

1 INTERNET-DRAFT
2 <draft-ietf-ipp-notify-mailto-01.txt>

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May 9, 2000

10 Internet Printing Protocol (IPP):
11 **The 'mailto:' Notification Delivery Method**

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13
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24 **Abstract**

25 The IPP: Event Notification Specification [ipp-ntfy] is an OPTIONAL extension to IPP/1.0 and IPP/1.1 that
26 requires the definition of one or more delivery methods for dispatching event notification reports to
27 Notification Recipients. This document describes the semantics and syntax of the 'mailto:' event
28 notification delivery method. For this delivery method, the IPP Printer uses the SMTP mail protocol to
29 send (push) Human Consumable and/or Machine Consumable Notifications to Notification Recipients.
30 The Subscriber specifies the mail address using the mailto: URL. This mail address can be any user or can
31 be any of the mail services defined to perform such notification using parameters in the URL, such as
32 paging. The Subscriber can specify the MIME media type of both the Human Consumable and Machine
33 Consumable Notifications. The Subscriber can also specify a mail address in the "subscriber-user-data"
34 Subscription attribute to which the Notification Recipient can reply and to which the mail system delivers
35 undeliverable mail messages. That mail address is usually the Subscribers mail address, but can be any
36 mail address.

37 The mail messages appear to come from the Printer, so that mail agents can sort and filter on the From:
38 field. Also the beginning of the Subject line starts with the "IPP: " prefix, so that mail agents can use it to
39 filter.

40 The full set of IPP documents includes:

- 41 Design Goals for an Internet Printing Protocol [RFC2567]
- 42 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
- 43 Internet Printing Protocol/1.1: Model and Semantics [ipp-mod]
- 44 Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]
- 45 Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]
- 46 Mapping between LPD and IPP Protocols [RFC2569]
- 47 Internet Printing Protocol (IPP): Event Notification Specification [ipp-ntfy]

48

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

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

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

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

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

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

74 The "Event Notification Specification" document extends the Job Creation operations and defines
75 additional operations that allow a client to subscribe to printing related events. Subscriptions are modeled
76 as Subscription objects, which can be Per-Job or Per-Printer Subscriptions. Additional operations are
77 defined to query, renew, and cancel Subscription objects.

78

Table of Contents

79	1	Introduction.....	5
80	2	Terminology.....	5
81	2.1	CONFORMANCE TERMINOLOGY	5
82	2.2	OTHER TERMINOLOGY.....	6
83	3	Model and Operation	6
84	4	Subscription Object Rules for use with the 'mailto:' Notification Delivery Method	7
85	5	Rules for Sending Notifications and the Mail Notification Content.....	8
86	5.1	HUMAN CONSUMABLE FORM.....	10
87	5.2	MACHINE CONSUMABLE FORM.....	10
88	6	Printer Description attributes specific to the 'mailto:' delivery method.....	10
89	6.1	"PRINTER-SMTP-MAIL-SERVICE-ADDRESS" (1SETOF TEXT(MAX)).....	10
90	6.2	USE OF "NOTIFY-SCHEMES-SUPPORTED"	11
91	7	Conformance Requirements.....	11
92	8	IANA Considerations.....	11
93	9	Internationalization Considerations	11
94	10	Security Considerations	11
95	11	References.....	12
96	12	Author's Addresses.....	13
97	13	Full Copyright Statement.....	14

98

99

Table of Tables

100	Table 1 - SMTP Fields to be filled in.....	9
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101

102 1 Introduction

103 An IPP Printer that supports the OPTIONAL IPP notification extension [ipp-ntfy] is called a Notification
104 Source, which sends event Notifications to Notification Recipients. As such, a Printer either a) accepts,
105 stores, and uses notification Subscription objects to generate event Notification reports and implement one
106 or more delivery methods for notifying interested parties, or b) supports a subset of these tasks and farms
107 out the remaining tasks to a Notification Delivery Service. This document describes the semantics and
108 syntax of the 'mailto:' event notification delivery method. Such a Notification Delivery Service then
109 delivers the event Notification to the Ultimate Notification Recipient.

110 For this delivery method, the IPP Printer uses the SMTP mail protocol to send (push) Human Consumable
111 and/or Machine Consumable Notifications to Notification Recipients. The Subscriber specifies the mail
112 address using the mailto: URL. This mail address can be any user or can be any of the mail services
113 defined to perform such notification using parameters in the URL, such as paging. The Subscriber can
114 specify the MIME media type of both the Human Consumable and Machine Consumable Notifications.
115 The Subscriber can also specify a mail address in the "subscriber-user-data" Subscription attribute to which
116 the Notification Recipient can reply and to which the mail system delivers undeliverable mail messages.
117 That mail address is usually the Subscribers mail address, but can be any mail address.

