The Printer Working Group

November 5, 2013
Working Draft

IPP Scan Service

Status: Initial

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

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ftp://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippscan10-20131005.docx
ftp://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippscan10-20131005.pdf

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The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology Organization (ISTO) with member organizations including printer manufacturers, print server developers, operating system providers, network operating systems providers, network connectivity vendors, and print management application developers. The group is chartered to make printers and the applications and operating systems supporting them work together better. All references to the PWG in this document implicitly mean "The Printer Working Group, a Program of the IEEE ISTO." In order to meet this objective, the PWG will document the results of their work as open standards that define print related protocols, interfaces, procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from the interoperability provided by voluntary conformance to these standards.

In general, a PWG standard is a specification that is stable, well understood, and is technically competent, has multiple, independent and interoperable implementations with substantial operational experience, and enjoys significant public support.

For additional information regarding the Printer Working Group visit:

http://www.pwg.org

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About the Internet Printing Protocol Work Group

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

For additional information regarding IPP visit:

http://www.pwg.org/ipp/

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

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1. Introduction

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

2. Terminology

2.1 Conformance Terminology

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

2.2 Scanning Terminology

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

This document also defines the following terms in order to specify unambiguous conformance requirements:

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

Document: An object created and managed by a Scan Service that contains the description, processing, and status information. A Document object may have attached data and is bound to a single Job.

Imaging Device: A logical or physical device that supports printing, scanning, and other imaging services.

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

Job: An object created and managed by a Scan Service that contains description, processing, and status information. The Job also contains zero or more Document objects.

Job Description: Attributes supplied by the Client or end user including job processing instructions which are intended to override any Printer object defaults and/or instructions embedded within the document data (IPP Model and Semantics [RFC2911]).

Job Template: Attributes describing the Job object's identification, state, size, etc. (IPP Model and Semantics [RFC2911])

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

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

Physical Device: a hardware implementation of a endpoint device, e.g., a marking engine, a fax modem, etc.

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

Spooling Device: An Imaging Device that stores a Job's document data prior to processing.

Streaming Device: An Imaging Device that processes a Job's document data as it is received from the Client.

2.3 Acronyms and Organizations

IANA: Internet Assigned Numbers Authority, http://www.iana.org/

IETF: Internet Engineering Task Force, http://www.ietf.org/

ISO: International Organization for Standardization, http://www.iso.org/

PWG: Printer Working Group, http://www.pwg.org/

3. Requirements

3.1 Rationale for the IPP Scan Service

The Internet Printing Protocol Version 2.0 Second Edition [PWG5100.12] defines a collection of existing IPP specifications that form the basis for IPP/2.0.

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

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

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

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

3.2 Use Cases

3.2.1 Mobile User

Andrew has a WiFi-capable tablet computing device. While traveling he wants to be able use a multi-function device at the hotel to scan in his receipts to prepare his expense report.

3.2.2 Home/Family User

Melissa uses a family computer for her homework assignments as well as her artistic activities. She uses her scanner to scan in homework documents as well as the drawings and paintings she does on paper.

3.2.3 Business User

Julia has a computer managed by her company's IT department. She scans documents, proposals, invoices, and other work-related documents onto her computer using one of several shared network scanners.

3.3 Out of Scope

The design of the client's user interface and the methods of performing scans are out of scope for this specification.

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 semantic model for scanning.
2. Scan should map cleanly to the existing IPP protocol binding
3. Push and pull scanning are required.
4. The Client can specify one or more destinations.
5. The Scan Service needs to support a minimum set of document formats
6. The Scan Destination handles conversion of documents if a document format other than those supported by the Scan Service is required.
7. The Scan Service can stream basic page-based raster data.
8. The Client resubmits jobs when the Scan Service is unable to deliver the document(s) to the destination(s).
9. The Client can monitor the status of transmission to each destination.
10. The Client can request identification of the Imaging Device.

4. Scan Service Definition

4.1 Scan Job Processing

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

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

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

When supported by the Scan Service, Scan Jobs can also be directed to multiple destinations. This requires some additional state information to manage the transmission of the job to each destination.

