1 INTERNET-DRAFT <mark>There are 5 ISSUES highlighted like this.</mark>
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Internet Printing Protocol (IPP)~~/1.1 (IPP)~~:

The INDP ~~Event~~ Notification Delivery Method

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Abstract

The IPP event notification specification [ipp-ntfy] is an OPTIONAL extension to IPP/1.0,~~and~~ IPP/1.1, and future versions. [ipp-ntfy] requires the definition of one or more delivery methods for dispatching ~~event notification reports~~Notifications to Notification Recipients. This document describes the semantics and syntax of the ~~'indp' event~~INDP Notification Delivery ~~notification delivery method~~Method that is itself a request/response protocol. For this delivery method, an IPP Printer sends (pushes) IPP event Notifications to the Notification Recipients using the IPP Notification Delivery Protocol (INDP) defined in [indp]. The Notification Recipient can either be the Ultimate Recipient of the Notification or can be a Notification Service that forwards the Notification to the Ultimate Recipient.

32 The full set of IPP documents includes:

33   Design Goals for an Internet Printing Protocol [RFC2567]
34   Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
35   Internet Printing Protocol/1.1: Model and Semantics (this document)[ipp-mod]
36   Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]
37   Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]
38   Mapping between LPD and IPP Protocols [RFC2569]
39
40 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
41 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included
42 in a printing protocol for the Internet. It identifies requirements for three types of users: end users,
43 operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A
44 few OPTIONAL operator operations have been added to IPP/1.1.

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

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

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

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

61

Table of Contents

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81

1   Introduction

83   An IPP Printers that supports the OPTIONAL IPP event notification extension [ipp-ntfy] is called a
84   Notification Source which sends event Notifications to Notification Recipients. As such, a Printer either a)
85   accepts, stores, and uses notification Subscription objects to generate event Nnotification reports and
86   implementNotification and implements one or more delivery methods for notifying interested parties, or b)
87   supports a subset of these tasks and farms out the remaining tasks to a Notification Delivery Service. Such a
88   Notification Delivery Service then delivers the event Notification to the Ultimate Notification Recipient.
89   Based on INDP, tThe 'indp' event notification delivery methodThe INDP Notification Delivery Method
90   specified in this document employs a request/response protocol, which is a subset of the IPP Notification
91   Delivery Protocol (INDP), defined in [indp]. Its The primary intended use of INDP is for IPP Printers andA
92   Notification Source may implement the INDP Notification Delivery ServicesMethod to send (push) event
93   notifications to Notification Recipients using the INDP Send-Notifications operation (see section 4.1)4.1)
94   over HTTP.

2   Terminology

96   This document uses terms such as "attributes", "keywords", and "support". These terms have special
97   meaning and are defined in the model terminology [ipp-mod] section 12.2.

98   Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED
99   NOT, and OPTIONAL, have special meaning relating to conformance. These terms are defined in [ipp-
100 mod] section 12.1 on conformance terminology, most of which is taken from RFC 2119 [RFC2119].

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

102   REQUIRED: if an implementation supports the extensions described in this document, it MUST
103   support a REQUIRED feature.
104   OPTIONAL: if an implementation supports the extensions described in this document, it MAY support
105   an OPTIONAL feature.
106   Event Notification (Notification for short) - See [ipp-ntfy]
107   Notification Source - See [ipp-ntfy]
108   Notification Recipient - See [ipp-ntfy]
109   Subscription object - See [ipp-ntfy]
110   Ultimate Notification Recipient - See [ipp-ntfy]

3   Model and Operation

112 1.In the IPP Notification Model [ipp-ntfy], a client is able to:

113 1. supply one or more Per-Job Subscriptionscan be supplied in the Job Creation operation or

114 2. OPTIONALLY supply Per-Job Subscriptions as subsequent Create-Job-Subscription operations;

115   3.   ~~supply~~Supply one Per-Printer Subscription~~can be supplied~~ in the Create-Printer-Subscription operation.

116   The client that creates these Subscription objects becomes the owner of the Subscription object.

117   When creating each Subscription object, the client supplies the "notify-recipient" (uri) attribute. The
118   "notify-recipient" attribute specifies both a single Notification Recipient that is to receive the Notifications
119   when subsequent events occur and the method for notification delivery that the IPP Printer is to use. For
120   the Notification delivery method defined in this document, the notification method is 'indp' and the rest of
121   the URI is the address of the Notification Recipient to which the IPP Printer will send the INDP Send-
122   Notifications operation.

