



The Printer Working Group

IPP Workgroup Session, Day 1

April 17, 2019

PWG IP Policy



- "This meeting is being held in accordance with the PWG Intellectual Property Policy"
 - http://www.pwg.org/chair/membership_docs/pwg-ip-policy.pdf
- TL;DR: Anything you say in a PWG meeting or email to a PWG address can be used in a PWG standard
 - (but please do read the IP policy above if you haven't done so)



April 17, 2019 (Eastern Daylight Time)

When	What
09:00 - 09:30	IPP WG: Status
09:30 - 10:15	IPP WG: 3D Printing Topics
10:15 - 10:30	Break
10:30 - 12:00	IPP WG: System Service + Demo
12:00 - 13:00	Lunch
13:00 - 14:00	IPP WG: IPP Everywhere + Demo
14:00 - 15:30	IPP WG: Enterprise Printing Extensions v1.0, Job Extensions v2.0
15:30 - 15:45	Break
15:45 - 17:00	IPP WG: Job Accounting BoF



April 18, 2019 (Eastern Daylight Time)

When	What
09:00 - 11:00	IDS WG: Status and Discussion
11:00 - 12:15	IPP WG: Encrypted Jobs and Documents
12:15 - 12:30	IPP WG: Next Steps
12:30 - 13:30	Lunch



- Current charter:
 - <http://ftp.pwg.org/pub/pwg/ipp/charter/ch-ipp-charter-20170615.pdf>
- The Internet Printing Protocol (IPP) workgroup is chartered with the maintenance of IPP, the IETF IPP registry, and support for new clients, network architectures (Cloud, SDN), service bindings for MFDs and Imaging Systems, and emerging technologies such as 3D Printing
- In addition, we maintain the IETF Finisher MIB, Job MIB, and Printer MIB registries, and handle synchronization with changes in IPP



- **IPP WG Co-Chairs:**
 - Paul Tykodi (TCS)
 - Ira McDonald (High North)
- **IPP WG Secretary:**
 - Michael Sweet (Apple)
- **IPP WG Document Editors:**
 - Ira McDonald (High North) – IPP System Service, MFD Alerts v1.1
 - Michael Sweet (Apple) – IPP 3D Printing Extensions v1.1, IPP Document Object v1.1, IPP Encrypted Jobs and Documents, IPP Everywhere v1.1, IPP Everywhere Printer Self-Certification Manual v1.1, IPP Job Extensions v2.0, IPP System Service, PWG Safe G-Code Subset for 3D Printing v1.0
 - Smith Kennedy (HP Inc.) – IPP Authentication Methods, IPP Encrypted Jobs and Documents, IPP Enterprise Printing Extensions v1.0 (EPX)

Status (1/2)



- PWG Specifications in development:
 - IPP 3D Printing Extensions v1.1 - *Approved*
 - IPP Document Object v1.1 - Stable Draft
 - IPP Everywhere v1.1 - Stable Draft
 - IPP Everywhere Printer Self-Certification Manual v1.1 - Prototype Draft
 - IPP Job Extensions v2.0 - Prototype Draft
 - IPP Enterprise Printing Extensions v1.0 - Initial Draft
 - IPP System Service v1.0 - Prototype Draft
 - MFD Alerts v1.1 - *Approved*
- IPP Best Practice in development:
 - IPP Authentication Methods - *PWG Last Call*
 - IPP Encrypted Jobs and Documents - Interim Draft
 - PWG Safe G-Code Subset for 3D Printing - *PWG Formal Vote*



- Up-to-date pending IANA registrations online:
 - <http://www.pwg.org/ipp/ipp-registrations.xml>
 - Continue to maintain this in parallel for new specifications
 - Github repository: <https://github.com/istopwg/ippregistry>
- IPP Everywhere Printer Self-Certifications:
 - <https://www.pwg.org/printers>
 - 365 printers currently listed
 - Second 1.0 self-certification tools update released in October 2017
 - Third 1.0 self-certification tools update released in November 2018
- IPP Sample Code:
 - Github repository:
 - <https://github.com/istopwg/ippsample>
 - Fork of CUPS code includes ippfind, ippproxy, ippserver, ipptool, ipptransform, and ipptransform3d



3D Printing Topics

- Work to get wide adoption of IPP 3D v1.1 and PWG Safe G-Code Subset v1.0
 - Reach out to vendors - point to IPP sample code
 - Both local printing and cloud
 - Can we develop a GUI client prototype?
- Concrete printing
 - Material types
 - Determine whether other material properties are needed (additives, amount of water, etc.)
 - Other print ticket properties needed?
- Liaisons (next slide)