118 The mail messages appear to come from the Printer, so that mail agents can sort and filter on the From:
119 field. Also the beginning of the Subject line starts with the "IPP: " prefix, so that mail agents can filter
120 notifications from any IPP Printer.

121 2 Terminology

122 This section defines terminology used throughout this document:

123 2.1 Conformance Terminology

124 Capitalized terms, such as **MUST**, **MUST NOT**, **REQUIRED**, **SHOULD**, **SHOULD NOT**, **MAY**,
125 **NEED NOT**, and **OPTIONAL**, have special meaning relating to conformance to this specification.
126 These terms are defined in [ipp-mod section 13.1 on conformance terminology, most of which is
127 taken from RFC 2119 [RFC2119].

128 **REQUIRED** - an adjective used to indicate that a conforming IPP Printer implementation **MUST**
129 support the indicated operation, object, attribute, attribute value, status code, or out-of-band value in
130 requests and responses. See [ipp-mod] "Appendix A - Terminology for a definition of "support".
131 *Since support of this entire notification specification is OPTIONAL for conformance to IPP/1.0*
132 *or IPP/1.1, the use of the term REQUIRED in this document means "REQUIRED if this*
133 *OPTIONAL notification specification is implemented".*

134 **OPTIONAL** - an adjective used to indicate that a conforming IPP Printer implementation **MAY**, but is
135 **NOT REQUIRED** to, support the indicated operation, object, attribute, attribute value, status code,
136 or out-of-band value in requests and responses.

137 **2.2 Other terminology**

138 Event Notification (Notification for short) - See [ipp-ntfy]

139 Notification Source - See [ipp-ntfy]

140 Notification Recipient - See [ipp-ntfy]

141 Subscription object - See [ipp-ntfy]

142 Subscription Creation operation - See [ipp-ntfy]

143 Ultimate Notification Recipient - See [ipp-ntfy]

144 **3 Model and Operation**

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

- 146 1. supply one or more Per-Job Subscriptions in the Job Creation operation
- 147 2. OPTIONALLY supply Per-Job Subscriptions as subsequent Create-Job-Subscription operations
- 148 3. supply one Per-Printer Subscription in the Create-Printer-Subscription operation. The client that
149 creates these Subscription objects becomes the owner of the Subscription object.

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

151 When creating each Subscription object, the client supplies the "notify-recipient-uri" attribute. The "notify-
152 recipient-uri" attribute specifies both a single Notification Recipient that is to receive the Notifications
153 when subsequent events occur and the method for Notification delivery that the IPP Printer is to use. For
154 the 'mailto:' Notification delivery method defined in this document, the "notify-recipient" consists of the
155 'mailto:' scheme followed by an SMPT mail address [RFC822].

156 Notification Sources that implement the 'mailto:' event notification delivery method will need to include a
157 sender-SMTP mail agent while Notification Recipients that implement this delivery method will need to
158 support either a receiver-SMTP or, more commonly, a mailbox client.

159 The IPP Printer can be the Notification Source or could use some other Notification Delivery Service that
160 actually delivers the mail message. In this latter case, the protocol between the IPP Printer and the
161 Notification Delivery Service is implementation.

162 Also the Notification Recipient specified by the "notify-recipient" Subscription attribute can be either (1)
163 the Ultimate Notification Recipient or can be a Notification Delivery Service, such as a paging system that
164 accept 'mailto:' parameters to indicate the Ultimate Notification Recipient, such as a phone number or
165 paging subscriber's id.

166 4 Subscription Object Rules for use with the 'mailto:' Notification Delivery 167 Method

168 This section describes attributes and rules on how to subscribe to notifications to be delivered using the
169 'mailto;' notification delivery method. The overall model and relevant attributes for notification
170 subscriptions are defined and described in the IPP Event Notification Specification [ipp-ntfy]. The usage of
171 each of the Subscription object attributes defined in [ipp-ntfy] is described here as it applies to the 'mailto:'
172 delivery method. The description of each Subscription attribute in this document is not the complete
173 description, but is just the application of the attribute to this 'mailto:' delivery method.

174 Attributes supplied by the IPP client in the subscription request and stored in the Subscription object:

175 - "notify-recipient-uri"

176 It is an IPP Printer configuration issue whether submitted mail messages will use additional
177 services, such as SMTP delivery status notifications [RFC1891] or S/MIME encryption [RFC2633],
178 or just sent as plain SMTP mail. There is no way for an IPP Client to request specific mail services
179 on a per subscription basis. It is never a good idea to permit mailing lists to be recipients of IPP
180 'mailto:' notifications, as this can open up the printer to be a tool for denial-of-service attacks.