123   The ~~"indp" event notification delivery method~~INDP Notification Delivery Method defined in this
124   document also~~employs~~ uses a client/server protocol paradigm. The "client" in this HTTP relationship is the
125   Notification Source described in [ipp-ntfy] while the "server" is the Notification Recipient. The Notification
126   Source invokes the Send-Notifications operation supported in INDP to communicate IPP event Notification
127   contents to the Notification Recipient. The Notification Recipient only conveys information to the
128   Notification Source in the form of responses to the operations initiated by the Notification Source.

129   Notification Sources that implement the ~~'indp' event notification delivery method~~INDP Notification
130   Delivery Method will need to include an INDP client stack (and hence an HTTP client stack) while
131   notification recipients that implement this delivery method will need to support an INDP server stack (and
132   hence an HTTP server stack). See section 6 for more details.

4   Notification Operations

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

136   INDP makes extensive use of the operations model defined by IPP [rfc2566]. This includes, the use of a
137   URI as the identifier for the target of each operation, the inclusion of a version number, operation-id, and
138   request-id in each request, and the definition of attribute groups. The Send-Notifications operation uses the
139   Operation Attributes group, but currently has no need for the Unsupported Attributes, Printer Object
140   Attributes, and Job-Object Attributes groups. However, it uses a new attribute group, the Notification
141   Attributes group (see [indp]).

4.1   Send-Notifications Operation

143   This REQUIRED operation allows a Notification Source to send one or more Notifications to a Notification
144   Recipient using HTTP. The operation has been tailored to accommodate the current definition of IPP
145   Notification [ipp-ntfy].

146   Both Machine-Consumable and Human-Consumable notifications may be sent to a Notification Recipient
147   through this operation.

148   **4.1.1 Send-Notifications Request**

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

150   -   —a "version-number"
151   -   —an "operation-id"
152   -   —a "request-id"

153   The following groups of attributes are part of the Send-Notifications Request:

154   Group 1: Operation Attributes
155   Natural Language and Character Set:
156   The "attributes-charset" and "attributes-natural-language" attributes ads defined in [rfc 2566]
157   section 3.1.4.1.
158
159   Target:
160   The "notification-recipient-uri" (uri) operation attribute which is the target of this operation
161   as described in [ipp-mod] section 3.1.5, i.e., the URI of the 'indp' Notification Recipient.

162   Group 2 to N: Notification Attributes

163   "human-readable-report" (text)
164   The 'indp' Notification Source OPTIONALLY supports this attribute. This attribute is a text string
165   generated by the IPP printer or Notification Delivery Service from the contents of the IPP
166   Notification suitable for human consumption. If the Notification Source supports this attribute, it
167   MUST supply this attribute if the Subscription object contains the "notify-text-format"
168   (mimeMediaType) attribute. The text value of this attribute MUST be localized in the charset
169   identified by the "notify-charset" (charset) attribute and the natural language identified by the notify-
170   natural-language" (naturalLanguage) attribute supplied in the associated Subscription object that
171   generates this event Notification. The format of the text value is specified by the value of the
172   "notify-text-format" (mimeMediaType) supplied in the associated Subscription object.
173
174   ""human-readable-report-format"""human-readable-report-format" (mime)
175   This attribute MUST be supplied by the Notification Source whenever the "human-readable-
176   report""human-readable-report" attribute is present. It indicates the format, e.g., text/plain,
177   text/html, etc. of the "human-readable-report""human-readable-report" attribute.
178
179   All of the REQUIRED attributes and any of the OPTIONAL attributes indicated in [ipp-ntfy] for a Push
180   event Notification, including "notify-text-format-type" (mimeMediaType), if the "human-readable-
181   report" (text) attribute is included, so that the Notification Recipient will know the text format of the
182   "human-readable-report" (text) attribute value.

183   These attributes communicate the same information as the notification attributes by the same name
184   described in sections 7.4, 7.5, and 7.6 of [ipp-ntfy]. The rules that govern when each individual attribute
185   MUST or MAY be included in this operation precisely mirror those specified in [ipp-ntfy].

186   **4.1.2 Send-Notifications Response**

187   The 'indp' Notification Recipient returns a status code for the entire operation and one for each Notification
188   Report in the request if the operation's status code is other than "successful-ok". If the 'ipp-notify-sendindp'
189   nNotification listener'indp' Notification Recipient receives a Notification report that it can't pair up with a
190   sSubscription it knows about, it can return a 'client-an 'client-error-unknown-subscription' error status-code
191   to indicate that events associated with that subscription should no longer be sent to it. Alternatively, the
192   Notification Recipient can return the 'successful-ok-but-cancel-subscription' to the Notification Source and
193   cancel a Subscription that is no longer wanted.

