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1    Requirements for IPP Notifications
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18
19   ABSTRACT
20

21   This document is one of a set of documents which together describe all aspects of a new Internet Printing Protocol
22   (IPP). IPP is an application level protocol that can be used for distributed printing on the Internet. There are
23   multiple parts to IPP, but the primary architectural components are the Model, the Protocol and an interface to
24   Directory Services. This document provides a statement of the requirements for notifications as part of an IPP
25   Service. The full set of IPP documents include:
26
27        Requirements for an Internet Printing Protocol
28        Internet Printing Protocol/1.0: Model and Semantics
29        Internet Printing Protocol/1.0: Protocol Specification
30        Rationale for the Structure of the Model and Protocol
31        for the Internet Printing Protocol
32

33  **1.0 Scope**
34
35  The scope of this requirements statement is for end users.  This document does not address requirements specific to
36  print administrators or operators. However, we fully expect the notification mechanisms defined in support of the
37  requirements set forth in this document to be extendible to print administrators and operators as well. This
38  document describes the requirements for notifications for client-server, server-printer, and client-printer
39  connections
40
41  **2.0 Terminology**
42
43  It is necessary to define a set of terms in order to be able to clearly express the requirements for notification
44  services in an IPP System.
45
46  **2.1 Job Submitting End User**
47
48  A human end user who submits a print job to an IPP Printer. This person may or may not be within the same
49  security domain as the Printer. This person may or may not be geographically near the printer.
50
51  **2.2 Job Submitting Application**
52
53  An application (for example a batch application), acting on behalf of an end user, which submits a print job to an
54  IPP Printer. The application may or may not be within the same security domain as the Printer. This application
55  may or may not be geographically near the printer.
56
57  **2.3 Security Domain**
58
59  For the purposes of this discussion, the set of network components which can communicate without going through
60  a proxy or firewall. A security domain may be geographically very large, for example - anyplace within IBM.COM.
61
62  **2.4 IPP Client**
63
64  The software component on the client system which implements the IPP protocol.
65
66  **2.5 Job Recipient**
67
68  A human who is the ultimate consumer of the print job. In many cases this will be the same person as the Job
69  Submitting End User, but this need not always be the case. For example, if I use IPP to print a document on a
70  printer in a business partner's office, I am the Job Submitting End User, while the person I intend the document for
71  in my business partner's office is the Job Recipient.  Since one of the goals of IPP is to be able to print near the
72  ultimate recipient of the printed output, we would normally expect the Job Recipient to be in the same security
73  domain as, and geographically near the Printer. However, this may not always be the case. For example, I submit a
74  print job across the Internet to a  Kinko's print shop. I am both the Submitting end User and the Job Recipient, but I
75  am neither near nor in the same security domain as the Printer.
76
77  **2.6 Job Recipient Proxy**
78
79  A person acting on behalf of the Job Recipient.  In particular, the Job Recipient Proxy physically picks up the
80  printed document from the Printer, if the Job Recipient cannot perform that function. The Proxy is  **by definition**
81  geographically near and in the same security domain as the printer. For example, I submit a print job from home to
82  be printed on a printer at work. I'd like my secretary to pick up the print job and put it on my desk. In this case,  I

