



The Printer Working Group

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Working Draft**

IPP Scan Service

Status: Prototype

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

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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 an IPP Scan Service that contains the
202 description, processing, and status information. A Document object may have attached
203 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 an IPP Scan Service that contains description,
208 processing, and status information. The Job also contains zero or more Document
209 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 aquired 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.

302 **3.2.5 Scan Aquisition Failure**

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

311 **3.3 Out of Scope**

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

- 314 a. The design of the client's user interface
- 315 b. The methods of performing the physical scans
- 316 c. The IPP Scan Service performing document format conversions. The document
317 formats emitted are limited to those supported by the IPP Scan Service. (i.e.,
318 The Scan Destination handles conversion of documents if a document format
319 other than those supported by the IPP Scan Service is required)

320 **3.4 Design Requirements**

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

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

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

338 **4. IPP Scan Service Definition**

339 **4.1 Scan Job Processing**

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

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

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

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

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

365 **4.1.1 Output Spooling Services**

366 Some Imaging Services have the capability to temporarily spool scan output documents.
367 Spooling services with a value of 'spool' for the "job-destination-spoolingsupported"

368 attribute (see 7.5.1) MUST automatically retry scan delivery upon failure and support
369 multiple destination URIs. Such Imaging Services typically support the PDF
370 ("application/pdf") and/or OpenXPS ("application/openxps") document formats, however
371 they MAY NOT support spooling for all formats. Clients MUST include and IPP Scan
372 Services MUST support the "document-format" operation attributes in Get-Printer-
373 Attributes requests in order to determine the spooling capabilities of the IPP Scan Service
374 for a given format.

375 **4.1.2 Output Streaming Services**

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

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

385 **4.1.3 Job Terminating State**

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

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

401 Jobs in the 'completed' state were successfully processed and transferred to at least one
402 of the Job's destination URIs. The "destination-statuses" Job Status attribute provides
403 detailed information regarding the terminating state of each destination URI. IPP Scan

404 Services MUST report the 'job-completed-with-errors' keyword in the "job-state-reasons"
405 attribute if the Job was not successfully transferred to any destination URI.

406 **4.1.4 Image Acquisition Failure**

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

414 **4.1.5 Job History**

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

416 **4.1.6 IPP Scan Service URIs**

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

421 **4.1.7 Destination URIs**

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

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

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

428 'dav': Scan jobs are sent to the destination address using HTTP Extensions for Distributed
429 Authoring (WebDAV) [RFC2518], [RFC4918].

430 'ipp', 'ipps': Scan jobs are submitted to the destination URI using the Internet Printing Protocol
431 [RFC2911], typically for printing.

432 'mailto': Scan jobs are converted to a supported document format and sent to the destination
433 email address using Multimedia Internet Mail Exchange [RFC2045] attachments.

434 'smb': Scan jobs are sent to the specified Server Message Block/Common Internet File System
435 destination.

436 **4.2 IPP Operations**

437 Table 1 lists the operations for an IPP Scan Service conforming to this IPP Scan Service
 438 specification. The Create-Job and Send-Document (i.e., GetNextDocumentImages)
 439 operations are required, but IPP Scan Services are not required to support multiple
 440 document jobs.

441

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 (O)	PauseScanService	RFC 2911
0x0011	Resume-Printer (O)	ResumeScanService	RFC 2911
0x0013	Set-Printer-Attributes (O)	SetScanServiceElements	RFC 3380
0x0014	Set-Job-Attributes (O)	SetScanJobElements	RFC 3380
0x0015	Get-Printer-Supported- Values (O)	-	RFC 3380
0x0016	Create-Printer- Subscriptions (O)	-	RFC 3995
0x0017	Create-Job-Subscriptions (O)	-	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)	PauseScanService AfterCurrentJob	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)	GetScanDocument Elements	PWG 5100.5

0x0035	Get-Documents (O)	GetScanDocuments	PWG 5100.5
0x0036	Delete-Documents (O)	-	PWG 5100.5
0x0037	Set-Documents-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-Documents (O)	ValidateScanDocumentTicket	PWG 5100.13
0x004A	Get-Next-Documents-Images	GetNextDocumentImages	PWG 5100.SCAN

