUST accept the request in any state. There is no state defined for the  
227 Notification Recipient for this Delivery Method.

228 Access Rights: Notification Recipient MAY enforce access rights. If the Printer receives a rejection with  
229 these status codes: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized'  
230 status code , the Printer SHOULD cancel the subscription.

#### 231 **8.1.1 Send-Notifications Request**

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

- 233 - a "version-number" '1.0' – the version of the 'indp' protocol is '1.0'.
- 234 - an "operation-id" - the value defined in Table 2
- 235 - a "request-id" - the contents of the Subscription object's "notify-sequence-number" after  
236 incrementing for the first try (see [ipp-ntfy]).

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

238 Group 1: Operation Attributes

239 Natural Language and Character Set:

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

242

243 Target:

244 A copy of the Subscription object's "notification-recipient-uri" (uri) attribute which is the  
 245 target of this operation as described in [ipp-mod] section 3.1.5, i.e., the URI of the 'indp'  
 246 Notification Recipient (see section 5.2.1).  
 247

#### 248 Group 2 to N: Event Notification Attributes

249 In each group 2 to N, each attribute is encoded using the IPP rules for encoding attributes [ipp-pro]  
 250 and may be encoded in any order. Note: the Get-Jobs response in [ipp-mod] acts as a model for  
 251 encoding multiple groups of attributes.  
 252

253 Each Event Notification Group **MUST** contain all of attributes specified in [ipp-ntfy] section 9.1  
 254 (“Content of Machine Consumable Event Notifications”) with exceptions denoted by asterisks in  
 255 the tables below.  
 256

257 The tables below are copies of the tables in [ipp-ntfy] section 9.1 (“Content of Machine Consumable  
 258 Event Notifications”) except that each cell in the “Sends” column is a “MUST”.  
 259

260 For an Event Notification for all Events, the Printer sends the following attributes.  
 261

**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 ***	MUST	Printer
attributes from the “notify-attributes” attribute ***	MUST	Job

Source Value	Sends	Source Object
attributes from the “notify-attributes” attribute ***	MUST	Subscription

262

263

264

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

265

266

267

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

268

269

270

\*\*\* 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.

271

272

273

274

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

275

276

**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

277

278

\* 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.

279

280

281

**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’

282

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

285 **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

286

287

### 288 8.1.2 Send-Notifications Response

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

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

- 292 - a "version-number"
- 293 - a "status-code"
- 294 - the "request-id" that was supplied in the corresponding request

295

296 Group 1: Operation Attributes

297 Status Message:

298 As defined in [ipp-mod].

299

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

303

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

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

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

313

314 Natural Language and Character Set:  
315 The "attributes-charset" and "attributes-natural-language" attributes as defined in [ipp-mod] section  
316 3.1.4.1.  
317

318 Group 2 to N: Notification Attributes

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

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

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

324

325 '**successful-ok**' - this Event Notification Attribute Group was consumed

326 '**client-error-not-found**' - this Event Notification Attribute Group was not able to be consumed.  
327 The Printer MUST cancel the Subscription and MUST NOT attempt to send any further Event  
328 Notifications from the associated Subscription object.

329 '**successful-ok-but-cancel-subscription**' - the Event Notification Attribute Group was consumed,  
330 but the Notification Recipient wishes to cancel the Subscription object. The Printer MUST  
331 cancel the Subscription and MUST NOT attempt to send any further Event Notifications from  
332 the associated Subscription object.

## 333 9 Status Codes

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

### 337 4.19.1 Additional Status Codes

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

#### 342 4.1.19.1.1 successful-ok-ignored-notifications (0x0004)

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

## 345 [4.29.2](#) Status Codes returned in Event Notification Attributes Groups

346 This section contains values of the “notify-status-code” attribute that the Notification Recipient returns in a  
347 Event Notification Attributes Group in a response when the corresponding Event Notification Attributes  
348 Group in the request:

- 349 1. was not consumed OR
- 350 2. was consumed, but the Notification Recipient wants to cancel the corresponding Subscription object

