



The Printer Working Group

~~January 27~~ ~~February 27~~, 2014
Working Draft

Style Definition: IEEEStd Paragraph

Style Definition: Numbered List

IPP Scan Service

Status: ~~Interim~~Prototype

Abstract: This standard defines an IPP extension to support the PWG Semantic Model Scan service over IPP.

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:

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63 Contact information:

64 The Printer Working Group
65 c/o The IEEE Industry Standards and Technology Organization
66 445 Hoes Lane
67 Piscataway, NJ 08854
68 USA

69

70 About the Internet Printing Protocol Work Group

71 The Internet Printing Protocol (IPP) working group has developed a modern, full-featured
72 network printing protocol, which is now the industry standard. IPP allows a print client to
73 query a printer for its supported capabilities, features, and parameters to allow the
74 selection of an appropriate printer for each print job. IPP also provides job information
75 prior to, during, and at the end of job processing.

76 For additional information regarding IPP visit:

77 <http://www.pwg.org/ipp/>

78 Implementers of this specification are encouraged to join the IPP mailing list in order to
79 participate in any discussions of the specification. Suggested additions, changes, or
80 clarification to this specification, should be sent to the IPP mailing list for consideration.

81

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183 **1. Introduction**

184 This document specifies an IPP binding of the PWG Network Scan Service Semantic
185 Model and Service Interface Version 1.0 [PWG5108.02].

186 **2. Terminology**

187 **2.1 Conformance Terminology**

188 Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED,
189 SHOULD, SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to
190 conformance as defined in Key words for use in RFCs to Indicate Requirement Levels
191 [RFC2119]. The term CONDITIONALLY REQUIRED is additionally defined for a
192 conformance requirement that applies to a particular capability or feature.

193 **2.2 Scanning Terminology**

194 Normative definitions and semantics of printing terms are imported from IETF Printer MIB
195 v2 [RFC3805], IETF Finisher MIB [RFC3806], and IETF Internet Printing Protocol/1.1:
196 Model and Semantics [RFC2911].

197 This document refines the definition of the following terms in order to specify
198 unambiguous conformance requirements:

199 *Client*: Initiator of outgoing IPP session requests and sender of outgoing IPP operation
200 requests (HyperText Transfer Protocol -- HTTP/1.1 [RFC2616] User Agent).

201 *Document*: An object created and managed by ~~a-IPP~~an IPP Scan Service that contains
202 the description, processing, and status information. A Document object may have
203 attached data and is bound to a single Job.

204 *Imaging System*: A logical or physical system that supports printing, scanning, and other
205 imaging services.

206 *ith*: referring to a specific 1setOf value - the first value, the second value, and so forth.

207 *Job*: An object created and managed by ~~a-IPP~~an IPP Scan Service that contains
208 description, processing, and status information. The Job also contains zero or more
209 Document objects.

210 *Job Description:* Attributes supplied by the Client or end user to provide additional
211 information for the Scan Job and the Documents generated during the Scan Job
212 Processing (IPP Model and Semantics [RFC2911]).

213 *Job Status:* Attributes maintained by the automata describing the Job object's
214 identification, state, size, etc. These attributes are not directly modified by the Client (IPP
215 Model and Semantics [RFC2911]).

216 *Job Template:* Attributes supplied by the Client or end user specifying job processing
217 instructions which are intended to override any IPP Scan Service object defaults (IPP
218 Model and Semantics [RFC2911]).

219 *Job Ticket:* The combination of Job Description and Job Template attributes.

220 *Logical Device:* a print server, software service, or gateway that processes jobs and either
221 forwards or stores the processed job or uses one or more Physical Devices to render
222 output.

223 *Output Image:* A digital electronic representation of the information captured by the image
224 acquisition hardware and optionally processed by the associated IPP Scan Service. An
225 Output Image can simply be the image acquired from the specified scan region. The scan
226 region can encompass the entire media sheet or a portion thereof. Or an Output Image
227 can contain images acquired from multiple scan regions and combined into a final Output
228 Image through job processing attributes such as “n-up”.

229 *Physical Device:* a hardware implementation of a endpoint device, e.g., a scanner subunit,
230 a fax modem, etc.

231 *Pull Scan:* A Scan Job where the resulting scan document data is retrieved from the IPP
232 Scan Service by an authorized client.

233 *Push Scan:* A Scan Job where the resulting scan document data is delivered to the
234 specified destination by the IPP Scan Service.

235 *IPP Scan Service:* Listener for incoming IPP session requests and receiver of incoming
236 IPP operation requests (HyperText Transfer Protocol -- HTTP/1.1 [RFC2616] Server) that
237 represents one or more Imaging Devices.

238 *Spooling Device:* An Imaging Device that can store a Job's document data prior to
239 processing.

240 *Streaming Device:* An Imaging Device that processes a Job's document data as it is
241 acquired from the scanner subunit and stores portions of it temporarily until the portions
242 have been delivered to the destination.

243 **2.3 Acronyms and Organizations**

244 *IANA*: Internet Assigned Numbers Authority, <http://www.iana.org/>

245 *IETF*: Internet Engineering Task Force, <http://www.ietf.org/>

246 *ISO*: International Organization for Standardization, <http://www.iso.org/>

247 *PWG*: Printer Working Group, <http://www.pwg.org/>

248 **3. Requirements**

249 **3.1 Rationale for the IPP Scan Service**

250 This specification is based on common requirements defined in the Multifunction Device
251 Service Model Requirements [MFDREQ]. In order to support common functionality for
252 Scan using Multifunction Devices, there is a clear need to develop a semantic model and
253 a set of abstract operations and elements for Scan related services. In order to implement
254 an abstract model of the operations and elements for Scan related services, there is need
255 to map them onto implementable applications and communication protocols that support
256 interactions between IPP Scan Clients and IPP Scan Services. Tin order to reuse existing
257 protocol encoding components deployed across the industry there is a clear need to
258 define a binding of the abstract model onto the IPP protocol stack.The Internet Printing
259 Protocol Version 2.0 Second Edition [PWG5100.12] defines a collection of existing IPP
260 specifications that form the basis for IPP/2.0.

261 The MFD Model and Common Semantics [PWG5108.1] defines a common semantic
262 model and service interface for multi-function devices based on IPP.

263 The Scan Service Semantic Model and Service Interface v1.0 [PWG5108.05] defines the
264 semantics and interfaces specific to scanning.

265 The PWG Raster Format [PWG5102.4] defines simple page-based raster format.

266 Therefore, this IPP Scan Service specification should support scanning using IPP based
267 on the semantics and interfaces defined by the Scan Service Semantic Model and Service
268 Interface v1.0.

269 3.2 Use Cases

270 3.2.1 Mobile User

271 Andrew has a WiFi-capable tablet computing device. While traveling he was given access
272 to a hard copy document containing some information he'd like to keep. Andrew uses his
273 tablet to locate a nearby MFD and specifies the scanning intent he'd like to use when
274 scanning the document. Andrew loads the multipage document into an MFD's automatic
275 document feeder and the document is scanned and stored locally on his tablet.

276 3.2.2 Home/Family User

277 Melissa borrowed a collection of old family photographs she would like to own. She would
278 like to submit scans of the photographs to a photo web site to eventually have new copies
279 created and delivered to her. Melissa uses her mobile device to create a scan job for her
280 personal scanner that will deliver the scans to the photo web site. She then places each
281 photo on the platen and initiates the scan resulting in the scan being delivered to the
282 photo web site.

283 3.2.3 Business User

284 Julia has access to several shared network scanners managed by her company's IT
285 department. She uses them to scan documents, proposals, invoices, and other work-
286 related documents and deliver them to the appropriate destination for storage and/or
287 further processing. She has some documents that need to be scanned to deliver them to
288 the legal department's document repository and she needs them delivered to her
289 administrative assistant for further processing. She uses her mobile device to select a
290 network scanner. Since there is several scanners right next to each other she then uses
291 her mobile device to instruct the device to flash an indicator light to insure she is using the
292 correct scanner. She uses her mobile device to construct a scan job that will scan the
293 documents and deliver copies to the desired location. She can subsequently check the
294 scan job status to determine if the scanned documents were delivered successfully.

295 3.2.4 Scan Delivery Failure

296 Molly has scanned some invoices and requested they be delivered to the appropriate
297 destination for storage and/or further processing. The specified destination is currently
298 down for maintenance. The Scan Service automatically retries delivery as specified.
299 Since the delivery was unsuccessful, the Scan Job completes indicating the transmission
300 error. Molly can subsequently check the scan job status to determine if the scanned
301 documents were delivered to each destination successfully.

3.2.5 Scan Acquisition Failure

Anne has placed a stack of her student's tests in a scanner's automatic document feeder. She requested they be delivered to the appropriate destination for further processing. While scanning the Automatic Document Feeder gets jammed. The Scan Service has delivered a portion of the scanned tests to the destination. Since all the documents could not be scanned, the Scan Job is aborted and indicates the jam and subsequent timeout reasons for the aborted job. When Anne comes back and sees that the scanner is jammed she can check the scan job status to determine the state of the current job and check if the subset of delivered scans can be used or must be rescanned.