Just as with printing attribute fidelity specified with the "ipp-attribute-fidelity" [RFC2911] and "job-mandatory-attributes" [PWG5100.7] operation attributes applies only when a Job

is created - Scan Services indicate that fidelity was not honored during transmission by reporting the 'job-completed-with-warnings' keyword in the "job-state-reasons" Job attribute.

4.1.1 Spooling Devices

Some Imaging Devices have the capability to temporarily spool scan jobs. Spoolinh devices MUST automatically retry scan delivery upon failure and support multiple destination URIs. Such Imaging Devices typically support the PDF ("application/pdf") and/or OpenXPS ("application/openxps") document formats, however they MAY NOT support spooling for all formats. Clients MUST include and Scan Services MUST support the "document-format" operation attributes in Get-Printer-Attributes requests in order to determine the spooling capabilities of the Scan Service for a given format.

Comment [PZ1]: Is seem that inspecting destination/desination-uris is insufficient to discriminate between spooling and streaming devices. Is another attribute required?

Comment [PZ2]: Destination-uri is much more flexible than destination. We should deprecate destination and exclusively use destination-uri across all appropriate services in the PWG.

4.1.2 Streaming Devices

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

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

Comment [PZ3]: Will attribute coloring be used to discriminate spool vs stream document formats or will pdl specific service level attributes be used?

4.1.3 Job Terminating State

The terminating state of an IPP Scan Job reflects the final disposition of the Job. Jobs in the ‘canceled’ state were canceled by a User using the Cancel-Job, Cancel-Jobs, or Cancel-My-Jobs operations, regardless of whether any or all of the Job has been processed or partially transferred to its destination URI(s). The “destination-statuses” Job Description attribute (section **Error! Reference source not found.**~~7.3.1~~) provides detailed information regarding the progress of the job prior to cancellation with the value of the "destination-state" member attribute set to 'completed' for Jobs that were completely sent to the destination or 'canceled' otherwise.

Jobs in the ‘aborted’ state were aborted by the IPP Scan service itself, typically due to a fatal processing error or a failed transfer to any of a Job’s destination URIs. The “destination-statuses” Job Description attribute (section **Error! Reference source not found.**~~7.3.1~~) provides detailed information regarding the progress of the Job prior to being aborted by the service with the value of the "destination-state" member attribute set to

'completed' for Jobs that were completely sent to the destination or 'aborted' otherwise. The “job-state-reasons” Job Description attribute will contain the keyword ‘destination-uri-failed’ if the Job was aborted due to a transfer error to one or more destination URIs.

Jobs in the ‘completed’ state were successfully processed and transferred to at least one of the Job’s destination URIs. The “destination-statuses” Job Description attribute (section **Error! Reference source not found.**~~7.3.1~~) provides detailed information regarding the terminating state of each destination URI. Scan Services MUST report the 'job-completed-with-errors' keyword in the "job-state-reasons" attribute if the Job was not successfully transferred to any destination URI.

4.1.4 Job History

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

4.1.5 Scan Service URIs

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

4.1.6 Destination URIs

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

‘ftp, ‘sftp’: Scan jobs are sent to the destination address using the File Transfer Protocol [RFC1738].

‘http, ‘https’: Scan jobs are sent to the destination address using the hypertext Transfer Protocol [RFC1738], [RFC2616], [RFC2817].

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

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

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

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

4.2 IPP Operations

Table 1 lists the operations for a Scan Service conforming to this Scan service specification. The Create-Job and Send-Document (i.e., GetNextScanDocument) operations are required, but Scan Services are not required to support multiple document jobs.

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
0x0006	Send-Document	GetNextScanDocument	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	-	RFC 3995

Comment [PZ4]: New operation required for pull scanning

	(O)		
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
0x0033	Cancel-Document (O)	CancelScan	PWG 5100.5

		Document	
0x0034	Get-Document-Attributes (O)	GetScanDocument Elements	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

346 "(O)" = OPTIONAL

347

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

Comment [PZ5]: Is there a reason for this restriction

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

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4.3 IPP Scan Service Description Attributes

Table 2 lists the REQUIRED Scan Service Description attributes for a Scan Service.