3D Liaison Discussions

- ASTM Committee F42 on Additive Manufacturing Technologies
 - <https://www.astm.org/COMMITTEE/F42.htm>
- ISO/IEC JTC 1 WG 12 3D Printing and Scanning eCommittee
 - <https://isotc.iso.org/livelink/livelink?func=ll&objId=19905763&objAction=browse&viewType=1>
 - Participation in the ISO initiative is currently via the INCITS Ad Hoc.
- 3D PDF Consortium
 - <https://www.3dpdfconsortium.org>
- 3D Concrete Printing Standards Development
 - NIST
 - ACI
 - ASTM
- 3MF Consortium
 - <https://www.3mf.io>



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Break



IPP System Service (SYSTEM)

- Current prototype draft at:
 - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippssystem10-20190130-rev.pdf>
- Combines and implements a concrete IPP binding of the following abstract Semantic Model 2.0 services and objects:
 - PWG 5108.06: System Object and System Control Service
 - PWG 5108.03: Network Resource Service
 - PWG 5109.1: Cloud Imaging Requirements and Model
- Almost all required attributes and operations have been prototyped in the ippsample project
- Proposed Schedule:
 - Stable draft in Q2 2019



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IPP System Service

Demo of ippsample Prototype



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Lunch Break

Resuming at 1:00pm EDT

IPP Everywhere



- Stable draft of core specification:
 - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippeve11-20190128-rev.pdf>
- Prototype draft of manual:
 - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippeveselfcert11-20180704-rev.pdf>
- Beta tools nearing completion:
 - <https://github.com/istopwg/ippeveselfcert>
- New JSON-based portal:
 - <https://beta.pwg.org/printers>
- Submission tool for new JSON-based portal
- Proposed schedule:
 - Stable drafts and beta tools Q2/Q3 2019
 - Update 4 for v1.0 tools Q2/Q3 2019



IPP Everywhere Self-Certification

- Resources:
 - <http://www.pwg.org/ipp/everywhere.html> (for tools/info)
 - <https://www.pwg.org/ippeveselfcert> (submission form)
 - <http://www.pwg.org/printers> (printer list)
 - <https://github.com/istopwg/ippeveselfcert> (Github repo)
- Released v1.0 Update 3 of self-certification tools on November 9th, 2018
 - Fixed all known issues in v1.0 tools
 - v1.0 is tracking CUPS 2.2.x (current stable branch)
 - Need an update 4 for another Windows packaging issue and the new JSON submission tool
- v1.1 self-certifications tools on track for Q2/Q3 2019
 - Includes new JSON submission tool and test updates
 - v1.1 tracks CUPS 2.3.x (current development branch)



IPP Everywhere v1.0 Tool Updates

- Issue #25: ipptool shows junk for "media-col-database" on Windows
 - This is actually a Windows runtime bug, will use our vsnprintf "emulation" function instead
- Issue #41: Missing regex.dll in Windows tools
 - Looks like an installer bug



IPP Everywhere v1.1 Tool Updates

- Tools:
 - Issue #25: ipptool shows junk for "media-col-database" on Windows
- DNS-SD tests:
 - Issue #29: Rename to dnssd-tests.*
 - Issue #36: Make JPEG tests conditional
- IPP tests:
 - Issue #33: Use PWG Raster for basic printing tests instead of JPEG
 - Issue #37: Make JPEG tests conditional
 - Issue #43: Add more "requested-attributes" tests
- Document tests:
 - Issue #38: Make JPEG tests conditional



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IPP Everywhere v1.1
Self-Certification Tools Demo