3.3 Out of Scope

The rationale in section 3.1 and the use cases in section 3.2 identify several out of scope items:

- ~~1.a.~~ The design of the client's user interface
- ~~2.b.~~ The methods of performing the physical scans
- ~~3.c.~~ The IPP Scan Service ~~is not required to perform~~ing document format conversions. The document formats emitted are limited to those supported by the IPP Scan Service. (i.e., The Scan Destination handles conversion of documents if a document format other than those supported by the IPP Scan Service is required)

3.4 Design Requirements

The rationale in section 3.1 and the use cases in section 3.2 identify several design requirements:

1. Scan should closely mirror the PWG Semantic Model for the Network Scan Service.
 - ~~2.a.~~ Scan should map cleanly to the existing IPP protocol binding
 - ~~3.b.~~ Push Scan and Pull Scan are required.
 - ~~4.c.~~ The Client can specify one or more destinations.
 - ~~5.d.~~ The IPP Scan Service needs to support a minimum set of document formats
 - ~~6.e.~~ The IPP Scan Service can stream basic page-based raster data.
 - ~~7.f.~~ The Client can monitor the status of transmission to each destination.
 - ~~8.g.~~ The Client can request identification of the Imaging Device.
 - ~~9.h.~~ Follow the naming conventions defined in IPP/1.1: Model and Semantics [RFC2911], including keyword value case (lower) and hyphenation requirements
 - ~~10.i.~~ Define IPP attributes and values necessary for scan specific features
 - ~~11.j.~~ Define IPP operations necessary for scan specific features

- 336 | 42.k. Define security requirements necessary to support privacy, integrity, and
337 | auditing policies
338 | 43.l. Define sections to register all attributes, values, and operations with IANA

339 | **4. IPP Scan Service Definition**

340 | **4.1 Scan Job Processing**

341 | From the Client's perspective, Scan jobs are largely processed the same way as a Print
342 | job, and IPP Scan reuses operations, attributes, and status codes from the Internet
343 | Printing Protocol/1.1: Model and Semantics [RFC2911] wherever possible. Spooling Scan
344 | Services handle retransmission of whole jobs automatically while Streaming Scan
345 | Services put the burden of retransmission on the Client.

346 | One primary difference with Scan is that instead of picking up the output of the job at the
347 | device as with printing, the output of the job must be delivered to a destination. In a Pull
348 | Scan the IPP Scan Service retains the scan document(s) data until the data is requested
349 | by a ~~IPP~~an IPP Scan Client. In a Push Scan the IPP Scan Service transmits the scan
350 | document(s) data to the specified destination(s).

351 | Another difference is that Scan Jobs generally expose different capabilities and use
352 | different resources than Print jobs, e.g., scan media path (i.e., platen, automatic document
353 | feeder) and scanner subunits. Imaging Devices MUST support Scan on
354 | endpoint(s)/path(s) separate from the Print service(s) in order to expose the capabilities
355 | and status corresponding to the service being accessed by the Client.

356 | When supported by the IPP Scan Service, Scan Jobs can also be directed to multiple
357 | destinations. This requires some additional state information to manage the transmission
358 | of the job to each destination. Scan Jobs that have multiple destinations has the
359 | "destination-statuses" Job Status attribute (section 7.3) to track the status of the delivery
360 | to each requested destination.

361 | Just as with printing attribute fidelity specified with the "ipp-attribute-fidelity" [RFC2911]
362 | and "job-mandatory-attributes" [PWG5100.7] operation attributes applies only when a Job
363 | is created - IPP Scan Services indicate that fidelity was not honored during transmission
364 | by reporting the 'job-completed-with-warnings' keyword in the "job-state-reasons" Job
365 | attribute.

366 4.1.1 **Output Spooling Services**

367 ~~[Ed Note: Is seem that inspecting destination/desination uris is insufficient to discriminate between~~
368 ~~spooling and streaming devices. Is another attribute required?]~~

369 Some Imaging Services have the capability to temporarily spool scan ~~jobs~~output
370 documents. Spooling services with a value of 'spool' for the "job-destination-
371 spoolingsupported" attribute (see 7.5.1) MUST automatically retry scan delivery upon
372 failure and support multiple destination URIs. Such Imaging Services typically support
373 the PDF ("application/pdf") and/or OpenXPS ("application/openxps") document formats,
374 however they MAY NOT support spooling for all formats. Clients MUST include and IPP
375 Scan Services MUST support the "document-format" operation attributes in Get-Printer-
376 Attributes requests in order to determine the spooling capabilities of the IPP Scan Service
377 for a given format.

378 4.1.2 **Output Streaming Services**

379 ~~Other~~ Imaging Services that can only stream scan jobs to a single destination URI MUST
380 support redelivery of the current page. When an error occurs that requires redelivery of
381 larger portions of the job by the Client, IPP Scan Services MUST move the job to the
382 aborted state, add the appropriate keyword to the "job-state-reasons" Job Description
383 attribute for the Job, and return the server-error-device-error status code to the Client.

384 Some document formats, e.g., PWG Raster ("image/pwg-raster"), are considered to be
385 streamable formats. Clients MUST include and IPP Scan Services MUST support the
386 "document-format" operation attribute in Get-Printer-Attributes requests in order to
387 determine the streaming capabilities of the IPP Scan Service for a given format.

388 4.1.3 **Job Terminating State**

389 The terminating state of an IPP Scan Job reflects the final disposition of the Job. Jobs in
390 the 'canceled' state were canceled by a User using the Cancel-Job, Cancel-Jobs, or
391 Cancel-My-Jobs operations, regardless of whether any or all of the Job has been
392 processed or partially transferred to its destination URI(s). The "destination-statuses" Job
393 Status attribute (section 7.3) provides detailed information regarding the progress of the
394 job prior to cancellation with the value of the "destination-state" member attribute set to
395 'completed' for Jobs that were completely sent to the destination or 'canceled' otherwise.

396 Jobs in the 'aborted' state were aborted by the IPP Scan service itself, typically due to a
397 fatal processing error or a failed transfer to any of a Job's destination URIs. The
398 "destination-statuses" Job Status attributes provides detailed information regarding the
399 progress of the Job prior to being aborted by the service with the value of the "destination-
400 state" member attribute set to 'completed' for Jobs that were completely sent to the

401 destination or 'aborted' otherwise. The "job-state-reasons" Job Status attribute will contain
402 the keyword 'destination-uri-failed' if the Job was aborted due to a transfer error to one or
403 more destination URIs.

404 Jobs in the 'completed' state were successfully processed and transferred to at least one
405 of the Job's destination URIs. The "destination-statuses" Job Status attribute provides
406 detailed information regarding the terminating state of each destination URI. IPP Scan
407 Services MUST report the 'job-completed-with-errors' keyword in the "job-state-reasons"
408 attribute if the Job was not successfully transferred to any destination URI.

409 **4.1.4 Image Acquisition Failure**

410 When a Scan Job is processed it is possible that no image can be obtained (e.g., nothing
411 on platen) or during processing there can be an interruption in the stream of images (e.g.,
412 jam in Automatic Document Feeder). After an implementation defined period of time has
413 elapsed and the issue has not been resolved the Scan Job moves to the aborted state
414 with an appropriate set of job state reasons (e.g., media-jam, aborted-by-system). Since
415 there is no guarantee that the images delivered by the aborted job can be used, the entire
416 job should be resubmitted.

417 **4.1.44.1.5 Job History**

418 IPP Scan Job history MUST be retained for a minimum of 300 seconds.

419 **4.1.54.1.6 IPP Scan Service URIs**

420 Each instance of an IPP Scan service is identified by a URI. The path component of an
421 IPP Scan URI MUST be "/ipp/scan" for the only (or default) instance of the service on an
422 Imaging Device and "/ipp/scan/instance-name" for each additional, non-default instance
423 on the Imaging Device.

424 **4.1.64.1.7 Destination URIs**

425 IPP Scan supports delivery of scan jobs to one or more destination URIs. The following
426 URI schemes are identified by this specification:

427 'ftp, 'ftps': Scan jobs are sent to the destination address using the File Transfer Protocol
428 [RFC1738].

429 'http, 'https': Scan jobs are sent to the destination address using the HyperText Transfer
430 Protocol [RFC1738], [RFC2616], [RFC2817].

- 431 'dav': Scan jobs are sent to the destination address using HTTP Extensions for Distributed
432 Authoring (WebDAV) [RFC2518], [RFC4918].
- 433 'ipp', 'ipps': Scan jobs are submitted to the destination URI using the Internet Printing Protocol
434 [RFC2911], typically for printing.
- 435 'mailto': Scan jobs are converted to a supported document format and sent to the destination
436 email address using Multimedia Internet Mail Exchange [RFC2045] attachments.
- 437 'smb': Scan jobs are sent to the specified Server Message Block/Common Internet File System
438 destination.

439 **4.2 IPP Operations**

440 | Table 1 lists the operations for [an IPPan IPP](#) Scan Service conforming to this IPP Scan
 441 Service specification. The Create-Job and Send-Document (i.e.,
 442 GetNextDocumentImages) operations are required, but IPP Scan Services are not
 443 required to support multiple document jobs.