Table 2 - Required Scan Service Description Attributes

Attribute	Reference
charset-configured	RFC 2911
charset-supported	RFC 2911
color-supported (note 3)	RFC 2911
compression-supported	RFC 2911
copies-default (note 2)	RFC 2911
copies-supported (note 2)	RFC 2911
destination-uri-schemes-supported	PWG 5100.FAX
document-format-default	RFC 2911
document-format-supported	RFC 2911
generated-natural-language-supported	RFC 2911
input-attributes-default	PWG 5100.FAX
input-attributes-supported	PWG 5100.FAX
input-color-mode-supported	PWG 5100.FAX
input-media-supported	PWG 5100.FAX
input-orientation-requested-supported	PWG 5100.FAX
input-quality-supported	PWG 5100.FAX
input-resolution-supported	PWG 5100.FAX
input-sides-supported	PWG 5100.FAX
input-source-supported	PWG 5100.FAX

ipp-extensions-supported	PWG 5100.13
ipp-versions-supported	RFC 2911
job-ids-supported	PWG 5100.11
media-bottom-margin-supported	PWG 5100.13
media-col-database	PWG 5100.11
media-col-default	PWG 5100.3
media-col-supported	PWG 5100.3
media-default	RFC 2911
media-left-margin-supported	PWG 5100.13
media-right-margin-supported	PWG 5100.13
media-size-supported	PWG 5100.3
media-supported	RFC 2911
media-top-margin-supported	PWG 5100.13
multiple-destination-uris-supported	PWG 5100.FAX
multiple-document-handling-supported (note 1)	RFC 2911
multiple-document-jobs-supported	RFC 2911
multiple-operation-timeout	RFC 2911
multiple-operation-timeout-action	PWG 5100.13
natural-language-configured	RFC 2911
number-of-retries-default	PWG 5100.FAX
number-of-retries-supported (note 5)	PWG 5100.FAX
operations-supported	RFC 2911
overrides-supported	PWG 5100.6

Comment [PZ6]: Probably not needed

Comment [PZ7]: Probably not needed

page-ranges-supported	RFC 2911
print-quality-default	RFC 2911
print-quality-supported	RFC 2911
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 4)	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-resolution-default	RFC 2911
printer-resolution-supported	RFC 2911
printer-state	RFC 2911
printer-state-change-date-time	RFC 3995

Comment [PZ8]: Only useful for overrides?

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 3)	PWG 5102.4
queued-job-count	RFC 2911
retry-interval-default (note 5)	PWG 5100.FAX
retry-interval-supported (note 5)	PWG 5100.FAX
retry-time-out-default (note 5)	PWG 5100.FAX
retry-time-out-supported (note 5)	PWG 5100.FAX
uri-security-supported	RFC 2911
uri-authentication-supported	RFC 2911
which-jobs-supported	PWG 5100.11

Note 1: CONDITIONALLY REQUIRED for Scan Services that support the "application/openxps" "application/pdf" or multipage “image/tiff” MIME media types.

Note 2: Always one copy for scan jobs.

Note 3: Defines color support of the Scan Service, not of the recipient.

Note 4: MUST include “destination-uri” in order to filter capabilities by URI scheme.

Note 5: CONDITIONALLY REQUIRED for Spooling Devices

4.4 IPP Operation Attributes

Table 3 lists the REQUIRED operation attributes for a Scan Service.

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
first-job-id	RFC 2911
input-attributes (note 1)	PWG 5100.FAX
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

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

4.5 IPP Job Template Attributes

Table 4 lists the REQUIRED Job Template attributes for a Scan Service.

Table 4 - Required Job Template Attributes

Attribute	Reference
copies (note 2)	RFC 2911
destination-uris	PWG 5100.FAX
media	RFC 2911
media-col	PWG 5100.3
media-col.media-bottom-margin	PWG 5100.13
media-col.media-left-margin	PWG 5100.13
media-col.media-right-margin	PWG 5100.13
media-col.media-size	PWG 5100.3
media-col.media-top-margin	PWG 5100.13
multiple-document-handling (note 1)	RFC 2911
number-of-retries (note 3)	PWG 5100.FAX
page-ranges (note 1)	RFC 2911
print-quality	RFC 2911
printer-resolution	RFC 2911
retry-interval (note 3)	PWG 5100.FAX
retry-time-out (note 3)	PWG 5100.FAX

Note 1: CONDITIONALLY REQUIRED for Scan Services that support the "application/openxps", "application/pdf", or multipage “image/tiff” MIME media types.