442 "(O)" = OPTIONAL

443

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

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

448

449 4.3 IPP Scan Service Description Attributes

450 Table 2 lists the REQUIRED IPP Scan Service Description attributes for an IPP Scan
451 Service.

452 **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

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

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

455

456 Note 2: MUST have a value of 1.

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

459 Note 4: CONDITIONALLY REQUIRED for Push Scan

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

461 4.4 IPP Operation Attributes

462 Table 3 lists the REQUIRED operation attributes for an IPP Scan Service.

463 **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

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

465

466 **4.5 IPP Job Template Attributes**

467 Table 4 lists the REQUIRED Job Template attributes for an IPP Scan Service.

468 **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

469 Note 1: Must have a value of 1.

470 Note 2: CONDITIONALLY REQUIRED for Push Scan

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

472 **4.5.1 Other Job Template Attributes**

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

479

480 **4.6 IPP Job Description Attributes**

481 Table 5 lists the REQUIRED Job Description attributes for an IPP Scan Service.

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

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

483 **4.7 IPP Job Status Attributes**

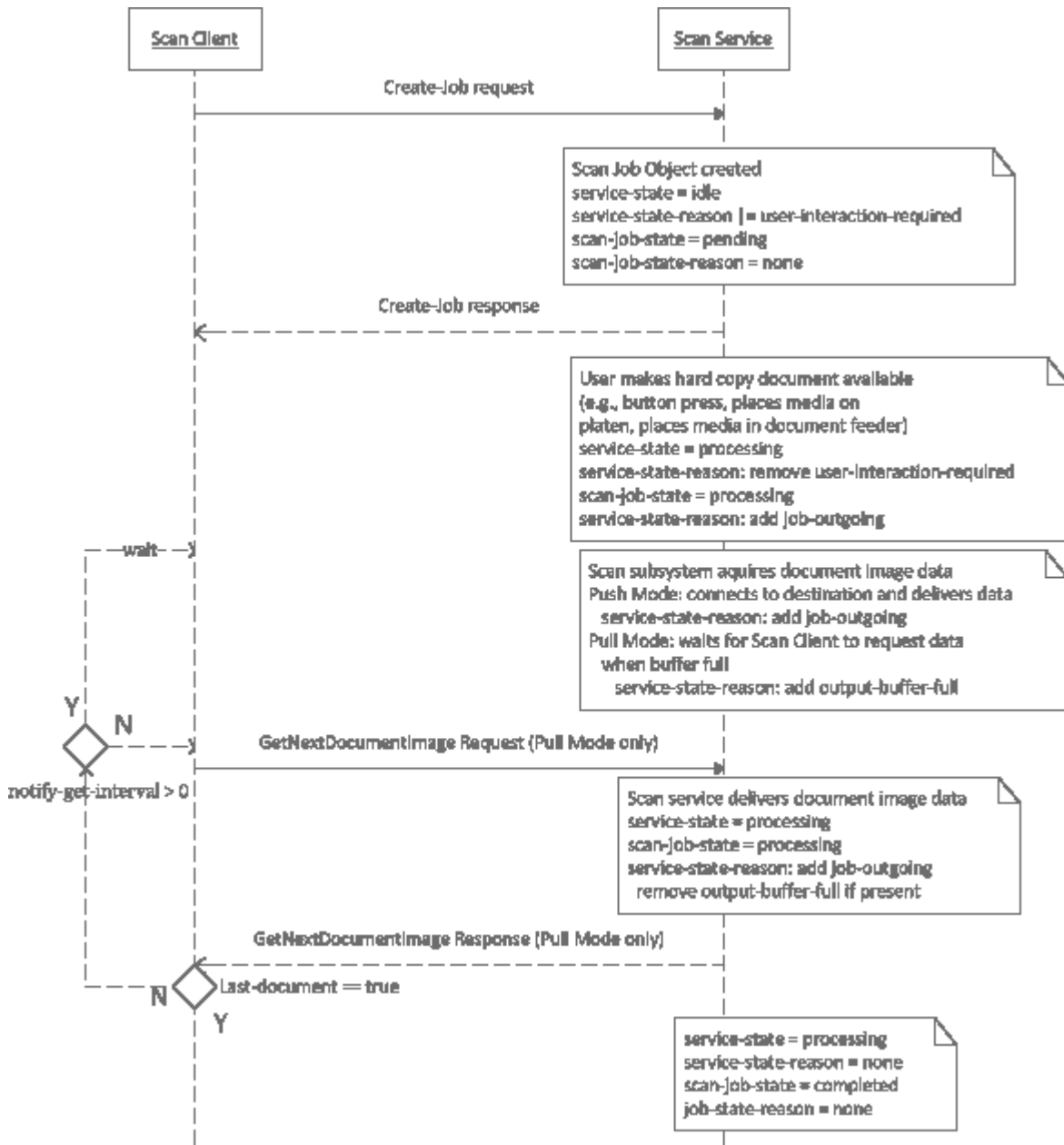
484 Table 6 lists the REQUIRED Job Status attributes for an IPP Scan Service.

