The Printer Working Group

Cloud Printing Requirements and Model

Status: Interim

Abstract: This document contains specifications to support Cloud based printing using the PWG semantic model.

This document is a PWG Working Draft. For a definition of a "PWG Working Draft", see: ftp://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf

This document is available electronically at:

ftp://ftp.pwg.org/pub/pwg/cloud/wd-cloudmodel10-20120917.docx

ftp://ftp.pwg.org/pub/pwg/cloud/wd-cloudmodel10-20120917.pdf

1   ## 1. Requirements

2   ### 1.1 Rationale for Cloud Print Model and Requirements

3   Cloud-based applications and solutions are increasingly common, and Cloud-based
4   printing, scanning, and facsimile (collectively called "Cloud Imaging") are emerging in
5   several different forms. Adopting standard protocols and schemas now will help
6   interoperability, speed adoption, and address privacy, security, and legal issues
7   involved in Cloud Imaging.

8   Cloud printing has many potential implementation methods to comply with the need for
9   security, and that the components can be located or contained within different
10   locations.

11   The cloud can be a private cloud, a public cloud, or some hybrid federation of the two.
12   The actual print device may be located at the users location, part of the service
13   provider, at a remote user's location, or remotely as a pay to print destination.

14   ### 1.2 Consideration of Print Use Cases

15   Each of the Cloud Printing use cases in this section require establishing a connection
16   to a Cloud-based entity (typically involving authentication and authorization of the
17   prospective Job Originator), although it is possible that this connection may not have
18   been made specifically for printing. The printing process follows the network printing
19   process, and the use cases for network printing apply.

20   Further, although identified use cases assume a problem-free sequence in
21   implementation, problems do arise and the requirements must address them. Rather
22   than complicate each use case discussion with consideration of the various problems,
23   a separate section identifies "exceptions", essentially problems that may occur in
24   addressing different use cases.

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26   ### 1.3 Cloud Printing Requirements

27   For these requirements the following scenario applies. This sets a scenario where a
28   transversal is required between the user and the cloud print provider, and between the
29   printer and the cloud print provider. User is not part of the cloud print provider domain
30   and is not directly connected to the printer domain and the Printer is not part of the
31   cloud print provider domain.

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32 **1.3.1 User must be able to connect to the cloud print provider from a variety of**
33 **devices, operating systems, and applications.**

34 **1.3.2 User must provide acceptable credentials to the cloud print provider**

35 **1.3.3 User must be able to select the print destination.**

36 **1.3.4 User must be able to submit a print job including a document (direct or**
37 **by reference) and the print job attributes.**

38 **1.3.5 Cloud print provider must return a response that indicates the**
39 **submission is acceptable or rejected.**

40 **1.3.6 Cloud print provider must return a status of printing completed, or the**
41 **print job failed.**

42 **1.3.7 Printer must be registered with the cloud print provider by the printer**
43 **owner, including the user rights associated with the printer. User rights**
44 **include paid printing, and other printer capabilities that may be restricted**
45 **tocertain users.**

46 **1.3.8 Printer must provide to the cloud print provider it's attributes, including**
47 **supported document formats, paper sizes and types, finishing options, and**
48 **operational status.**

49 **1.3.9 Printer must initiate all communications with the cloud print provider**
50 **(maybe?)**

51 **1.3.10 When the cloud print provider has a job available for printing, the**
52 **printer must return acceptance or rejection of the job.**

53 **1.3.11 Printer must return operational status when requested**

54 **1.3.12 At end of printing, printer must return a completion status**

55 **1.3.13 If unable to complete job, or job is canceled, printer must return status**
56 **indicating such activity occurred.**

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1.3.14 All communications between the client and the cloud, and between the printer and the cloud, should be performed in a secure manner.

1.3.15 All interactions between the printer and the cloud service shall be logged following the common log format.

1.4 Out of Scope

From the Charter of the Cloud Imaging working group [ ] and the recognition that Cloud Printing may use different paths and elements within the cloud that are not within the province of the Printer Working Group, the detailed definition of the following elements and aspects of Cloud Printing is out of scope for this specification, although the general functions performed by these things in Cloud Printing may be identified in the Model discussion.