181 - "notify-events"

182 Some rapidly recurring events, such as page events, are not appropriate to use with this delivery
183 method. E.g. implementations would typically choose not to support page events with the 'mailto:'
184 delivery method.

185 - "notify-text-format"

186 The IPP client does not have to supply this attribute, but if absent in the subscription request then
187 the Printer object populates this value with the MIME media type 'text/plain'. Please note that this
188 attribute only carries information about text MIME media types, and that any text parameters
189 supplied by the IPP client are dropped; any text parameter values have to be specified in the "notify-
190 charset" attribute described below.

191 - "notify-additional-formats"

192 This attribute, if supplied by the client, specifies additional MIME media types that MUST be
193 included as mail attachments in the 'mailto:' delivery method.

194 - "notify-requested-attributes"

195 This attribute, if supplied by the client, lists the name of (other) attributes, which the subscriber
196 wishes to include in the notification messages. Best attempt should be made to include these in any
197 Human or Machine Readable notification messages.

198 - "notify-user-data"

199 The Subscriber MUST supply this attribute with the user's mail address as value. The Subscriber
200 SHOULD obtain the user's mail address automatically from the client system (in an implementation-
201 dependent manner) and supply it as the value of the "subscriber-user-data" attribute by default,
202 rather than require the user to explicitly supply it. Allowing users to supply the mail address
203 explicitly would allow the malicious user to hide his/her identity when sending notifications by
204 email.

205 - "notify-charset"

206 This attribute describes the text character parameters to be used in Human Consumables
207 notifications, as well as in text parts of Machine Consumable notifications. For historical reasons
208 the default character set for 'text/plain' MIME media type is 'us-ascii', while most mail systems now
209 are using 'utf-8'. Note that in order to produce a complete MIME definition e.g. for utf-8, the value
210 from 'notify-text-format' attribute, described above, has to be concatenated with the value in this
211 attribute to form 'text plain; charset=utf-8'.

212 - "notify-natural-language"

213 Attributes generated by the Printer and stored in the Subscription object:

214 - "subscription-request-id"

215 - "subscription-id"

216 - "notify-lease-expiration-time"

217 - "printer-uri"

218 - "subscriber-user-name"

219 See the semantics for this attribute in [ipp-ntfy]. The Printer includes the value of this attribute as
220 the value of the SMTP "FROM" field outside the <> (see RFC 822 [RFC822] section 4.4.1.)

221 - "notify-server-up-time"

222 - "notify-persistence-granted"

223 **5 Rules for Sending Notifications and the Mail Notification Content**

224 This section defines the processing that the IPP Printer MUST perform when sending an event Notification
225 using the 'mailto:' delivery method. It defines how the IPP Printer populates the SMTP fields in the mail
226 message from the Subscription object.

227 Table 1 shows the SMPT fields that the IPP Printer MUST fill in from the indicated sources of the data.
228 The first column refers to the sections in [RFC822].

Table 1 - SMTP Fields to be filled in

SMTP RFC 822 section	SMTP Field Name	Subscription object attribute source for SNMP field
4.4.1	From:	<p>"printer-name" <"subscriber-user-data"></p> <p>For example, if Bob Jones submits a print job to the Printer "Freight Train " and his email address is jones@acme.com, the From: line will be displayed as:</p> <p>From: Freight Train<jones@acme.com></p> <p>Mail messages appear to the Notification Recipient to come from the Printer, so that mail agents can sort and filter on the From: field.</p> <p>Note: The "printer-name" is the Mail Display name. And the "subscriber-user-data" inside <> is assumed to be an SMTP mail address so that the Notification Recipient can reply to the subscriber. For example, to say "I picked up your document, thanks." The 'printer-name' is defined in [ipp-mod].</p>
4.4.2	Sender:	<p>"subscriber-user-name" <"notify-user-data"></p> <p>For example, if Bob Jones submits a print job to the Printer "George Washington" and his email address is jones@acme.com, the Sender: line will be displayed as:</p> <p>Sender: Bob Jones <jones@acme.com></p> <p>Note: The "subscriber-user-name" is the Mail Display name (Bob Jones). And the " notify-user-data" inside <> is assumed to be an SMTP mail address so that the mail system will send failure to deliver mail messages to the mail address specified by the " notify-user-data", not the Printer.</p>
4.5.1	To:	The rest of the URI following the 'mailto:' scheme in the value of the "notify-recipient-uri" attribute.
4.7.1	Subject:	Implementation-dependent, but SHOULD start with "IPP: " (localized) followed by the job or printer event name, job name, etc. The beginning of the Subject line is a standardized prefix, so that mail agents can use it for filtering.