485 **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

486 Note 1: Impressions is equivalent to Output Images in the output file(s) delivered to the
487 destination
488



489

490

491

Figure 1 Scan Job Creation Flow Chart

492 **5. Document Formats**

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

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

498 IPP Scan Services **MAY** support generating other documents formats.

499 **6. New Operation**

500 **6.1 Get-Next-Document-Images Operation**

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

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

513 **6.1.1 Get-Next-Document-Images Request**

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

515 **Group 1: Operation Attributes**

516 Natural Language and Character Set:

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

519 Target:

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

524 Requesting User Name:

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

528 Document Format Accepted:

529 The “document-format-accepted (1setOf mimeType)” attributes SHOULD be
530 supplied by the client as described in section 8.1.1. The order of the values
531 specifies the Client’s format preference.

532 get-next-image-wait-mode:

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

537

538 **6.1.2 Get-Next-Document-Images Response**

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

540 **Group 1: Operation Attributes**

541 Status Message:

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

546 Natural Language and Character Set:

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

549 Document Format:

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

553 next-image-get-interval:

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

563 Last-Document:

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

569 **Group 2: Document Description Attributes**

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

571 The number of the document in the Job.

572 **Group 3: Document content**

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

575 **7. Ammended Operation**

576 **7.1 Create-Job Operation**

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

579 **7.1.1 Create-Job Request**

580 The following attributes are part of the Create-Job Request:

581 **Group 1: Operation Attributes**

582 Natural Language and Character Set:

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

585 Target:

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

590 Requesting User Name:

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

594 Job Name:

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

597 Ipp Attribute Fidelity:

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

600 Document Format Accepted:

601 The “document-format-accepted” (1setOf mimeType) attributes SHOULD be
602 supplied by the client as described in section 8.1.1.

603 Input Attributes:

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

607 **Group 2: Job Template Attributes**

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

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

616

617 **7.1.2 Create-Job Response**

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

620 **8. New Attributes**

621 **8.1 Operation Attribute**

622 **8.1.1 document-format-accepted” (1 set of mimeType)**

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

629 **8.1.2 get-next-image-wait-mode (boolean)**

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

633 **8.1.3 input-attributes (collection)**

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

640

641 The following member attributes are defined in [PWG5100.15] and are coherent with
642 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”	

643 The member attributes in the remainder of section 8.1 are defined in [PWG5108.02].

644 The “input-attributes-supported” IPP Scan Service attribute (section 8.4) defines which of
645 the “input-attributes” member attributes are supported.

646 **8.1.3.1 input-color-mode (type2 keyword)**

647 The “input-color-mode” member attribute specifies the color processing mode. Each
648 keyword describes a color encoding, color space, bit depth and samples per pixel

649

650

Table 7 - input-color-mode keywords

651

Keyword	Color Type	Color Encoding	Bit Depth	Samples per pixel
auto	Color/Gray or Binary			
bi-level	Binary		1	1
black-and-white-1	Binary		1	1
color	Color			
grayscale-4	Gray		4	4
grayscale-8	Gray		8	8
grayscale-16	Gray		16	16
monochrome	One color (usually gray)			
r-g-b-24	color	RGB	24	8
r-g-b-32	color	RGB	32	8
r-g-b-48	color	RGB	48	16
r-g-b-64	color	RGB	64	16
c-m-y-k-32	color	CMYK	32	8
c-m-y-k-64	color	CMYK	64	16

652 The “input-color-mode-supported” IPP Scan Service attribute (section 8.4) defines the
653 supported values. IPP Scan Services MUST support and Clients MUST supply this
654 member attribute, either directly or through the “input-attributes-default” IPP Scan Service
655 attribute (section 8.4) value.

656 **8.1.4 next-image-get-interval(integer(0:MAX))**

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

665 **8.1.5 output-attributes (collection)**

666 The OPTIONAL "output-attributes" operation attribute specifies the attributes for image
667 processing to be applied when generating the output images. IPP Scan Services MUST
668 support this attribute.