1. OOS 1: Defining Cloud federation interfaces and associated protocols and technologies.
2. OOS 2: Defining the interface between the physical Printer Device and the component that provides the interface between the Printer and the Cloud (later called the Cloud PrintImaging Manager); this component may be part of the Printer device in which case it is an "internal" interface; or it may be external, possibly serving multiple physical Printers, in which case it is assumed to use already standardized Printer interfaces.
3. OOS 3: Defining new protocols for authentication, authorization, and access control (AAA), enumeration, transport, notification, or device management.
4. OOS 4: Defining new document file formats.
5. OOS 5: Defining new abstract job tickets.
6. OOS 6: Defining specific interfaces within the Cloud Environment established to support Cloud Printing (later termed the Cloud servicePrint Provider).
7. OOS 7: Defining the interface by which Printers are registered with the Cloud.
8. OOS 8: Defining the interface by which Users, including potential Job Originators are associated with the Cloud.
9. OOS 9: Defining the interface between the User and the local component that provides the User's interface with the cloud (the User Client), this being part of an application (or operating system) than can be assumed to be proprietary.

1.5 Design Requirements

As previously discussed, the scenarios in section 3.2 can be divided into series of "Front-end" interactions between the User and the Cloud and "Back-End" interactions between the Printer and the Cloud. Considering the Out-of-Scope items, the design requirements are limited to defining or referencing an existing the definition of the User Client-to Cloud interface on the Front end, and the Cloud to Cloud Print Manager interface on the Back End. These definitions will, however, assume or impose some characteristics of the otherwise out-of-scope components.

1.5.1 ClientUser -side Design Requirements

In all of the scenarios, the User, operating though a Client, must establish a connection with the Cloud elements supporting the functions necessary for Cloud Printing. The authentication and authorization of the User, and the methods by which the printers

100 that he can use are located are out of scope. However, the following are in scope and
101 must be addressed by this specification:

1.5.1.1 Selecting a Printer

103 The cloud can determine, on the basis of User Association and Printer Registration,
104 what printers can be used by the User. The User will select a printer of group of
105 printers, possibly indirectly on the basis of his requirements, or possible directly by
106 reviewing the requested printer capabilities. This may be a multistep process, often
107 including a query of printer status.

108 Req 1. The User, operating though the user Client, must be able to communicate to
109 the Cloud the attributes needed of the printer, and the Cloud must be able to
110 provide a list of printers that can be used by the User that include the required
111 attribute values. From the scenarios, attributes include but are not limited to the
112 applicable items in the Standard set of printing capabilities (e.g., Table 8 in IPP/2.0
113 [PWG5100.12]), and those identified in Section 5.6 of JPS3 [PWG 5100.13].
114
115 Req 2: The User, operating through the client, must be able obtain the values of
116 specific configuration, capabilities and/or status items of an identified printer. The
117 values that may be queried include but are not limited to the applicable attributes in
118 the Standard set of printing capabilities (e.g., Table 8 in IPP/2.0 [PWG5100.12]),
119 and those identified in Section 5.6 of JPS3 [PWG 5100.13]. This requirement
120 especially includes access to printer status element values

1.5.1.2 Determining Job Request Status and Job Status

122 As part of the job request submission process, and possibly as an aspect of Printer
123 selection, a Job Originator will want to check on the progress of his request.

124 Req 3: User, operating through the User Client, must be able to determine the
125 status of a submitted Job Request, and if that request has been accepted by a
126 printer, the status of the resulting Job.

127 Users with some administrative rights may want to check on the job and their status in
128 a clod printing service or on a specific printer.

129 Req 4: Users with proper authorization must also be able to determine what Jobs
130 and Job Requests exist within the printer or service they are authorized to access,
131 and the state of these job requests and jobs.

1.5.1.3 Submitting a Job Request

133

1.5.1.4 Specifying Handling of the Printed Documents

135 Specifying to whom, when and where the printed job is to be made available.

136   **1.5.2 Printer-side Requirements**

137   Although the registration of the printer with the Cloud Service, including
138   communication of printer capabilities and possibly User access restrictions, is out of
139   scope, the communication of status and possibly changes in capabilities is not.

140   **1.5.2.1 Communication Printer Status and Configuration Changes**

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142   **1.5.2.2 Communicating Job Status**

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144   **1.5.2.3 Handling a Job Request**

145

146   **1.5.2.4 Handling of Printed Document**

147   (Accepting Specification Of How A Job Is To Be Delivered)

148   **1.5.2.5 Access of a Referenced Document**

149   Optional capability for printers capable of print-by-reference.

150   **1.5.3 Transforms**

151   ?

152   **1.5.4 Notification events**

153   TBD

154   **1.5.5 Privacy and security policies**

155   TBD

156   **1.5.6 Logging**