Note 2: Always one copy for fax jobs.

Note 3: CONDITIONALLY REQUIRED for Spooling Devices

4.5.1 Other Job Template Attributes

Scan Services MAY support additional Job Template attributes such as “imposition-template”, “number-up”, “orientation-requested”, “overrides”, “presentation-direction-number-up”, “print-color-mode”, “print-content-optimize”, “print-rendering-intent”, and so forth. These attributes are applied by the Scan Service when generating the content to be delivered to the destination, just as if the content was being printed.

4.6 IPP Job Description Attributes

Table 5 lists the REQUIRED Job Description attributes for a Scan Service.

Table 5 - Required Job Description Attributes

Attribute	Source
compression-supplied	PWG 5100.7
date-time-at-completed	RFC 2911
date-time-at-creation	RFC 2911
date-time-at-processing	RFC 2911
destination-statuses	PWG 5100.FAX
document-format-supplied	PWG 5100.7
document-format-version-supplied	PWG 5100.7
document-name-supplied	PWG 5100.7
job-id	RFC 2911
job-impressions	RFC 2911
job-impressions-completed	RFC 2911
job-name	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

Comment [PZ9]: In a scan service is this equivalent to Job-Images

job-uuid	PWG 5100.13
time-at-completed	RFC 2911
time-at-creation	RFC 2911
time-at-processing	RFC 2911

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5. Document Formats

Scan Services MUST support documents conforming to the PWG Raster Format [PWG5102.4] ("image/pwg-raster").

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

IPP/2.1 and IPP/2.2 Scan Services MUST and IPP/2.0 Scan Services SHOULD support documents conforming to Document management — Portable document format — Part 1: PDF 1.7 [ISO32000] ("application/pdf"). IPP/2.0, IPP/2.1, and IPP/2.2 Scan Services are defined in IPP/2.0 Second Edition [PWG5100.12].

Scan Services MAY support other documents formats.

5.1 Document Conversion

Scan Services SHOULD support conversion of supported document formats into Portable Document Format: Image-Streamable (PDF/is) [PWG5102.3] or Document management — Portable document format — Part 1: PDF 1.7 [ISO32000] ("application/pdf") files for 'mailto' destinations.

6. New Operation

6.1 Get-Next-Scan-Document Operation

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

A client SHOULD check to see if the Scan Service supports the Get-Next-Scan-Document operation by querying the values of the "operations-supported" Scan Service Description attribute.

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

6.1.1 Get-Next-Scan-Document Request

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

Group 1: Operation Attributes

Natural Language and Character Set:

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

Target:

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

Requesting User Name:

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

6.1.2 Get-Next-Scan-Document Response

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

Group 1: Operation Attributes

Status Message:

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

Natural Language and Character Set:

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

Last-Document:

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

Group 2: Document Description Attributes

“document-number (integer(1:MAX))”

The number of the document in the Job.

Group 3: Document content

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

6.2 Create-Scan-Job Operation

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

6.2.1 Create-Scan-Job Request

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

Group 1: Operation Attributes

Natural Language and Character Set:

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

Target:

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

Requesting User Name:

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

Job Name:

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

Ipp Attribute Fidelity:

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

Input Attributes:

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

Group 2: Job Template Attributes

The client OPTIONALLY supplies a set of Job Template attributes as defined in section 7.1.1.3~~7.2~~. If the client is not supplying any Job Template attributes in the request, the client SHOULD omit Group 2 rather than sending an empty group. However, a Printer object MUST be able to accept an empty group.

6.2.2 Create-Scan-Job Response

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

7. New Attributes

7.1 Operation Attribute

7.1.1 input-attributes (collection)

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

The following member attributes are defined in [RFC2911]:

“input-color-mode”	“input-orientation-requested”	“input-media”
“input-media-type”	“input-quality”	“input-resolution”
“input-sides”		

The following member attributes are defined in [IPPFAX]:

“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-scaling-height”	input-scaling-width”	“Input-scan-regions”
“input-sharpness”	“input-source”	

The member attributes in the remainder of section 7.1.1 are defined in [PWG5108.02].