669

670 **8.1.5.1 output-compression-quality-factor (integer(0:100))**

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

676 The “output-compression-quality-factor-supported” IPP Scan Service attribute (section
677 4.3) specifies whether the IPP Scan Service supports the " output-compression-quality-
678 factor" member attribute.

679 **8.1.5.2 noise-removal (integer(0:100))**

680 The "noise-removal" member attribute contains a normalized integer value used control
681 the amount of random unwanted data to be removed from the scan data. The higher the
682 requested removal value the more aggressively the noise is removed. The value is
683 normalized as an integer between 0 and 100.

684 **8.2 Job Template Attributes**

685 The following attributes are defined in [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”	

686 **8.2.1 destination-uris (1setOf collection)**

687 The CONDITIONALLY REQUIRED "destination-uris" Job Template attribute specifies the
 688 destination of the scan job document data. The “destination-uris” attribute MUST be set
 689 for a Push Scan and MUST NOT be set for a Pull Scan. Note that the URL schemes “tel”,
 690 “fax”, “sip” or “sips” are reserved for use by the FaxOut Service and MUST NOT be used
 691 with the IPP Scan Service.

692 **8.3 Job Status Attributes**

693 The following attributes are defined in [PWG5100.15]:

“destination-statuses”	“images-completed”	“transmission-status”
“input-attributes-actual”		

694

695 **8.4 IPP Scan Service Description Attributes**

696 The following attributes are defined in [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-mode-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”

697 **8.4.1 destination-uri-schemes-supported (1setOf uriScheme)**

698 The CONDITIONALLY REQUIRED "destination-uri-schemes-supported" IPP Scan
699 Service attribute lists the supported "destination-uri" URI schemes. IPP Scan Services that
700 support Push Scan MUST support this attribute. IPP Scan Services MUST support the
701 “http”, “https”, “ftp” and “ftps” URI schemes. IPP Scan Services MAY support the “smb”,
702 “ipp”, “ipps” “mailto” and other file transfer URI schemes.

703 IPP Scan Services MUST NOT support the “tel”, “fax”, “sip” or “sips” URI schemes. These
704 URI schemes are reserved for use by the FaxOut Service. An IPP Scan Service does not
705 satisfy the additional requirements beyond delivering a scanned document to a destination
706 (e.g., durable log).

707 **8.4.2 output-attributes-default (collection)**

708 The CONDITIONALLY REQUIRED “output-attributes-default” attribute defines the default
709 value for the “output-attributes” operation attribute (section 4.4). IPP Scan Services that
710 support the “output-attributes” operation attribute MUST support this attribute.

711 **8.4.3 output-attributes-supported (1setOf keyword)**

712 The CONDITIONALLY REQUIRED "output-attributes-supported" IPP Scan Service
713 attribute lists the supported member elements of the “output-attributes” operational
714 attribute. IPP Scan Services that support “output-attributes” MUST support this attribute.

715

716 **8.5 IPP Scan Service Status Attributes**

717 **8.5.1 Job-destination-spooling-supported (type2 keyword)**

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

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

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

725 The Get-Printer-Supported-Values operation (see description in [RFC3380]) returns a
726 '1setOf type2 keyword' so that all possible values that the implementation is capable of
727 supporting are indicated.

728 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.

729 **8.6 Document Description Attributes**

730 **8.6.1 input-attributes-actual (collection)**

731 The RECOMMENDED "input-attributes-actual" Document Description attribute
732 [PWG5100.8] section 3 provides a receipt of the "input-attributes" (section 7.1.1) operation
733 attribute values that were used in the Create-Job (section 6.2) request that created the
734 Job object.

735 **8.6.2 output-attributes-actual (collection)**

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

740

741 **9. Additional Values and Semantics for Existing Attributes**

742 **9.1 ipp-features-supported (1setOf type2 keyword)**

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

746 **9.2 job-state-reasons (1setOf type2 keyword)**

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

749 **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.

750

751

752 **10. Specification: Bonjour Support**

753 Network scanners are discovered using Bonjour, which is implemented via DNS service
754 discovery and Multicast DNS. All Bonjour-related requirements for IPP Everywhere are
755 also requirements for IPP Scan. For more information, see
756 <http://devimages.apple.com/opensource/BonjourPrinting.pdf> Clients using Bonjour for
757 discovery can browse for the _scan subtype to limit the list of services to those with
758 scanning capabilities. While additional filtering can be performed using TXT record key
759 values, such filtering is not recommended for general purpose scan Clients since all IPP
760 Scan Services may not be discovered.