444 **Table 1 - Operations for Scan (note 1)**

Code	IPP Operation Name	SM Operation Name	Reference
0x0004	Validate-Job	ValidateScanJobTicket	RFC 2911
0x0005	Create-Job	CreateScanJob	RFC 2911
0x0008	Cancel-Job	CancelScanJob	RFC 2911
0x0009	Get-Job-Attributes	GetScanJobElements	RFC 2911
0x000A	Get-Jobs	GetActiveScanJobs, GetScanJobHistory	RFC 2911
0x000B	Get-Printer-Attributes	GetScanServiceElements	RFC 2911
0x000C	Hold-Job	HoldScanJob	RFC 2911
0x000D	Release-Job	ReleaseScanJob	RFC 2911
0x0010	Pause-Printer (0)	PauseScanService	RFC 2911
0x0011	Resume-Printer (0)	ResumeScanService	RFC 2911
0x0013	Set-Printer-Attributes (0)	SetScanServiceElements	RFC 3380
0x0014	Set-Job-Attributes (0)	SetScanJobElements	RFC 3380
0x0015	Get-Printer-Supported- Values (0)	-	RFC 3380
0x0016	Create-Printer- Subscriptions (0)	-	RFC 3995
0x0017	Create-Job-Subscriptions (0)	-	RFC 3995

0x0018	Get-Subscription-Attributes (O)	-	RFC 3995
0x0019	Get-Subscriptions (O)	-	RFC 3995
0x001A	Renew-Subscription (O)	-	RFC 3995
0x001B	Cancel-Subscription (O)	-	RFC 3995
0x001C	Get-Notifications (O)	-	RFC 3996
0x0022	Enable-Printer (O)	EnableScanService	RFC 3998
0x0023	Disable-Printer (O)	DisableScanService	RFC 3998
0x0024	Pause-Printer-After-Current-Job (O)	PauseScanServiceAfterCurrentJob	RFC 3998
0x0025	Hold-New-Jobs (O)	HoldNewScanJobs	RFC 3998
0x0026	Release-Held-New-Jobs (O)	ReleaseHeldScanJobs	RFC 3998
0x0027	Deactivate-Printer (O)	-	RFC 3998
0x0028	Activate-Printer (O)	-	RFC 3998
0x0029	Restart-Printer (O)	RestartScanService	RFC 3998
0x002A	Shutdown-Printer (O)	ShutdownScanService	RFC 3998
0x002B	Startup-Printer (O)	StartupService (note 2)	RFC 3998
0x002D	Cancel-Current-Job (O)	CancelCurrentScanJob	RFC 3998
0x002E	Suspend-Current-Job (O)	SuspendCurrentScanJob	RFC 3998
0x002F	Resume-Job (O)	ResumeScanJob	RFC 3998
0x0030	Promote-Job (O)	PromoteScanJob	RFC 3998
0x0031	Schedule-Job-After (O)	PromoteScanJob	RFC 3998
0x0034	Get-Document-Attributes (O)	GetScanDocumentElements	PWG 5100.5

0x0035	Get-Documents (O)	GetScanDocuments	PWG 5100.5
0x0036	Delete-Document (O)	-	PWG 5100.5
0x0037	Set-Document-Attributes (O)	SetScanDocument Elements	PWG 5100.5
0x0038	Cancel-Jobs (O)	CancelScanJobs	PWG 5100.11
0x0039	Cancel-My-Jobs	CancelMyScanJobs	PWG 5100.11
0x003A	Resubmit-Job (O)	ResubmitScanJob	PWG 5100.11
0x003B	Close-Job	CloseScanJob	PWG 5100.11
0x003C	Identify-Printer	IdentifyScanService	PWG 5100.13
0x003D	Validate-Document (O)	ValidateScanDocumentTicket	PWG 5100.13
0x004A	Get-Next-Document-Images	GetNextDocumentImages	PWG 5100.SCAN

445 "(O)" = OPTIONAL

446

447 Note 1: The legacy IPP Print-Job (0x0002), Print-URI (0x0003), Restart-Job (0x000E), Purge-
 448 Jobs (0x0012), and Reprocess-Job (0x002C) operations MUST NOT be supported by a
 449 conforming IPP Scan implementation.

450 Note 2: StartupService is an operation on the Semantic Model System Control Service.

451

452 **4.3 IPP Scan Service Description Attributes**

453 | Table 2 lists the REQUIRED IPP Scan Service Description attributes for ~~a-IPP~~an IPP
454 | Scan Service.

455 **Table 2 - Required IPP Scan Service Description Attributes**

Attribute	Reference
charset-configured	RFC 2911
charset-supported	RFC 2911
color-supported (note 1)	RFC 2911
compression-supported	RFC 2911
copies-default (note 2)	RFC 2911
copies-supported (note 2)	RFC 2911
destination-uri-schemes-supported	PWG 5100.15
document-format-default	RFC 2911
document-format-supported	RFC 2911
generated-natural-language-supported	RFC 2911
input-attributes-default	PWG 5100.15
input-attributes-supported	PWG 5100.15
input-color-mode-supported	PWG 5100.15
input-media-supported	PWG 5100.15
input-orientation-requested-supported	PWG 5100.15
input-quality-supported	PWG 5100.15
input-resolution-supported	PWG 5100.15
input-sides-supported	PWG 5100.15

input-source-supported	PWG 5100.15
ipp-extensions-supported	PWG 5100.13
ipp-versions-supported	RFC 2911
job-ids-supported	PWG 5100.11
multiple-destination-uris-supported	PWG 5100.15
multiple-document-handling-supported (note 3)	RFC 2911
multiple-document-jobs-supported	RFC 2911
multiple-operation-timeout (note 3)	RFC 2911
multiple-operation-timeout-action (note 3)	PWG 5100.13
natural-language-configured	RFC 2911
number-of-retries-default	PWG 5100.15
number-of-retries-supported (note 4)	PWG 5100.15
operations-supported	RFC 2911
overrides-supported	PWG 5100.6
printer-alert	PWG 5100.9
printer-alert-description	PWG 5100.9
printer-config-change-date-time	PWG 5100.13
printer-config-change-time	PWG 5100.13
printer-device-id	PWG 5107.2
printer-geo-location	PWG 5100.13
printer-get-attributes-supported (note 5)	PWG 5100.13
printer-icons	PWG 5100.13
printer-info	RFC 2911

printer-is-accepting-jobs	RFC 2911
printer-location	RFC 2911
printer-make-and-model	RFC 2911
printer-more-info	RFC 2911
printer-name	RFC 2911
printer-organization	PWG 5100.13
printer-organizational-unit	PWG 5100.13
printer-state	RFC 2911
printer-state-change-date-time	RFC 3995
printer-state-change-time	RFC 3995
printer-state-message	RFC 2911
printer-state-reasons	RFC 2911
printer-up-time	RFC 2911
printer-uri-supported	RFC 2911
printer-uuid	PWG 5100.13
pwg-raster-document-resolution-supported	PWG 5102.4
pwg-raster-document-type-supported (note 1)	PWG 5102.4
queued-job-count	RFC 2911
retry-interval-default (note 4)	PWG 5100.15
retry-interval-supported (note 4)	PWG 5100.15
retry-time-out-default (note 4)	PWG 5100.15
retry-time-out-supported (note 4)	PWG 5100.15
uri-security-supported	RFC 2911

456	uri-authentication-supported	RFC 2911
	which-jobs-supported	PWG 5100.11

457 Note 1: Defines color support of the IPP Scan Service, not of the recipient.

458

459 Note 2: MUST have a value of 1.

460 Note 3: CONDITIONALLY REQUIRED for IPP Scan Services that support the multi-document
461 jobs.

462 Note 4: CONDITIONALLY REQUIRED for Push Scan

463 Note 5: MUST include “destination-uri” in order to filter capabilities by URI scheme.

464 4.4 IPP Operation Attributes

465 Table 3 lists the REQUIRED operation attributes for ~~a-IPP~~an IPP Scan Service.

466 **Table 3 - Required Operation Attributes**

Attribute	Reference
compression	RFC 2911
document-format	RFC 2911
document-format-version	PWG 5100.7
document-name	RFC 2911, PWG 5100.5
first-index	PWG 5100.13
input-attributes (note 1)	PWG 5100.15
ipp-attribute-fidelity	RFC 2911
job-ids	PWG 5100.11
job-name	RFC 2911
last-document	RFC 2911

limit	RFC 2911
requesting-user-name	RFC 2911
requesting-user-uri	PWG 5100.13
which-jobs	RFC 2911, PWG 5100.11

467 Note 1: Only those members explicitly listed in this specification are required.

468

469 4.5 IPP Job Template Attributes

470 Table 4 lists the REQUIRED Job Template attributes for ~~a-IPP~~an IPP Scan Service.

471 **Table 4 - Required Job Template Attributes**

Attribute	Reference
copies (note 1)	RFC 2911
destination-uris (note 2)	PWG 5100.15
multiple-document-handling (note 3)	RFC 2911
number-of-retries (note 2)	PWG 5100.15
page-ranges (note 3)	RFC 2911
retry-interval (note 2)	PWG 5100.15
retry-time-out (note 2)	PWG 5100.15

472 Note 1: Must have a value of 1.

473 Note 2: CONDITIONALLY REQUIRED for Push Scan

474 Note 3: CONDITIONALLY REQUIRED for IPP Scan Services that support multi-document jobs

475 4.5.1 Other Job Template Attributes

476 IPP Scan Services MAY support additional Job Template attributes such as “media”
477 “number-up”, and “overrides. These attributes are applied by the IPP Scan Service when
478 generating the content to be delivered to the destination (e.g. specifying a media size that
479 is different from the acquired image size would result in an image scaled to the specified
480 media size. Note that the normal use case is that image size scanned would be the same
481 as the output image size.).

482

483 4.6 IPP Job Description Attributes

484 | Table 5 lists the REQUIRED Job Description attributes for [a-IPPan IPP](#) Scan Service.