The “input-attributes-supported” Scan Service attribute (section **Error! Reference source not found.**~~7.4.8~~) defines which of the "input-attributes" member attributes are supported.

7.1.1.1 input-color-entry (type2 keyword)

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

506

Keyword	Color Type	Color Encoding	Bit Depth	Samples per pixel
BlackandWhite1	Binary		1	1
Grayscale4	Gray		4	4
Grayscale8	Gray		8	8
Grayscale16	Gray		16	16
RGB24	color	RGB	24	8
RGB48	color	RGB	48	16
RGBa32	color	RGB	32	8
RGBa64	color	RGB	64	16
CMYK32	color	CMYK	32	8
CMYK64	color	CMYK	64	16

The "input-color-entry-supported" Scan Service attribute (section **Error! Reference source not found.**~~7.4.9~~) defines the supported values. Scan Services MUST support and Clients MUST supply this member attribute, either directly or through the "input-attributes-default" Scan Service attribute (section **Error! Reference source not found.**~~7.4.6~~) value.

7.1.1.2 input-compression-quality-factor (integer(0:100))

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

The "input-compression-quality-factor-supported" Scan Service attribute (section **Error! Reference source not found.**~~7.4.8~~) specifies whether the Scan Service supports the " input-compression-quality-factor" member attribute.

7.1.1.3 input-noise-removal (integer(0:100))

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

7.2 Job Template Attributes

The following member attributes are defined in [IPPFAX]:

"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"	

Note 1: The "post-dial-string", "pre-dial-string" and "t33-subaddesss MUST NOT be used for the Scan Service.

529 **7.2.1 destination-uris (1setOf collection)**

530 The REQUIRED "destination-uris" Job Template attribute specifies the destination of the
531 scan job document data. The mandatory destination URI MUST be supplied. There is a
532 difference between the Scan Services use of this attribute and the FaxOut Services use of
533 this attribute. For the Scan Service the member attributes “pre-dial-string”, “post-dial-
534 string” and “t33-subaddress” MUST NOT be supplied by the client.

535 ## 7.3 Job Description Attributes

536 The following member attributes are defined in [IPPFAX]:

“destination-statuses” “images-completed” “transmission-status”

“input-attributes-actual”

537

538 ## 7.4 Scan Service Description Attributes

539 The following member attributes are defined in [IPPFAX]:

“destination-uri-schemes-supported” (see 7.4.1)	“destination-uris-supported”
“input-attributes-default”	“input-attributes-supported”
“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-regios-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”

7.4.1 destination-uri-schemes-supported (1setOf uriScheme)

The REQUIRED "destination-rui-schemes-supported" Scan Service attribute lists the supported "destination-uri" URI schemes. Scan Services differ from FaxOut services in that the Scan Services MUST NOT support the “tel”, “sip” or “sips” URI schemes. Scan Services MAY support the “http”, “https”, “ftp”, “ftps”, “smb”, “ipp”, “ipps” and “mailto” URI schemes.

7.5 Document Description Attributes

7.5.1 input-attributes-actual (collection)

The "input-attributes-actual" Document Description attribute provides a receipt of the "input-attributes" (section 7.1.1) operation attribute values that were used in the Create-Scan-Job (section 6.2) request that created the Job object. Scan Services SHOULD support this attribute.

8. Additional Values and Semantics for Existing Attributes

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

This specification defines the REQUIRED keyword ‘scan' for the "ipp-features-supported" Printer attribute.

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

Table 6~~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 6~~7~~ - IPP Scan "job-state-reasons" Keyword Values

Keyword	Description
TBD	

9. Conformance Requirements

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

9.1 Conformance Requirements for this Specification

In order for a Client or a Scan Service to claim conformance to this specification a Client MUST be able to supply or a 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,
3. The REQUIRED Scan Service Description attributes and values defined in sections 4.3 and 7.4~~7.3.2~~,
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 7.1.1.3~~7.2~~,
6. The REQUIRED Job Description attributes and values defined in section 4.6,
7. The REQUIRED document formats and behaviors defined in section 5,
8. The REQUIRED values defined in section 0,
9. The internationalization considerations in section 10, and
10. The security considerations in section 11.