194   Every operation response contains the following REQUIRED parameters (see [ipp-mod] section
195   3.1.1):3.1.1}:

196   -   -a "version-number"
197   -   -a "status-code"
198   -   -the "request-id" that was supplied in the corresponding request
199
200   Group 1: Operation Attributes

201   Natural Language and Character Set:
202   The "attributes-charset" and "attributes-natural-language" attributes ads defined in [rfc 2566] section
203   3.1.4.1.
204

205   ISSUE 01 - Should there be an Unsupported Attributes group so that the Notification Recipient can return
206   attributes that are not supported to the Notification Source?

207   Group 2 to N: Notification Attributes

208   "notification-report-status-code" (type2 enum)
209   Indicates whether the 'ipp-notify-send' Notification Recipient was able to consume the n-th
210   Notification Report.
211

212   The status-code can take any of the following standard enum values are defined:IPP values (as defined in
213   [ipp-mod]):
214
215   'successful-ok'
216   'successful-ok-but-cancel-subscription'
217   'client-error-unknown-subscription'
218   'client-error-bad-request'
219
220
221   ISSUE 02 - Use the same status code space as IPP, namely:
222   "successful" - 0x0000 to 0x00FF
223   "informational" - 0x0100 to 0x01FF
224   "redirection" - 0x0200 to 0x02FF
225   "client-error" - 0x0400 to 0x04FF

226   "server-error"   0x0500 to 0x05FF

227

228   ISSUE 03 - What status codes from IPP can we re-use?

229

230   ISSUE 04 - Where should the status code be defined? Here, in [indp], in [ipp-ntfy], or in [ipp-mod]?

231

232   ISSUE 05 - Since there is a overall status code for the entire operation and one for each Notification,
233   what status code is returned for the overall operation, if one Notification succeeds and another
234   fails?'client-error-not-found'
235   'client-error-request-entity-too-large'
236   'client-error-request-value-too-long'
237   'server-error-version-not-supported'
238   'server-error-temporary-error'

239

240   or one of the following INDP status-code extensions:
241   'successful-ok-partial-notification' (0x0004)

242

243   The 'successful-ok-partial-notification indicates that at least one notification was received and process
244   successfully and that errors were encountered with one or more notifications. If this status code is returned,
245   then Group 2 below MUST be present in the response with one status-code per notification.

246

247   Group 1: Operation Attributes

248   Natural Language and Character Set:
249   The "attributes-charset" and "attributes-natural-language" attributes ads defined in [rfc 2566] section
250   3.1.4.1.

251

252   Group 2 to N: Notification Attributes

253   "notification-report-status-code" (type2 enum)
254   Indicates whether the 'ipp-notify-send' Notification Recipient was able to consume the n-th
255   Notification Report.

256

257   The following standard IPP status codes, defined in [ipp-mod], may be returned:

258

259   'successful-ok'
260   'client-error-not-found'

261   **4.2   Notification Protocol URI Scheme**

262   The 'indp' event notification delivery methodINDP Notification Delivery Method uses the 'indp://' URI
263   scheme in the "notify-recipients" attribute in the Subscription object in order to indicate theevent
264   notification delivery method defined in this document. The remainder of the URI indicates the host and
265   address of the Notification Recipient that is to receive the Send-Send-Notification operation.

266 ## 5   Encoding of the Operation Layer

267 The 'indp' event notification delivery methodINDP Notification Delivery Method uses the INDP operation
268 layer encoding described in [indp].

269 ## 6   Encoding of Transport Layer

270 The 'indp' event notification delivery methodINDP Notification Delivery Method uses the INDP transport
271 layer encoding described in [indp].

272 It is REQUIRED that an 'indp' Notification Recipient implementation support HTTP over the IANA
273 assigned Well Known Port XXX (the INDP default port), though a notification recipient implementation
274 MAY support HTTP over some other port as well.

275 ## 7   IANA Considerations

276 The 'indp://''indp://' URL scheme and the IDNP default fort will be registered with IANA.

277 ## 8   Internationalization Considerations

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

282 ## 9   Security Considerations

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

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

291 ### 9.1   Security Conformance

292 Notification Sources (client) MAY support Digest Authentication [rfc2617]. If Digest Authentication is
293 supported, then MD5 and MD5-sess MUST be supported, but the Message Integrity feature NEED NOT be
294 supported.

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

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

10 References

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