231 Each format specified by the "notify-additional-formats" MUST be sent as a MIME attachment according to
232 [RFC1341] and [RFC2046]. For additional rules see the following sections on Human and Machine
233 Consumable Forms below.

234 **5.1 Human Consumable Form**

235 Human Consumable Form is typically sent in the body of the SMTP mail message [RFC822] based on
236 information from the "notify-text-format", "notify-charset" and "notify-natural-language" in the
237 Subscription object.

238 The following localized information SHOULD be included:

- 239 - Repeat the text from the Subject: line.
- 240 - Printer name
- 241 - Printer URI
- 242 - Job name (if job event)
- 243 - Event name
- 244 - Date and time of the event
- 245 - Requested attributes (if any)

246 **5.2 Machine Consumable Form**

247 If one of the values of the "notify-additional-formats" is 'application/ipp' the generated MIME object MUST
248 be identical to the content defined for responses to the Get-Notifications operation as defined in [ipp-
249 notification-poll]. The "status-code" parameter MUST be filled with the 'successful-ok' value, see [ipp-
250 mod].

251 **6 Printer Description attributes specific to the 'mailto:' delivery method**

252 This section defines Printer Description attributes that are REQUIRED when supporting the 'mailto:'
253 delivery method.

254 **6.1 "printer-smtp-mail-service-address" (1setOf text(MAX))**

255 When supporting the 'mailto:' delivery method this is a REQUIRED Printer Description attribute which
256 contains the DNS or IP address of the SMTP relaying mail server (see [RFC822]) that the Printer is to use

257 to send mail messages when supporting the 'mailto:' delivery method. The System Administrator is
258 expected to configure this attribute with one or more values.

259 **6.2 Use of "notify-schemes-supported"**

260 If the 'mailto:' notification delivery method is supported, then the REQUIRED Printer description attribute
261 "notify-schemes-supported", defined in [ipp-ntfy], MUST contain the value 'mailto' as one of its values to
262 indicate that this delivery method is supported.

263 **7 Conformance Requirements**

264 If the IPP Printer supports the 'mailto:' notification delivery scheme, the Printer MUST meet these
265 conformance requirements:

- 266 1. MUST meet the conformance requirements defined in [ipp-ntfy].
- 267 2. MUST support at least the 'text/plain' Notification Content format. Being able to support any other
268 MIME media types (MUST be sent as mail attachments) is OPTIONAL.
- 269 3. MUST support the Subscription attribute semantics specified in section 4 when sending Notifications.
- 270 4. MUST fill in the SMTP fields in the mail message as specified in section 5.
- 271 5. MUST support the "printer-smtp-mail-service-address" (1setOf text(MAX)) Printer Description
272 attribute defined in section 6.

273 **8 IANA Considerations**

274 Since the 'mailto:' URL scheme is already defined in a standards track document and registered with IANA,
275 this document does not require anything further of IANA.

276 **9 Internationalization Considerations**

277 This notification delivery method presents no additional internationalization considerations already covered
278 in the [ipp-ntfy] document. The IPP Printer MUST localize the Human Consumable format and the 'text'
279 attributes in the Machine Consumable form. The Notification Recipient is expected to localize the
280 attributes in the Machine Consumable that have the 'keyword' attribute syntax according to the charset and
281 natural language supplied in the Notification Content which is derived from the Subscription object as
282 supplied by the Subscriber.

283 **10 Security Considerations**

284 By far the biggest security concern is the abuse of notification: sending unwanted notifications to third
285 parties potentially creating denial-of-service problems (i.e., spam). The problem is made worse by

286 notification addresses that may be redistributed to multiple parties (e.g. mailing lists). There exist scenarios
287 where third party notification is required (see Scenario #2 and #3 in [ipp-not-req]). The fully secure
288 solution would require active agreement of all recipients before sending out anything. However,
289 requirement #9 in [ipp-req] ("There is no requirement for IPP Printer receiving the print request to validate
290 the identity of an event recipient") argues against this. To minimize the risk, certain systems may decide to
291 disallow third party notifications (a traditional facsimile model).

292 Sometimes the Notification Recipient is not the same person as the person who created the Subscription. It
293 is possible for the Notification Recipient to find out who created the Subscription, since the subscriber
294 MUST supply the "subscriber-user-name" Subscription attribute in the Subscription Creation operation.

295 Some firewall administrators are preventing mail attachments from being accepted into their organizations
296 because of the problem of the attachments containing computer viruses. The 'mailto:' delivery method
297 allows the subscriber to suppress sending any attachments, by specifying only the 'text/plain' MIME media
298 type.

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