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

### 352 [4.1.19.2.1](#) client-error-not-found (0x0406)

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

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

### 357 [4.1.29.2.2](#) successful-ok-but-cancel-subscription (0x0006)

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

## 361 10 Encoding and Transport

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

### 363 [4.1.10.1](#) Encoding of the Operation Layer

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

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

366

### 367 [4.2.10.2](#) Encoding of Transport Layer

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

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

## 372 **11 Conformance Requirements**

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

### 374 **11.1 Printer Conformance Requirements**

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

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

- 377 1. meet the conformance requirements defined in [ipp-ntfy].
- 378 2. support the conformance requirements for Subscription object attributes defined in section 5, including  
379 the syntax for the "notify-recipient-uri" Subscription Object attribute defined in section 5.2.1.
- 380 3. support the conformance requirements for Printer Description object attributes defined in section 6.
- 381 4. support the 'indp' protocol by sending Event Notifications using the Send-Notifications operation  
382 defined in section 8.1.
- 383 5. support sending Event Notification via email with the content specified in section 8.1.1.

### 384 **11.2 Notification Recipient Requirements**

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

## 387 **12 IANA Considerations**

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

## 390 **13 Internationalization Considerations**

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



## 395 14 Security Considerations

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

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

### 404 ~~4.1~~14.1 Security Conformance

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

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

410 Notification Recipients MAY support TLS for client authentication, server authentication and operation  
411 privacy. If a Notification Recipient supports TLS, it MUST support the  
412 TLS\_DHE\_DSS\_WITH\_3DES\_EDE\_CBC\_SHA cipher suite as mandated by RFC 2246 [rfc2246]. All  
413 other cipher suites are OPTIONAL. Notification recipients MAY support Basic Authentication (described  
414 in HTTP/1.1 [rfc2616]) for client authentication if the channel is secure. TLS with the above mandated  
415 cipher suite can provide such a secure channel.

## 416 15 References

417  
418 [ipp-mod]  
419 R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and  
420 Semantics", <draft-ietf-ipp-model-v11-07.txt>, May 22, 2000.

421 [ipp-ntfy]  
422 Isaacson, S., Martin, J., deBry, R., Hastings, T., Shepherd, M., Bergman, R., "Internet Printing  
423 Protocol/1.1: IPP Event Notification Specification", <draft-ietf-ipp-not-spec-04.txt>, July 13, 2000.

424 [ipp-pro]  
425 Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.1: Encoding and  
426 Transport", draft-ietf-ipp-protocol-v11-06.txt, May 30, 2000.

427 [rfc2026]  
428 S. Bradner, "The Internet Standards Process -- Revision 3", RFC 2026, October 1996.

429 [rfc2616]

430 R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, "Hypertext  
431 Transfer Protocol - HTTP/1.1", RFC 2616, June 1999.

432 [rfc2617]

433 J. Franks, P. Hallam-Baker, J. Hostetler, S. Lawrence, P. Leach, A. Luotonen, L. Stewart, "HTTP  
434 Authentication: Basic and Digest Access Authentication", RFC 2617, June 1999.

## 435 **16 Author's Addresses**

436 Hugo Parra  
437 Novell, Inc.  
438 1800 South Novell Place  
439 Provo, UT 84606  
440  
441 Phone: 801-861-3307  
442 Fax: 801-861-2517  
443 e-mail: hparra@novell.com  
444

445 Tom Hastings  
446 Xerox Corporation  
447 737 Hawaii St. ESAE 231  
448 El Segundo, CA 90245  
449  
450 Phone: 310-333-6413  
451 Fax: 310-333-5514  
452 e-mail: hastings@cp10.es.xerox.com  
453

## 454 **17 Full Copyright Statement**

455 Copyright (C) The Internet Society (2000). All Rights Reserved.

456 This document and translations of it may be copied and furnished to others, and derivative works that  
457 comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and  
458 distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and  
459 this paragraph are included on all such copies and derivative works. However, this document itself may not  
460 be modified in any way, such as by removing the copyright notice or references to the Internet Society or  
461 other Internet organizations, except as needed for the purpose of developing Internet standards in which  
462 case the procedures for copyrights defined in the Internet Standards process must be followed, or as  
463 required to translate it into languages other than English.

464 The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its  
465 successors or assigns.

466 This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET  
467 SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES,  
468 EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE  
469 OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED  
470 WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.