485 **Table 5 - Required Job Description Attributes**

Attribute	Source
job-name	RFC 2911
job-originating-user-name	RFC 2911

486 4.7 IPP Job Status Attributes

487 | Table 6 lists the REQUIRED Job Status attributes for [a-IPPan IPP](#) Scan Service.

488 **Table 6 - Required Job Status Attributes**

Attribute	Source
date-time-at-completed	RFC 2911
date-time-at-creation	RFC 2911
date-time-at-processing	RFC 2911
destination-statuses	PWG 5100.15
document-name-supplied	PWG 5100.7
input-attribute-actual	PWG 5100.15
job-id	RFC 2911
job-impressions (note 1)	RFC 2911
job-impressions-completed (note 1)	RFC 2911
job-originating-user-name	RFC 2911
job-printer-up-time	RFC 2911

job-printer-uri	RFC 2911
job-state	RFC 2911
job-state-message	RFC 2911
job-state-reasons	RFC 2911
job-uri	RFC 2911
job-uuid	PWG 5100.13
time-at-completed	RFC 2911
time-at-creation	RFC 2911
time-at-processing	RFC 2911

489 Note 1: Impressions is equivalent to Output Images in the output file(s) delivered to the
490 destination

491

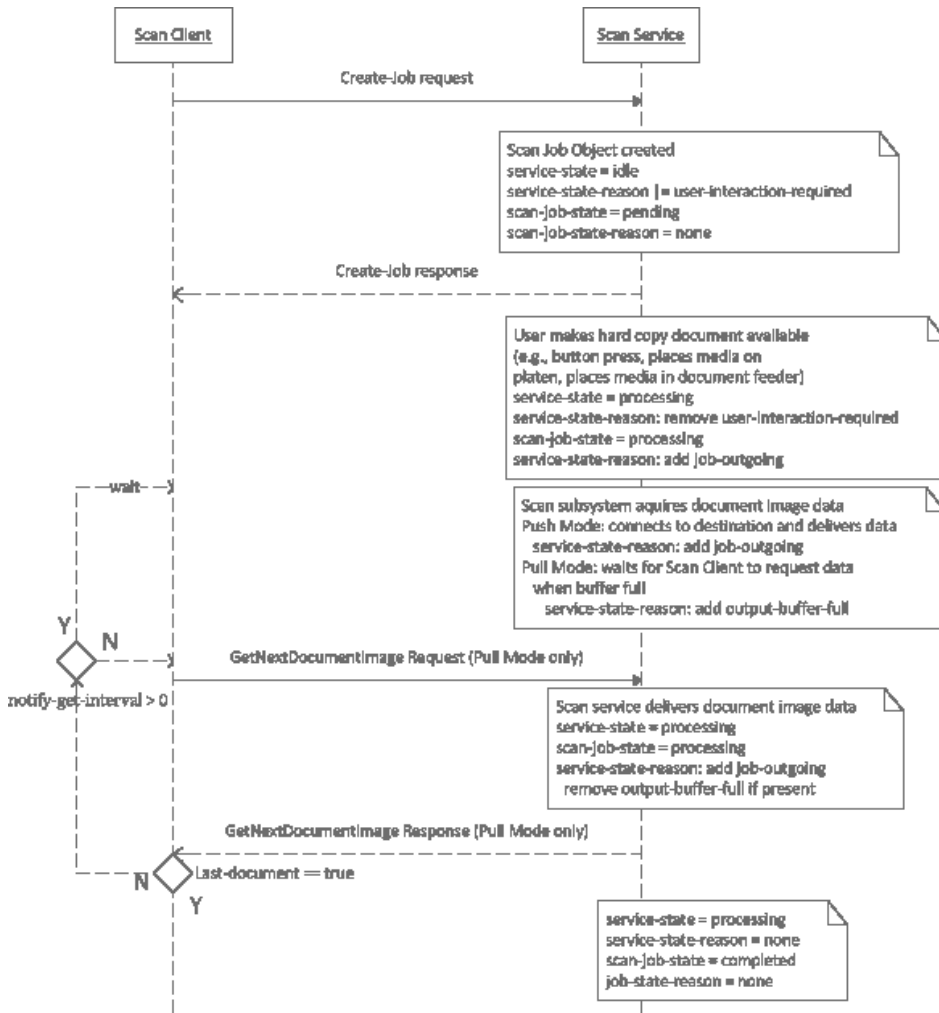


Figure 1 Scan Job Creation Sequence Diagram Flow Chart

492

493

494

495 5. Document Formats

496 IPP Scan Services MUST support generating documents conforming to Document
497 management — Portable document format — Part 1: PDF 1.7 [ISO32000]
498 ("application/pdf").

499 IPP Scan Services SHOULD support generating documents conforming to the JPEG JFIF
500 format [T81], [W3CJFIF] ("image/jpeg").

501 IPP Scan Services MAY support generating other documents formats.

502 6. New Operation

503 6.1 Get-Next-Document-Images Operation

504 | The REQUIRED Get-Next-Document-Images operation allows ~~a-IPP~~an IPP Scan Client to
505 retrieve a scanned document from an existing job object. This operation enables pull
506 scanning. IPP Scan Services MUST support this operation. The IPP Scan Client specifies
507 the target Scan Job. The Scan Job MUST be in the 'processing' or 'completed' state. As
508 the scan data becomes available the document content is delivered using a mime
509 attachment. To support streaming the IPP Scan Client MUST support chunked encoding
510 of MIME attachments.

511 *Access Rights:* The authenticated user (see [RFC2911] section 8.3) performing this
512 operation must either be the job owner (as determined in the Create-Job operation) or an
513 operator or administrator of the IPP Scan Service object (see [RFC2911] Sections 1 and
514 8.5). Otherwise, the IPP object MUST reject the operation and return: 'client-error-
515 forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

516 6.1.1 Get-Next-Document-Images Request

517 The following attributes are part of the Get-Next-Document-Images Request:

518 Group 1: Operation Attributes

519 Natural Language and Character Set:

520 The "attributes-charset (charset)" and "attributes-natural-language (naturalLanguage)"
521 attributes as described in [RFC2911] section 3.1.4.1.

522 Target:

523 The “printer-uri (uri)” plus “job-id (integer(1:MAX))” which define the target for this
524 operation as described in [RFC2911] section 3.1.5. The client MUST NOT supply and the
525 IPP Scan Service MUST NOT support the “job-uri (uri)” operation attribute for this
526 operation.

527 Requesting User Name:

528 The “requesting-user-name (name(MAX))” and “requesting-user-uri (uri)” attributes
529 SHOULD be supplied by the client as described in [RFC2911] section 8.3 and
530 [PWG5100.13] section 6.1.

531 Document Format Accepted:

532 The “document-format-accepted (1setOf mimeType)” attributes SHOULD be
533 supplied by the client as described in ~~[PWG5100.IPPSIX] section 5.4.4~~ section 8.1.1. The
534 order of the values specifies the Client’s format preference.

535 ~~notify-wait~~get-next-image-wait-mode:

536 This value indicates whether the IPP Scan Client wants to block waiting for the response.
537 The client MAY supply this attribute. The IPP Scan Service MUST support both values of
538 this attribute as described for “notify-wait” in [RFC3996] section 5.2 and 5.1.3.

539

540 **6.1.2 Get-Next-Document-Images Response**

541 The following attributes are part of the Get-Next-Document-Images Response:

542 Group 1: Operation Attributes

543 Status Message:

544 In addition to the REQUIRED status code returned in every response, the response
545 OPTIONALLY includes a “status-message (text(255))” and/or a “detailed-status- message
546 (text(MAX))” operation attribute as described in [RFC2911] sections 13 and 3.1.6.

547 Natural Language and Character Set:

548 The “attributes-charset (charset)” and “attributes-natural-language (naturalLanguage)”
549 attributes as described in [RFC2911] section 3.1.4.2.

550 Document Format:

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551 The “document-format (mimeMediaType)” attributes MUST be supplied by the server.
552 This attribute indicates the format of the documents retrieved in this operation.

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553 ~~next-image-notify~~-get-interval

554

555 The value of this ~~notify-next-image~~-get-interval(integer(0:MAX)) attribute is the number of
556 seconds that the IPP Scan Client SHOULD wait before trying the Get-Next-Document-
557 Images operation again. The IPP Scan Service MUST return this operation attribute if (1)
558 it is too busy to return events, or (2) the IPP Scan Client did not request Event Wait
559 Mode. The IPP Scan Client MUST accept this attribute and SHOULD reissue the Get-
560 Next-Document-Images operation (with or without "~~notify-wait~~~~get-next-image-wait~~" = 'true')
561 at the indicated number of seconds in the future in order to get more Scan Document
562 image data. This value is intended to help the client be a good network citizen.

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563 Last-Document:

564 The “last-document” operation attribute set to 'true' indicates that this is the last document
565 available for the Scan Job. The “last-document” attribute is used in a slightly different
566 manner than in [RFC2911] section 3.3.1.1. The consistent semantics is that the supplier
567 of the document data is indicating that ~~ten the~~ last document has been reached.

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568 Group 2: Document Description Attributes

569 “document-number (integer(1:MAX))”

570 The number of the document in the Job.

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571 Group 3: Document content

572 The document content is sent as a MIME attachment. Note that the IPP Scan Client
573 MUST be ready to accept a chunked response.

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574 **7. Ammended Operation**

575 **6.27.1 Create-Scan-Job~~Create-Job~~ Operation**

576 The “~~Create-Scan-Job~~~~Create-Job~~” has a slightly different signature than the “Create-Job”
577 in [RFC2911] section 3.2.4.