761 **10.1 Required Service Type**

762 Scanners MUST register the "_ipp._tcp._scan" service type (i.e., IPP type and scan
763 subtype) to indicate conformance to the Internet Printing Protocol and this IPP
764 specification.

765 **10.2 Required Separate Registrations**

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

770 **10.3 Required TXT Record Values**

771 In order to conform to the IPP Scan Specification, a scanner's TXT record MUST provide
772 the following keys:

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

Key	Description	Default
txtvers	Version of TXT record; MUST be 1.	1
adminurl	The configuration page URL for the Scanner; MUST be identical to the value of the printer-more-info IPP Scanner description attribute.	
rs	Resource portion of Scanner URI without leading slash.	
ty	The human-readable make and model.	
note	The human-readable location	

Key	Description	Default
uuid	The value of this key MUST be a universally unique identifier string.	
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.	“F”
ADF	“S” if the Scanner has a simplex Automatic Document Feeder, “D” if it has a duplexing one, “N” if 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)

774

775

776 **10.3.1 Scanner Advertisement**

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

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

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

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

781 `_scan._ipp._tcp.local.`

782 **10.3.1.1 IPP Scan TXT Records**

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

784 **10.3.1.2 txtvers**

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

786 `txtvers=1`

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

788 **10.3.1.3 adminurl**

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

790 `adminurl=http://scanner.local./path/configpage.html`

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

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

799 **10.3.1.4 rs**

800 This value indicates the full path to a particular scan queue specified by the IPP-SE URL.
801 The value MUST NOT begin with a slash (“/”). For example, if “`sp=queue123`” is present,
802 the resulting URL for that scan queue would be:

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

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

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

807 10.3.1.5 ty

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

811 ty=HP Officejet Pro 8500

812 10.3.1.6 note

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

815 note=3rd Floor Copy Room

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

819 10.3.1.7 uuid

820 The value of this key MUST be a universally unique identifier string. It can be the MAC
821 address of the device’s network interface. If a scanner has multiple network interfaces,
822 then the same MAC address MUST be used every time the scanner broadcasts its TXT
823 records. For example:

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

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

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

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

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

836 10.3.1.8 TMA

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

839 TMA=T

840 10.3.1.9 ADF

841 This value is set to “S” if the scanner is equipped with a simplexAutomatic Document
842 Feeder, “D” if equipped with a duplexing Automatic Document Feeder, and “N” if no
843 Automatic Document Feeder is present. For example:

844 ADF=N

845 10.3.1.10 Scan2

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

852 Scan2=ftp,http

853 11. Conformance Requirements

854 This section summarizes the Conformance Requirements detailed in the definitions in this
855 document for Clients and Printers002E

856 11.1 Conformance Requirements for this Specification

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

- 859 1. The REQUIRED “printer-uri-supported” values defined in section 4.1.5,
- 860 2. The REQUIRED operations defined in sections 4.2 and 6,
 - 861 a. IPP Scan Clients MUST support either Pull (i.e., Get-Next-Document-Images) or
862 Push Scan. Clients SHOULD support both.
 - 863 b. IPP Scan Services MUST support Pull Scan and SHOULD support Push Scan.

- 864 c. If the IPP Scan Client supports Pull Scanning it MUST determine whether the
865 IPP Scan Service supports it and the corresponding destination URI scheme.
- 866 d. Clients SHOULD support Pull Scanning as a fallback when the IPP Scan
867 Service does not support Push Scanning with the desired destination URI
868 scheme.
- 869 3. The REQUIRED IPP Scan Service Description attributes and values defined in
870 sections 4.3 and 7.4,
- 871 4. The REQUIRED operation attributes and values defined in sections 4.4 and 7.1,
- 872 5. The REQUIRED Job Template attributes and values defined in sections 4.5 and
873 7.1.2.2,
- 874 6. The REQUIRED Job Description attributes and values defined in section 4.6,
- 875 7. The REQUIRED Job Status attributes and values defined in section 4.7,
- 876 8. The REQUIRED document formats and behaviors defined in section 5,
- 877 9. The REQUIRED values defined in section 0,
- 878 10. The internationalization considerations in section 11, and
- 879 11. The security considerations in section 12.