9.2 Conditional Conformance Requirements for Scan Service Objects

To claim conformance to this specification, Spooling Devices MUST support the following:

1. Automatic retries and redelivery of whole jobs as defined in section 4.1.1,
2. The "number-of-retries", "retry-interval", and "retry-timeout" Job Template attributes (section 7.1.1.3~~7.2~~),
3. The "number-of-retries-default", "retry-interval-default", and "retry-timeout-"retry-timeout-supported" Scan Service Description attributes (section 7.4~~7.3.2~~).
4. The "number-of-retries-supported", "retry-interval-supported", and "retry-timeout-supported" Scan Service Description attributes (section 7.4~~7.3.2~~) which MUST reflect any local regulatory requirements.

10. Internationalization Considerations

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

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

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

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

11. Security Considerations

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

An end user's Scan data can be protected from disclosure by encrypting the content and protected from modification by signing the data file when the data is stored in a repository or being transmitted over a communication link. Spooling Devices MUST protect document data from disclosure to unauthorized parties.

12. IANA Considerations

12.1 Attribute Registrations

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

http://www.iana.org/assignments/ipp-registrations

The registry entries will contain the following information:

Operation attributes:	Reference
input-attributes (collection)	[PWG5100.FAX]
input-color-entry (type2 keyword)	[PWG5100.SCAN]
input-compression-quality-factor (integer(0:100))	[PWG5100.SCAN]
input-noise-removal (integer(0:100))	[PWG5100.SCAN]
Scan Service Description attributes:	**Reference**
input-color-entry-default (type2 keyword)	[PWG5100.SCAN]
input-color-entry-supported (1setOf type2 keyword)	[PWG5100.SCAN]
input-compression-quality-factor-default (integer(0:100))	[PWG5100.SCAN]
input-compression-quality-factor-supported (rangeOfInteger(0:100))	[PWG5100.SCAN]
input-noise-removal-default (integer(0:100))	[PWG5100.SCAN]
input-noise-removal-supported (rangeOfInteger(0:100))	[PWG5100.SCAN]

12.2 Attribute Value Registrations

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

http://www.iana.org/assignments/ipp-registrations

The registry entries will contain the following information:

Attributes (attribute syntax) Keyword Attribute Value	Reference
input-color-type (type2 keyword)	[PWG5100.SCAN]
BlackandWhite1	[PWG5100.SCAN]
Grayscale4	[PWG5100.SCAN]
Grayscale8	[PWG5100.SCAN]
Grayscale16	[PWG5100.SCAN]
RGB24	[PWG5100.SCAN]
RGB48	[PWG5100.SCAN]
RGBa32	[PWG5100.SCAN]
RGBa64	[PWG5100.SCAN]
CMYK32	[PWG5100.SCAN]


```
    CMYK64                                              [PWG5100.SCAN]


ipp-features-supported (1setOf type2 keyword)           [PWG5100.13]
    scan                                                [PWG5100.SCAN]

job-state-reasons (1setOf type2 keyword)                [RFC2911]
    TBD                                                 [PWG5100.SCAN]
```

12.3 Type2 enum Attribute Value Registrations

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

http://www.iana.org/assignments/ipp-registrations

The registry entries will contain the following information:

```
Attributes (attribute syntax)
    Enum Value      Enum Symbolic Name                  Reference
    ----------      ------------------                  ---------
TBD                                                     [PWG5100.SCAN]
    <any new TBD value>                                 [PWG5100.SCAN]
```

12.4 Operation Registrations

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

http://www.iana.org/assignments/ipp-registrations

The registry entries will contain the following information:

```
Operation Name                                          Reference
--------------                                          ---------
Get-Next-Document                                       [PWG5100.SCAN]
```


13. References

13.1 Normative References

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15. Change History

15.1 November 28, 2012

1. Initial Version.
2. Started with IPP FaxOut Service