578 ~~6.2.1.7.1.1~~ ~~Create-Scan-Job~~**Create-Job** Request

579 The following attributes are part of the ~~Create-Scan-Job~~**Create-Job** Request:

580 Group 1: Operation Attributes

581 Natural Language and Character Set:

582 The “attributes-charset (charset)” and “attributes-natural-language (naturalLanguage)”
583 attributes as described in [RFC2911] section 3.1.4.1.

584 Target:

585 The “printer-uri (uri)” plus “job-id (integer(1:MAX))” which define the target for this
586 operation as described in [RFC2911] section 3.1.5. The client MUST NOT supply and the
587 IPP Scan Service MUST NOT support the “job-uri (uri)” operation attribute for this
588 operation.

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589 Requesting User Name:

590 The “requesting-user-name (name(MAX))” and “requesting-user-uri (uri)” attributes
591 SHOULD be supplied by the client as described in [RFC2911] section 8.3 and
592 [PWG5100.13] section 6.1.

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593 Job Name:

594 The “job-name (name(MAX))” attribute SHOULD be supplied by the client as described in
595 [RFC2911] section 3.2.1.1.

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596 Ipp Attribute Fidelity:

597 The “ipp-attribute-fidelity (boolean)” attribute MAY be supplied by the client as described
598 in [RFC2911] section 3.2.1.1.

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599 Document Format Accepted:

600 The “~~document-format-accepted~~**document-format-accepted** (1setOf mimeType)”
601 attributes SHOULD be supplied by the client as described in section
602 8.1.1[PWG5100.IPPSIX] section 5.4.1. ~~The order of the values specifies the Client's~~
603 ~~format preference.~~

604 Input Attributes:

605 The “input-attributes (collection)” attribute MUST be supplied by the client as described in
606 section 7.1.1. This attribute is not an operational attribute in the “Create-Job” operation in
607 [RFC2911] section 3.2.4.

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608 Group 2: Job Template Attributes

609 The client OPTIONALLY supplies a set of Job Template attributes as defined in section
610 7.1.2.2. If the client is not supplying any Job Template attributes in the request, the client
611 SHOULD omit Group 2 rather than sending an empty group. However, ~~a-IPPan~~ IPP Scan
612 Service MUST be able to accept an empty group.

613 Note that the presence of the “destination-uris” indicates that a Push Scan is being
614 requested. The absence of a “destination-uris” indicates that a Pull Scan is being
615 requested. An empty “destinations-uris” should not be supplied. If it is the IPP Scan
616 Service treats the request the same as when “destination-uris” is omitted.

617

618 ~~6.2.27.1.2~~ ~~Create-Scan-Job~~ ~~Create-Job~~ Response

619 There is no difference between the response signature for the “~~Create-Scan-Job~~~~Create-~~
620 ~~Job~~” response and the “Create-Job” response in [RFC2911] section 3.2.4.

621 ~~7.8.~~ New Attributes

622 ~~7.18.1~~ Operation Attribute

623 ~~8.1.1~~ document-format-accepted” (1 set of mimeMediaType)

624 ~~7.1.4~~ The OPTIONAL “document-format-accepted” operation attribute SHOULD be
625 supplied by the client. It identifies the acceptable formats of the Document data to be
626 emitted by the IPP Scan Service for the Job. It is an ordered list starting with the preferred
627 format. The IPP Scan Service MUST use the first supported value in the list. The default
628 value that MUST be used, if left unspecified, is the value of the “document-format-default”.
629

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630 ~~8.1.2~~ get-next-image-wait-mode (boolean)

631 This value indicates whether the IPP Scan Client wants to block waiting for the
632 response. The client MAY supply this attribute. The IPP Scan Service MUST support both
633 values of this attribute.as described for “notify-wait” in [RFC3996] section 5.2 and 5.1.3

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634 **8.1.3 input-attributes (collection)**

635 The CONDITIONALLY REQUIRED "input-attributes" operation attribute specifies the
 636 scanning source and other attributes for processing scan documents. IPP Scan Services
 637 MUST support this attribute. The Semantic Model IPP Scan Service [PWG5108.05]
 638 defines a single InputSource element, which does not capture all of the necessary input
 639 intent. IPP Scan instead maps elements from the Semantic Model Copy Service
 640 [PWG5108.04] CopyDocumentProcessing.CopyInput group.

641
 642 ~~[Ed Note: Need reference for "input-sheet-count" (Like a page range for the number of sheets to~~
 643 ~~scan)]~~

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644 The following member attributes are defined in [~~IPP FAX~~PWG5100.15] and are coherent
 645 with corresponding attributes defined in [RFC2911]:

"input-auto-exposure"	"input-auto-scaling"	"input-auto-skew-correction"
"input-brightness"	"input-color-mode"	"input-content-type"
"input-contrast"	"input-film-scan-mode"	"input-images-to-transfer"
"input-orientation-requested"	"input-media"	"input-media-type"
"input-quality"	"input-resolution"	"input-scaling-height"
"input-scaling-width"	"input-scan-regions"	"input-sharpness"
"input-sides"	"input-source"	

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646 The member attributes in the remainder of section ~~87.1.4~~ are defined in [PWG5108.02].

647 The "input-attributes-supported" IPP Scan Service attribute (section ~~8.47.4~~**Error!**
 648 **Reference source not found.**) defines which of the "input-attributes" member attributes
 649 are supported.

650 **7.1.1.48.1.3.1 input-color-mode (type2 keyword)**

651 The "input-color-mode" member attribute specifies the color processing mode. Each
 652 keyword describes a color encoding, color space, bit depth and samples per pixel

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653

654

Table 7 - input-color-mode keywords

Keyword	Color Type	Color Encoding	Bit Depth	Samples per pixel
<u>auto</u>	<u>Color/Gray or Binary</u>			
<u>bi-level</u>	<u>Binary</u>		<u>1</u>	<u>1</u>
<u>bBlack-and-wWhite_1</u>	Binary		1	1
<u>color</u>	<u>Color</u>			
<u>gGrayscale_4</u>	Gray		4	4
<u>gGrayscale_8</u>	Gray		8	8
<u>gGrayscale_16</u>	Gray		16	16
<u>monochrome</u>	<u>One color (usually gray)</u>			
<u>RGBr-g-b-24</u>	color	RGB	24	8
<u>RGBr-g-b-48</u>	color	RGB	48	16
<u>RGBr-g-b-a32</u>	color	RGB	32	8
<u>RGBr-g-b-a64</u>	color	RGB	64	16
<u>CMYKc-m-y-k-32</u>	color	CMYK	32	8
<u>CMYKc-m-y-k-64</u>	color	CMYK	64	16

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655 The “input-color-~~entrymode~~-supported” IPP Scan Service attribute (section ~~8.4Error!~~
 656 ~~Reference source not found.~~) defines the supported values. IPP Scan Services MUST
 657 support and Clients MUST supply this member attribute, either directly or through the
 658 “input-attributes-default” IPP Scan Service attribute (section ~~8.4Error! Reference source~~
 659 ~~not found.~~) value.

660 **8.1.4 next-image-get-interval(integer(0:MAX))**

661 The OPTIONAL “next-image-get-interval” operation attribute specifies the number of
662 seconds that the IPP Scan Client SHOULD wait before trying the Get-Next-Document-
663 Images operation again. The IPP Scan Service MUST return this operation attribute if (1)
664 it is too busy to return events, or (2) the IPP Scan Client did not request Event Wait
665 Mode. The IPP Scan Client MUST accept this attribute and SHOULD reissue the Get-
666 Next-Document-Images operation (with or without “notify-waitget-next-image-wait” = ‘true’)
667 at the indicated number of seconds in the future in order to get more Scan Document
668 image data. This value is intended to help the client be a good network citizen.

669 **7.1.28.1.5 output-attributes (collection)**

670 The OPTIONAL “output-attributes” operation attribute specifies the attributes for image
671 processing to be applied when generating the output images. IPP Scan Services MUST
672 support this attribute.

673

674 **7.1.2.48.1.5.1 output-compression-quality-factor (integer(0:100))**

675 The “output-compression-quality-factor” member attribute contains a normalized integer
676 value used by JPEG compression to determine the amount of acceptable image loss.
677 JPEG compression can be lossy, some amount of data is lost (not reproducible) or
678 lossless. The higher the requested compression factor the smaller the resulting file size.
679 The value is normalized as an integer between 0 and 100.

680 The “output-compression-quality-factor-supported” IPP Scan Service attribute (section
681 ~~4.3~~**Error! Reference source not found.**) specifies whether the IPP Scan Service
682 supports the “output-compression-quality-factor” member attribute.

683 **7.1.2.28.1.5.2 input-noise-removalnoise-removal (integer(0:100))**

684 The “~~input-noise~~noise-removal” member attribute contains a normalized integer value
685 used control the amount of random unwanted data to be removed from the scan data.
686 The higher the requested removal value the more aggressively the noise is removed. The
687 value is normalized as an integer between 0 and 100.