880 **11.2 Conditional Conformance Requirements for IPP Scan Service Objects**

881 To claim conformance to this specification, Spooling Services MUST support the
882 following:

- 883 1. Automatic retries and redelivery of whole jobs as defined in section 4.1.1,
- 884 2. The “number-of-retries”, “retry-interval”, and “retry-timeout” Job Template attributes
885 (section 7.1.2.2),
- 886 a. The “number-of-retries-default”, “retry-interval-default”, and “retry-timeout-“retry-
887 timeout-supported” IPP Scan Service Description attributes (section 7.4).
- 888 b. The “number-of-retries-supported”, “retry-interval-supported”, and “retry-timeout-
889 supported” IPP Scan Service Description attributes (section 7.4) which MUST
890 reflect any local regulatory requirements.

891 **12. Internationalization Considerations**

892 For interoperability and basic support for multiple languages, conforming implementations
893 MUST support:

- 894 c. The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
895 [STD63] encoding of Unicode [UNICODE] [ISO10646]; and

896 d. The Unicode Format for Network Interchange [RFC5198] which requires
897 transmission of well-formed UTF-8 strings and recommends transmission of
898 normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

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

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

906 **13. Security Considerations**

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

909 **13.1 Storing Scan Documents in a Document Repository**

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

917 **13.2 Protection of End User's Scan Documents**

918 An End User's Scan Documents can be protected from disclosure by encrypting the
919 content of the Documents and protected from modification by signing the content of the
920 Documents when these Documents are stored in a repository or being transmitted over a
921 communication link.
922

923 Signing or encrypting Documents stored in a Document Repository requires secure key
924 management which includes the selection, generation, distribution, and destruction of
925 effective signing or encryption of each End User's keys. Signing or encrypting Documents
926 stored in a Document Repository is outside the scope of the IPP Scan Service. It is

927 RECOMMENDED that the End User designates a Document Repository that has their
928 desired level of signing or encryption capabilities.

929 **14. IANA Considerations**

930 **14.1 Attribute Registrations**

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

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

934 The registry entries will contain the following information:

935	Operation attributes:	Reference
936	-----	-----
937	input-attributes (collection)	[PWG5100.15]
938	input-color-mode (type2 keyword)	[PWG5100.15]
939	output-compression-quality-factor (integer(0:100))	[PWG5100.SCAN]
940	noise-removal (integer(0:100))	[PWG5100.SCAN]
941		
942	IPP Scan Service Description attributes:	Reference
943	-----	-----
944	input-color-mode-default (type2 keyword)	[PWG5100.15]
945	input-color-mode-supported (1setOf type2 keyword)	[PWG5100.15]
946	output-compression-quality-factor-default (integer(0:100))	
947		[PWG5100.SCAN]
948	output-compression-quality-factor-supported (rangeOfInteger(0:100))	
949		[PWG5100.SCAN]
950	noise-removal-default (integer(0:100))	[PWG5100.SCAN]
951	noise-removal-supported (rangeOfInteger(0:100))	[PWG5100.SCAN]
952		

953 **14.2 Attribute Value Registrations**

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

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

958 The registry entries will contain the following information:

959	Attributes (attribute syntax)	
960	Keyword Attribute Value	Reference
961	-----	-----
962	input-color-mode (type2 keyword)	[PWG5100.SCAN]
963	black-and-white-1	[PWG5100.SCAN]
964	grayscale-4	[PWG5100.SCAN]
965	grayscale-8	[PWG5100.SCAN]
966	grayscale-16	[PWG5100.SCAN]
967	r-g-b-24	[PWG5100.SCAN]
968	r-g-b-32	[PWG5100.SCAN]
969	r-g-b-48	[PWG5100.SCAN]
970	r-g-b-64	[PWG5100.SCAN]
971	c-m-y-k-32	[PWG5100.SCAN]
972	c-m-y-k-64	[PWG5100.SCAN]
973		
974		
975	ipp-features-supported (1setOf type2 keyword)	[PWG5100.13]
976	scan	[PWG5100.SCAN]
977		
978	job-state-reasons (1setOf type2 keyword)	[RFC2911]
979	TBD	[PWG5100.SCAN]

980 **14.3 Type2 enum Attribute Value Registrations**

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

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

984 The registry entries will contain the following information:

985	Attributes (attribute syntax)	
986	Enum Value	Enum Symbolic Name
987	-----	-----
988	TBD	[PWG5100.SCAN]
989	<any new TBD value>	[PWG5100.SCAN]
990		
991		

992 **14.4 Operation Registrations**

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

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

996 The registry entries will contain the following information:

997	Operation Name	Reference
998	-----	-----
999	Get-Next-Document-Images	[PWG5100.SCAN]

1000 15. References

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