83   am acting as both Job Submitting End User and Job Recipient. My secretary is acting as a Job Recipient Proxy.  An
84   issue that needs to be considered in the notification architecture is the impact of a third party receiving many
85   unwanted notifications.
86
87   **2.7 Notification Recipient**
88
89   Any of: Job Submitting End User, Job Submitting Application, Job Recipient, or Job Recipient Proxy.
90
91   **2.8 Notification Recipient Agent**
92
93   A program which receives events on behalf of the notification recipient. The agent may take some action on behalf
94   of the recipient, forward the notification to the recipient via some alternative means (for example, page the
95   recipient), or queue the notification for later retrieval by the recipient.
96
97   **2.9 Notification Events**
98
99   Any of the following constitute events that a Job Submitting End User can specify notifications be sent for.
100  Notifications are sent to an end user only for that end user's job, or for events that affect the processing of that end
101  user's job.
102
103  • Any standard Printer MIB alert (i.e. device events that impact the end user's job)
104  • Job Received (transition from Unknown to Pending or Pending-held)
105  • Job Started (Transition from Pending to Processing)
106  • Page Complete (Page is stacked)
107  • Collated Copy Complete (last sheet of collated copy is stacked)
108  • Job Complete (transition from Processing or  Processing-stopped to Completed)
109  • Job aborted (transition from Pending, Pending-held,  Processing, or Processing-stopped to Aborted)
110  • Job canceled (transition from Pending, Pending-held, Processing, or Processing-held to Canceled)
111  • The job has not ended (Completed, Aborted, Canceled, etc.) within a specified time limit.
112
113  **2.10 Notification Registration**
114
115  It should be possible for end users to "Register" for notifications of certain types of events. These include any of
116  those described in the preceding section.
117
118  **2.11 Notification Attributes**
119
120  IPP Objects (for example, a print job) from which notification are being sent may have attributes associated with
121  them. A user may want to have one or more of these associated attributes returned along with a particular
122  notification. In general, these may include any attribute associated with the object emitting the notification.
123  Examples include:
124
125          number-of-intervening jobs
126          job-k-octets
127          job-k-octets processed
128          job impressions
129          job-impressions-interpreted
130          job-impressions-completed
131          impressionsCompletedCurrentCopy (job MIB)
132          sheetCompletedCopyNumber (job MIB)

133          sheetsCompletedDocumentNumber (job MIB)
134          Copies-requested
135          Copy-type
136          Output-destination
137          Job-state-reasons
138
139
140     **2.12 Immediate Notification**
141
142     Notifications sent to the notification recipient or the notification recipient's agent in such a way that the
143     notification arrives immediately , within the limits of common addressing, routing, network congestion and quality
144     of service.
145
146     **2.13 Queued Notification**
147
148     Notifications which are not necessarily sent immediately, but are queued for delivery by some intermediate network
149     application, or for later retrieval. Email with store and forward is an example of queued notification.
150
151     **2.14 Notification with Reliable Delivery**
152
153     Notifications which are delivered by a reliable, sequenced delivery of packets or character stream, with
154     acknowledgment and retry, such that delivery of the notification is guaranteed within some reasonable time limits.
155     For example, if the notification recipient has logged off and gone home for the day, an immediate notification
156     cannot be guaranteed to be delivered, even when sent over a reliable transport, because there is nothing there to
157     catch it. Guaranteed delivery requires both queued notification and a reliable transport. If delivery of the
158     notification requires process to process communications, each session is managed in a reliable manner, assuring
159     fully ordered, end-to-end delivery.
160
161     **2.15 Notification with Unreliable Delivery**
162
163     Notifications are delivered via the fundamental transport address and routing framework, but no acknowledgment
164     or retry is required. Process to process communications, if involved, are unconstrained.
165
166     **2.16 Quality of Service**
167
168     Some notification delivery methods may allow users to select quality of service parameters. These will depend upon
169     the specific delivery method chosen, and may include parameters such as priority, security, number of retries, and
170     the like.
171
172     **2.17 Human Consumable Notification**
173
174     Notifications which are intended to be consumed by human end users **only**. They contain no machine readable
175     encodings of the event. Email would be an example of a Human consumable notification.
176
177     **2.18 Machine Consumable Notification**
178
179     Notifications which are intended for consumption by a program **only**, such as an IPP Client. Machine Consumable
180     notifications may not contain human readable information.
181
182     **2.19 Mixed Notification**