688 **7.28.2 Job Template Attributes**

689 The following ~~member~~ attributes are defined in [~~IPP FAX~~PWG5100.15]:
“destination-uris” (see note 1) “destination-uri” “input-auto-skew-correction”

“input-brightness”	“input-color-mode”	“input-content-type”
“input-contrast”	“input-film-scan-mode”	“input-images-to-transfer”
“input-scaling-height”	input-scaling-width”	“Input-scan-regions”
“input-sharpness”	“input-source”	“number-of-retries”
“retry-interval”	“retry-time-out”	

690 ~~7.2.18.2.1~~ destination-uris (1setOf collection)

691 The CONDITIONALLY REQUIRED "destination-uris" Job Template attribute specifies the
 692 destination of the scan job document data. ~~The mandatory destination URI MUST be~~
 693 ~~supplied. There is a difference between the IPP Scan Services use of this attribute and~~
 694 ~~the FaxOut Services use of this attribute.~~

695 The “destination-uris” attribute MUST be set for a Push Scan and MUST NOT be set for a
 696 Pull Scan. Note that the URL schemes “tel”, “fax”, “sip” or “sips” are reserved for use by
 697 the FaxOut Service and MUST NOT be used with the IPP Scan Service.

698 ~~7.38.3~~ Job Status Attributes

699 The following ~~member~~ attributes are defined in [~~IPPFAX~~PWG5100.15]:
 “destination-statuses” “images-completed” “transmission-status”
 “input-attributes-actual”

700

701 ~~7.48.4~~ IPP Scan Service Description Attributes

702 The following ~~member~~ attributes are defined in [~~IPPFAX~~PWG5100.15]:
 “destination-uri-schemes-supported” “destination-uris-supported”
 (see 7.4.1)

“input-attributes-default” “input-attributes-supported”

“input-color-mode-default

“input-color-~~entrymode~~-supported” “input-content-type-supported”

“input-film-scan-mode-supported”	input-media-supported”
“input-orientation-requested”	“input-quality-supported”
“input-resolution-supported”	“input-scan-regions-supported”
“input-sides-supported”	“multiple-destinations-uris-supported”
“number-of-retries-default”	“number-of-retries-supported”
“retry-interval-default”	“retry-interval-supported”
“retry-time-out-default”	“retry-time-out-supported”

703 **7.4.18.4.1 destination-uri-schemes-supported (1setOf uriScheme)**

704 The CONDITIONALLY REQUIRED "destination-uri-schemes-supported" IPP Scan
705 Service attribute lists the supported "destination-uri" URI schemes. IPP Scan Services that
706 support Push Scan MUST support this attribute. IPP Scan Services MUST support the
707 "http", "https", "ftp" and "ftps" URI schemes. IPP Scan Services MAY support the "smb",
708 "ipp", "ipps" "mailto" and other file transfer URI schemes.

709 IPP Scan Services MUST NOT support the "tel", "fax", "sip" or "sips" URI schemes. These
710 URI schemes are reserved for use by the FaxOut Service. An IPP Scan Service does not
711 ~~provide-satisfy~~ the additional requirements beyond delivering a scanned document to a
712 destination ~~that is required for a FaxOut Service~~ (e.g., durable log).

713 **8.4.2 output-attributes-default (collection)**

714 The CONDITIONALLY REQUIRED "output-attributes-default" attribute defines the default
715 value for the "output-attributes" operation attribute (section 4.4). IPP Scan Services that
716 support the "output-attributes" operation attribute MUST support this attribute.

717 **8.4.3 output-attributes-supported (1setOf keyword)**

718 The CONDITIONALLY REQUIRED "output-attributes-supported" IPP Scan Service
719 attribute lists the supported member elements of the "output-attributes" operational
720 attribute. IPP Scan Services that support "output-attributes" MUST support this attribute.

721

8.5 IPP Scan Service Status Attributes

8.5.1 Job-destination-spooling-supported (type2 keyword)

This attribute indicates whether or not Scan Job Document data is spooled before the document data is delivered to the specified destination(s).

The value of this attribute returned in a Get-Printer-Attributes response MAY depend on the "document-format" attribute supplied in the Get-Printer-Attributes request (see [RFC2911] Section 3.2.5.1 and 6.2).

. If the IPP Scan Service does not support this attribute, then the spooling behavior is assumed to be 'automatic'.

The Get-Printer-Supported-Values operation (see description in [RFC3380]) returns a '1setOf type2 keyword' so that all possible values that the implementation is capable of supporting are indicated.

The standard keyword values are:

Keyword	Description
'spool'	The Scan Service temporarily spools the scan document data until successfully delivered to the specified destinations or the Scan Job has reached a terminating state. For temporary transmission failure on a Push Scan the IPP Scan Service is responsible for retrying document delivery. For temporary transmission failure on a Pull Scan the IPP Scan Service is responsible retaining the document delivery.
'stream'	The amount of document data buffered by the Scan Service is implementation specific and document retransmission may not be possible. For temporary transmission failure on a Push or Pull Scan the IPP Scan Client is responsible for resubmitting the job after the job has been aborted.
'automatic'	The Printer MAY spool and/or stream depending on policy and other factors, such as the document format For temporary transmission failure the IPP Scan Client is responsible for resubmitting the job after the job has been aborted.

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736 **7.58.6 Document Description Attributes**737 ~~7.5.18.6.1~~ **input-attributes-actual (collection)**

738 The **RECOMMENDED** "input-attributes-actual" Document Description attribute
739 [PWG5100.8] section 3 provides a receipt of the "input-attributes" (section 7.1.1) operation
740 attribute values that were used in the ~~Create-Scan-Job~~ **Create-Job** (section 6.2) request
741 that created the Job object. ~~IPP Scan Services SHOULD support this attribute.~~

742 **8.6.2 output-attributes-actual (collection)**

743 The "output-attributes-actual" Document Description attribute [PWG5100.8] section 3
744 provides a receipt of the "output-attributes" (section 4.4) operation attribute values that
745 were used in the Create-Job (section 7.1) request that created the Job object. IPP Scan
746 Services SHOULD support this attribute.

747

8.9. Additional Values and Semantics for Existing Attributes

8.9.1 ipp-features-supported (1setOf type2 keyword)

This specification defines the REQUIRED keyword 'scan' for the "ipp-features-supported" Printer attribute. The IPP Scan Service uses this value to report support for this specification.

8.9.2 job-state-reasons (1setOf type2 keyword)

Table 7 lists the "job-state-reasons" keyword values that are specific to IPP Scan. Other Scan specific keywords are defined in IPP MFD Alerts [PWG5107.3].

Table 8 - IPP Scan "job-state-reasons" Keyword Values

Keyword	Description
waiting-for-user-action	The scan job is awaiting some userintervention to continue processing the job. Note that this is not an error condition and the state of the job remains in the processing state.

9.10. Specification: Bonjour Support

Network scanners are discovered using Bonjour, which is implemented via DNS service discovery and Multicast DNS. All Bonjour-related requirements for IPP Everywhere are also requirements for IPP Scan. For more information, see <http://devimages.apple.com/opensource/BonjourPrinting.pdf>

For more information, see [Clients using Bonjour for discovery can browse for the _scan subtype to limit the list of services to those with scanning capabilities. While additional filtering can be performed using TXT record key values, such filtering is not recommended for general purpose scan Clients since all IPP Scan Services may not be discovered.](#)

768 **9.110.1 Required Service Type**

769 Scanners MUST register the “~~ippscan_tcp~~, ipp_tcp_scan” service type (i.e., IPP type
 770 and scan subtype) to indicate conformance to the Internet Printing Protocol and this IPP
 771 specification.

772 **9.210.2 Required Separate Registrations**

773 Scanners conforming to this IPP Scan spec cannot return multiple TXT records for a
 774 single service name (e.g., as in the case of multiple queues for a single logical device) as
 775 described in Section 9.6 of the Bonjour Printing specification. Rather, scanners MUST
 776 register separate service names for each connected logical device.

777 **9.310.3 Required TXT Record Values**

778 In order to conform to the IPP Scan Specification, a scanner’s TXT record MUST provide
 779 the following keys:

780 **Table 9 - Required Text Record Values**

Key	Description	Default
txtvers	Version of TXT record; MUST be 1.	<u>1</u>
adminurl	The configuration page URL for the Scanner; MUST be identical to the value of the printer-more-info IPP Scanner description attribute.	
representation	A URL to a PNG or ICO file containing a graphical representation of the Scanner.	
rsp	Resource portion of Scanner URI without leading slash.	

Key	Description	Default
ty	The human-readable make and model.	
note	The human-readable location	
pdf	A list of MIME media types supported by the Scanner, separated by commas	
uuid	The value of this key MUST be a universally unique identifier string.	
Color	“T” if the Scanner supports color scanning, “F” if it does not support color.	
Monochrome	“T” if the Scanner supports monochrome scanning, “F” if it does not. Should color supported semantic be used?	
TMA	“T” if the Scanner has a Transparency Media Adaptor (an adaptor for scanning media such as slides and negatives) “F” if it doesn’t.	<u>“F”</u>
Platen	“T” if the Scanner has a traditional scan bed, “F” if it does not.	

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Key	Description	Default
ADF	“S” if the Scanner has a simplex Automatic Document Feeder, “D” if it has a duplexing one . “N” if it doesn’t there is no Automatic Document Feeder.	“N”
Scan2	A comma-delimited list of destination URI schemes supported by the IPP Scan Service, including “ftp”, “ftps”, “http”, “https”, “ipp”, “ipps”, “mailto”, and “smb”. MUST contain the same values as reported by the “destination-uri-schemes-supported” attribute or be the empty string if Push Scanning is not supported.	“” (i.e., Push Scanning not supported)
Duplex	“T” if the Scanner has a duplex capable Automatic Document Feeder, “F” if it doesn’t. Should sides supported semantics be used?	
Camera	“T” if the Scanner has a non-traditional scan bed (such as a stage), “F” if it doesn’t.	