183
184  A mixed notification may contain both human readable and human readable information.
185
186  **3.0 Requirements**
187
188  3.1  A Job Submitting End User must be able to specify zero or more notification recipients when submitting a
189       print job.
190
191  3.2  When specifying a notification recipient, a Job Submitting End user must be able to specify one or more
192       notification events for that notification recipient.
193
194  3.3  When specifying a notification recipient, the Job Submitting End User must be able to specify a notification
195       delivery method and any associated quality of service parameters for that notification recipient.  The method
196       may be explicit, or implied by characteristics of the method, such as queued, immediate, reliable, etc.
197
198  3.4  When specifying a notification event, a Job Submitting End User must be able to specify that zero or more
199       notification attributes be sent along with the notification, when that event occurs.
200
201  3.5  Common delivery methods should be utilized where they are appropriate and meet the requirements expressed
202       in this document.
203
204  3.6  There is no requirement for the IPP Printer receiving the print request to validate the identity of an event
205       recipient, nor the ability of the system to deliver an event to that recipient as requested (for example, if the
206       event recipient is not at work today).
207
208  3.7  However, an IPP Printer must validate its ability to deliver an event using the specified delivery scheme. If it
209       does not support the specified scheme, or the specified scheme is invalid for some reason, then it should
210       respond to the print request with an error condition.
211
212  3.8  There must be a class of IPP event notifications which can flow through corporate firewalls. However, an IPP
213       printer need not test to guarantee delivery of the notification through a firewall before accepting a print job.
214
215  3.9  A mechanism must be provided for delivering a notification to the submitting client when the delivery of an
216       event notification to a specified Notification Recipient fails.
217
218  3.10 There must be a mechanism for localizing human consumable notifications.
219
220  **4.0 Scenarios**
221
222  4.1  I am sitting in my office and submit a print job to the printer down the hall. I am in the same security domain
223       as the printer and of course, geographically near.  I want to know immediately when my print job will be
224       completed (or if there is a problem) because the document I am working on is urgent. I submit the print job
225       with the following attributes:
226
227       • Notification Recipient - me
228       • Notification Events - all
229       • Notification Attributes - job-state-reason
230       • Notification Type - immediate
231

232  4.2  I am working from home and submit a print job to the same printer as in the previous example. However,
233       since I am not at work, I cannot physically get the print file or do anything with it. It can wait until I get to
234       work this afternoon. However, I'd like my secretary to pick up the output and put it on my desk so it doesn't
235       get lost or mis-filed. I'd also like a queued notification sent to my email so that when I get to work I can tell if
236       there was a problem with the print job. I submit a print job with the following attributes:
237
238       •  Notification Recipient - my secretary
239       •  Notification Events - print complete
240       •  Notification Type - immediate
241
242       •  Notification Recipient - me
243       •  Notification Events - print complete
244       •  Notification Attributes - impressions completed
245       •  Notification Type - queued
246
247  4.3  I am sitting in my office and submit a print job to a client at an engineering firm we work with on a daily
248       basis. The engineering form is in Belgium. I would like my client to know when the print job is complete, so
249       that she can pick it up from the printer in her building.  It is important that she review it right away and get
250       her comments back to me. I submit the print job with the following attributes:
251
252       •  Notification Recipient - client at engineering firm
253       •  Notification Events - print complete
254       •  Notification Type - immediate
255       •  Notification Language - French
256
257  4.4  I am in a hotel room and send a print job to a  Kinko's store in the town I am working in, in order to get a
258       printed report for the meeting I am attending in the morning.  Since I'm going out to dinner after I get this job
259       submitted, an immediate notification won't do me much good. However, I'd like to check in the morning
260       before I drive to the Kinko's store to see if the file has been printed. An email notification is sufficient for this
261       purpose. I submit the print job with the following attributes:
262
263       •  Notification Recipient - me
264       •  Notification Events - print complete
265       •  Notification Type - email
266
267  4.5  I am printing a large, complex print file. I want to have some immediate feedback on the progress of the print
268       job as it prints. I submit the print job with the following attributes:
269
270       •  Notification Recipient - me
271       •  Notification Type - immediate
272       •  Notification Events - all state transitions
273       •  Notification Attributes - impression completed
274