781

782

783 **9.3.410.3.1 Scanner Advertisement**

784 The scanner MUST advertise both an SRV and a TXT record with a name in the form of:

785 <Scanner Name>._scan._ipp._tcp.local._scan._sub._ipp._tcp.local

786 For example: HP Officejet Pro 8500._scan._ipp._tcp.local.

787 In addition, one of the PTR records registered by the scanner MUST use the name:

788 _scan._ipp._tcp.local.

789 ~~9.3.1.1~~10.3.1.1 IPP Scan TXT Records

790 The following provides more details about the TXT records from the above table.

791 ~~9.3.1.2~~10.3.1.2 txtvers

792 This key defines the TXT record version number. Its value must be 1. For example:

793 txtvers=1

794 txtvers SHOULD be the first key/value pair in the TXT record.

795 ~~9.3.1.3~~10.3.1.3 adminurl

796 This key specifies the configuration URL associated with a given scanner. For example:

797 adminurl=http://scanner.local./path/configpage.html

798 In this case, “scanner.local.” is the domain name used by the Target Host in its SRV
799 record. The ending “.” indicates an absolute path. If a port number is not specified, port 80
800 is assumed. The “/path/configpage.html” string is a complete path to the desired web
801 page. Alternatively, the URL could point to a Bonjour-specific configuration page that
802 allows the user to change the scanner’s service name, host name, and location.

803 The user will be taken to this URL when clicking the “Configure” button in the Scan UI. If
804 the user changes the scanner’s host name, the scanner MUST update the adminurl
805 values in all registered TXT records since they will likely contain the old host name.

806 ~~9.3.1.4~~ representation

807 ~~This key specifies a URL to a PNG or ICO file that graphically represents the Scanner. If~~
808 ~~the URL points to a PNG file, the PNG file MUST be 128x128 in size and MUST contain~~
809 ~~an Alpha channel to mask the background surrounding the scanner graphic.~~

810 ~~If the URL points to an ICO file (PREFERRED), the ICO file MUST include the following:~~

811 ~~1. at a minimum MUST include 48x48, 128x128, and 512x512 pixel representations of the scanner~~

812 ~~2. the various resolutions MUST be encoded using the PNG file format~~

813 ~~3. MUST contain an Alpha channel to mask the background surrounding the scanner graphic.~~

814 ~~9.3.1.5~~10.3.1.4 **rsp**

815 This value indicates the full path to a particular scan queue specified by the IPP-SE URL.
816 The value MUST NOT begin with a slash (“/”). For example, if “~~srp~~=queue123” is present,
817 the resulting URL for that ~~print-scan~~ queue would be:

818 `ipp://<hostname>:<port>/queue123`

819 If a scanner requires the string “scan” in the URL path, simply advertise
820 “rp=scan/queue123” so the resulting URL will be:

821 `ipp://<hostname>:<port>/scan/queue123`

822 ~~9.3.1.6~~10.3.1.5 **ty**

823 The value of the “ty” key is a user-readable description of the make and model of the
824 scanner, suitable for display in a user interface when referring to the scanner. For
825 example:

826 `ty=HP Officejet Pro 8500`

827 ~~9.3.1.7~~10.3.1.6 **note**

828 The value of the “note” key is a user-readable string describing the location of the
829 scanner. It is displayed in the Scan UI when browsing. For example:

830 `note=3rd Floor Copy Room`

831 The user SHOULD be able to specify the location of the scanner using this key via the
832 scanner configuration user interface. If no location information is available, the value of
833 this key SHOULD be empty.

834 ~~9.3.1.8~~ **pdf**

835 ~~A list of MIME media types supported by the Scanner, separated by commas. For~~
836 ~~example:~~

837 ~~pdf=application/pdf, image/tiff, image/jpeg, text/text, text/rtf~~

838 ~~9.3.1.9~~10.3.1.7 **uuid**

839 The value of this key MUST be a universally unique identifier string. It can be the MAC
840 address of the device’s network interface. If a scanner has multiple network interfaces,

841 then the same MAC address MUST be used every time the scanner broadcasts its TXT
842 records. For example:

843 uuid=aa:27:f2:d5:05:xy

844 The value of this key uniquely identifies the scanner. If this key is missing, then the
845 scanner cannot be uniquely identified.

846 If the scanner has a USB interface, then the value of this key MUST be the same as the
847 value of the serial number field in the USB device descriptor.

848 If the scanner has a FireWire (IEEE1394) interface, then the value of this key MUST be
849 the same as the value (in hexadecimal) of the GUID field in the FireWire configuration
850 ROM expressed as a string formatted as "00000000-0000-0000-0000-000000000000".

851 The UUID is useful for clients that remember the last Scanner used because it can warn
852 the user if the Scanner has been replaced or changed since their last scan, or if a different
853 Scanner is advertising the same Bonjour name. This reduces the risk of someone
854 scanning with the wrong Scanner.

855 **9.3.1.10 Color**

856 ~~This value is set to "T" if the scanner is capable of scanning Color documents, "F" if it is~~
857 ~~not. For example:~~

858 ~~Color=T~~

859 **9.3.1.11 Monochrome**

860 ~~This value is set to "T" if the scanner is capable of scanning Monochrome (B&W)~~
861 ~~documents, "F" if it is not. For example:~~

862 ~~Monochrome=T~~

863 **9.3.1.12 Glass**

864 ~~This value is set to "T" if the scanner is equipped with a traditional, flat scan bed, "F" if it is~~
865 ~~not. For example:~~

866 ~~Glass=T~~

867 ~~9.3.1.13~~**10.3.1.8 TMA**

868 This value is set to “T” if the scanner is equipped with a Transparency Media Adaptor
869 (used for scanning slides and negatives), “F” if it is not. For example:

870 TMA=T

871 ~~9.3.1.14~~**10.3.1.9 ADF**

872 This value is set to “~~T~~S” if the scanner is equipped with a ~~simplex~~ Automatic Document
873 Feeder, “D” if equipped with a duplexing Automatic Document Feeder, and “NF” if it is
874 no Automatic Document Feeder is present. For example:

875 ADF=~~N~~T

876 **10.3.1.10 Scan2**

877 This value of this key indicates if the IPP Scan Service is capable of Push Scan and if so
878 what URL schemes are supported to deliver the scan document data to its destination.
879 The value is comma-delimited list of destination URI schemes supported by the IPP Scan
880 Service, including "ftp", "ftps", "http", "https", "ipp", "ipps", "mailto", and "smb". The value
881 MUST contain the same values as reported by the "destination-uri-schemes-supported"
882 attribute or be the empty string if Push Scanning is not supported. For example:

883 Scan2=ftp,http

884 **~~9.3.1.15 Duplex~~**

885 ~~This value is set to “T” if the scanner is capable of scanning two-sided documents, “F” if it~~
886 ~~is not. For example:~~

887 ~~Duplex=T~~

888 ~~Note: Duplex is specifically an addition to the ADF flag, since it states that the ADF is~~
889 ~~equipped with a Duplexer. In other words it states that scanning two sides of a document~~
890 ~~placed via ADF is possible without user intervention. Consequently, if the ADF flag is set~~
891 ~~to F, the Duplex Flag MUST also be set to F.~~

892 ~~Regardless of the setting of the Duplex flag in the Bonjour TXT record, a scanner can~~
893 ~~prompt the user to scan the second side of a document/sheet using the Glass, a Simplex~~
894 ~~ADF, or with a Camera.~~

9.3.1.16 Camera

This value is set to “T” if the scanner is capable of scanning from a camera, “F” if it is not.
For example:

Camera=T

Note: the Camera keyword is added to describe non-traditional scan beds that typically a camera (single shot capture) instead of a fixed or movable scanning bar.

The Camera keyword can be used to describe either

4. a camera (single) shot mechanism that replaces the standard Scan mechanism (either from above or below the document) in a scanning device,
5. a digital still or video camera that implements this interface.

10.11. Conformance Requirements

This section summarizes the Conformance Requirements detailed in the definitions in this document for Clients and Printers 002E

10.11.1 Conformance Requirements for this Specification

In order for a Client or aan IPP Scan Service to claim conformance to this specification a Client MUST be able to supply or aan IPP Scan Service MUST support the following:

1. The REQUIRED “printer-uri-supported” values defined in section 4.1.5,
2. The REQUIRED operations defined in sections 4.2 and 6,
 - a. IPP Scan Clients MUST support either Pull (i.e., Get-Next-Document-Images) or Push Scan. Clients SHOULD support both.
 - b. IPP Scan Services MUST support Pull Scan and SHOULD support Push Scan.
 - c. If the IPP Scan Client supports Pull Scanning it MUST determine whether the IPP Scan Service supports it and the corresponding destination URI scheme.
 - a.d. Clients SHOULD support Pull Scanning as a fallback when the IPP Scan Service does not support Push Scanning with the desired destination URI scheme.
3. The REQUIRED IPP Scan Service Description attributes and values defined in sections 4.3 and 7.4,
4. The REQUIRED operation attributes and values defined in sections 4.4 and 7.1,
5. The REQUIRED Job Template attributes and values defined in sections 4.5 and 7.1.2.2,
6. The REQUIRED Job Description attributes and values defined in section 4.6,

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- 927 ~~6.7.~~ The REQUIRED Job Status attributes and values defined in section 4.7,
928 ~~7.8.~~ The REQUIRED document formats and behaviors defined in section 5,
929 ~~8.9.~~ The REQUIRED values defined in section 0,
930 ~~9.10.~~ The internationalization considerations in section 11, and
931 ~~10.11.~~ The security considerations in section 12.

932 ~~10.211.2~~ Conditional Conformance Requirements for IPP Scan Service 933 Objects

934 To claim conformance to this specification, Spooling Services MUST support the
935 following:

- 936 1. Automatic retries and redelivery of whole jobs as defined in section 4.1.1,
- 937 2. The “number-of-retries”, “retry-interval”, and “retry-timeout” Job Template attributes
938 (section 7.1.2.2),
 - 939 ~~3.a.~~ The “number-of-retries-default”, “retry-interval-default”, and “retry-timeout-
940 “retry-timeout-supported” IPP Scan Service Description attributes (section 7.4).
 - 941 ~~4.b.~~ The “number-of-retries-supported”, “retry-interval-supported”, and “retry-
942 timeout-supported” IPP Scan Service Description attributes (section 7.4) which
943 MUST reflect any local regulatory requirements.

944 ~~11.12.~~ Internationalization Considerations

945 For interoperability and basic support for multiple languages, conforming implementations
946 MUST support:

- 947 ~~5.c.~~ The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
948 [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
- 949 ~~6.d.~~ The Unicode Format for Network Interchange [RFC5198] which requires
950 transmission of well-formed UTF-8 strings and recommends transmission of
951 normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

952 Unicode NFC is defined as the result of performing Canonical Decomposition (into base
953 characters and combining marks) followed by Canonical Composition (into canonical
954 composed characters wherever Unicode has assigned them).

955 WARNING – Performing normalization on UTF-8 strings received from IPP Clients and
956 subsequently storing the results (e.g., in IPP Job objects) could cause false negatives in
957 IPP Client searches and failed access (e.g., to IPP Scan Services with percent-encoded
958 UTF-8 URIs now 'hidden').

959 **12.13. Security Considerations**

960 The IPP extensions defined in this document require the same security considerations as
961 defined in the IPP Model and Semantics [RFC2911].

962 **12.13.1 Storing Scan Documents in a Document Repository**

963 Organizations with higher security requirements may require End Users to store their
964 Documents only in the designated Document Repositories for which organizational
965 document access control policies can easily be instrumented. It is the End User's
966 responsibility to ensure that their target document repositories have been configured to
967 support the IPP Scan Service writing user's Scan Document Data into the repository. This
968 implies the requesting user has been authenticated in the same network domain of the
969 Document Repository.

970 **12.13.2 Protection of End User's Scan Documents**

971 An End User's Scan Documents can be protected from disclosure by encrypting the
972 content of the Documents and protected from modification by signing the content of the
973 Documents when these Documents are stored in a repository or being transmitted over a
974 communication link.
975

976 Signing or encrypting Documents stored in a Document Repository requires secure key
977 management which includes the selection, generation, distribution, and destruction of
978 effective signing or encryption of each End User's keys. Signing or encrypting Documents
979 stored in a Document Repository is outside the scope of the IPP Scan Service. It is
980 RECOMMENDED that the End User designates a Document Repository that has their
981 desired level of signing or encryption capabilities.

982 **13.14. IANA Considerations**

983 **13.14.1 Attribute Registrations**

984 The attributes defined in this document will be published by IANA according to the
985 procedures in IPP Model and Semantics [RFC2911] section 6.2 in the following file:

986 <http://www.iana.org/assignments/ipp-registrations>

987 The registry entries will contain the following information:

988	Operation attributes:	Reference
989	-----	-----
990	input-attributes (collection)	[PWG5100.15]
991	input-color-entry <u>input-color-mode</u> (type2 keyword)	[PWG5100.SCAN15]
992	output-compression-quality-factor (integer(0:100))	[PWG5100.SCAN]
993	input-noise-removal <u>noise-removal</u> (integer(0:100))	[PWG5100.SCAN]
994		
995	IPP Scan Service Description attributes:	Reference
996	-----	-----
997	input-color-entry <u>input-color-mode</u> -default (type2 keyword)	
998		[PWG5100.SCAN15]
999	input-color-entry <u>input-color-mode</u> -supported (1setOf type2 keyword)	
1000		[PWG5100.SCAN15]
1001	output-compression-quality-factor-default (integer(0:100))	
1002		[PWG5100.SCAN]
1003	output-compression-quality-factor-supported (rangeOfInteger(0:100))	
1004		[PWG5100.SCAN]
1005	input-noise-removal <u>noise-removal</u> -default (integer(0:100))	
1006		[PWG5100.SCAN]
1007	input-noise-removal <u>noise-removal</u> -supported (rangeOfInteger(0:100))	
1008		[PWG5100.SCAN]
1009		

1010 **13.214.2 Attribute Value Registrations**

1011 The keyword attribute values defined in this document will be published by IANA
 1012 according to the procedures in the IPP Model and Semantics [RFC2911] section 6.1 in the
 1013 following file:

1014 <http://www.iana.org/assignments/ipp-registrations>

1015 The registry entries will contain the following information:

1016	Attributes (attribute syntax)	Reference
1017	Keyword Attribute Value	-----
1018	-----	-----
1019	<u>input-color-type</u> (type2 keyword)	[PWG5100.SCAN]
1020	BlackandWhite1	[PWG5100.SCAN]
1021	Grayscale4	[PWG5100.SCAN]
1022	Grayscale8	[PWG5100.SCAN]
1023	Grayscale16	[PWG5100.SCAN]
1024	<u>RGBr-g-b-24</u>	[PWG5100.SCAN]
1025	<u>RGBr-g-b-48</u>	[PWG5100.SCAN]
1026	<u>RGBr-g-b-a32</u>	[PWG5100.SCAN]

Comment [ZP1]: Fix this

1027	RGB r-g-b-a64	[PWG5100.SCAN]
1028	CMYK c-m-y-k-32	[PWG5100.SCAN]
1029	CMYK c-m-y-k-64	[PWG5100.SCAN]
1030		
1031		
1032	ipp-features-supported (1setOf type2 keyword)	[PWG5100.13]
1033	scan	[PWG5100.SCAN]
1034		
1035	job-state-reasons (1setOf type2 keyword)	[RFC2911]
1036	TBD	[PWG5100.SCAN]

1037 ~~13.3~~14.3 Type2 enum Attribute Value Registrations

1038 The enumerations defined in this document will be published by IANA according to the
1039 procedures in the IPP Model and Semantics [RFC2911] section 6.2 in the following file:

1040 <http://www.iana.org/assignments/ipp-registrations>

1041 The registry entries will contain the following information:

1042	Attributes (attribute syntax)		
1043	Enum Value	Enum Symbolic Name	Reference
1044	-----	-----	-----
1045	TBD		[PWG5100.SCAN]
1046	<any new TBD value>		[PWG5100.SCAN]
1047			
1048			

1049 ~~13.4~~14.4 Operation Registrations

1050 The operations defined in this document will be published by IANA according to the
1051 procedures in the IPP Model and Semantics [RFC2911] section 6.2 in the following file:

1052 <http://www.iana.org/assignments/ipp-registrations>

1053 The registry entries will contain the following information:

1054	Operation Name	Reference
1055	-----	-----
1056	Get-Next-Document-Images	[PWG5100.SCAN]

1057 **14-15. References**1058 **14.115.1 Normative References**

- 1059 [ISO10646] "Information technology -- Universal Coded Character Set (UCS)",
1060 ISO/IEC 10646:2011
- 1061 [ISO32000] "Document management - Portable document format - Part 1: PDF
1062 1.7", ISO/IEC 32000-2008
- 1063 [PWG5100.3] K. Ocke, T. Hastings, "Internet Printing Protocol (IPP): Production
1064 Printing Attributes – Set1", PWG 5100.3-2001, February 2001,
1065 [ftp://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-
1066 5100.3.pdf](ftp://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-5100.3.pdf)
- 1067 [PWG5100.5] D. Carney, T. Hastings, P. Zehler, "Standard for IPP Document
1068 Object", PWG 5100.5-2003, October 2003,
1069 [ftp://ftp.pwg.org/pub/pwg/candidates/cs-ippdocobject10-20031031-
1070 5100.5.pdf](ftp://ftp.pwg.org/pub/pwg/candidates/cs-ippdocobject10-20031031-5100.5.pdf)
- 1071 [PWG5100.7] T. Hastings, P. Zehler, "Standard for The Internet Printing Protocol
1072 (IPP): Job Extensions", PWG 5100.7-2003, October 2003,
1073 [ftp://ftp.pwg.org/pub/pwg/candidates/cs-ippjobext10-20031031-
1074 5100.7.pdf](ftp://ftp.pwg.org/pub/pwg/candidates/cs-ippjobext10-20031031-5100.7.pdf)
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1165 **15-16. Author's Address**

1166 Peter Zehler
1167 Xerox Corp
1168 800 Phillips Rd
1169 M/S 128-25E
1170 Webster, NY 14580

1171 The author would also like to thank the following individuals for their contributions to this
1172 standard:

1173 Michael Sweet (Apple Inc.), Smith Kennedy (Hewlett Packard), Andrew Mitchell (Hewlett
1174 Packard), Ira McDonald (High North)

1175 **~~16. Change History~~**

1176 **~~16.1 November 5, 2013~~**

1177 **~~16.2 Initial Version Started with IPP FaxOut Service December 16, 2013~~**

1178 ~~Updates per Mike Sweet input~~

1179 ~~Updates per IPP meeting reviews~~

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