IPP Enterprise Printing Extensions v1.0



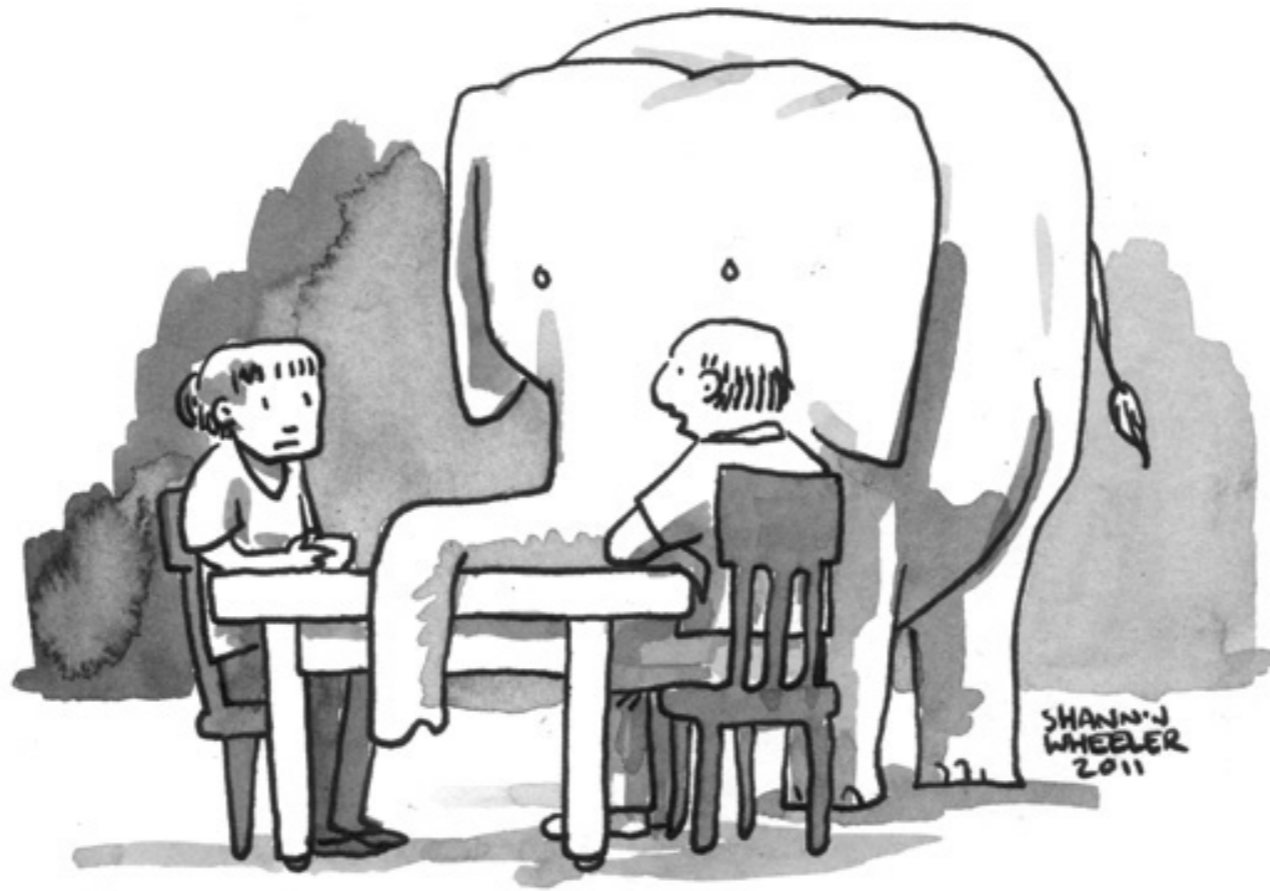
- Current interim draft:
 - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippepe-20190327.pdf>
- Proposed schedule:
 - Prototype draft in Q3 2019



IPP Job Extensions v2.0

- Current draft (IPP WG Last Call completed):
 - <https://ftp.pwg.org/pub/pwg/ipp/wd-ippjobext20-20190315.pdf>
- Discussion: Fate of "document-format-details"
 - Also affects IPP Document Object v1.1 (Stable, Completed IPP WG Last Call, next step is PWG Call for Objections)
- Proposed schedule:
 - PWG Last Call in Q2 2019

"document-format-details"



"HONESTLY? I PREFERRED WHEN WE DIDN'T TALK ABOUT THE ELEPHANT"



"document-format-details": History

- Early Semantic Model, IPP, and JDF discussions in 2002:
 - <https://www.pwg.org/archives/sm/2002/000487.html>
 - https://ftp.pwg.org/pub/pwg/ipp/new_DOC/Comparison%20of%20JDF%20and%20IPP%20document-format-attrs.pdf
 - TL;DR: IPP's "document-format-details" is largely based on JDF elements
- Original proposals used registered keywords for "document-source-os-name" (vs. current name syntax), but name values are defined as lowercase IANA values?!?
- Multiple values are allowed to support the contents of imagined "packaging" (archive/multi-part) formats
- Privacy and data protection were never considered
- Published in PWG 5100.5 (IPP Document Object v1.0) and 5100.7 (IPP Job Extensions v1.0) in 2003



"document-format-details": History

- Discussion to obsolete "document-format-details" occurred during the October 11 and 18, 2018 conference calls, the February 2019 vF2F, and the February 28, 2019 conference call
 - Privacy, interoperability, trust issues (see next slides)
 - Not required by any publicly-available standard
 - Limited implementation over the last 16 years - some Printers support it, but AirPrint, CUPS, Wi-Fi Direct, and Windows IPP/1.0 Clients do not support it
 - Some accounting solutions still want to use it for vendor-specific solutions
- *No objections to obsolete "document-format-details" were raised during the reviews of the spec updates or the IPP WG Last Call of IPP Document Object v1.1*
- Updates to PWG 5100.5 and 5100.7 are pending a re-review of our prior decision to obsolete "document-format-details" and replace it with something better



"document-format-details": Issues

- No "packaging" MIME media type is used for printing that requires specification of multiple sub-formats (XPS and 3MF don't need it)
- The "document-format (mimeType)" member attribute is redundant (and potentially mismatched) with the "document-format" and "document-format-detected" attributes
- The "document-format-device-id (text(127))" member attribute is too short (vs. the "printer-device-id (text(1023))" attribute) and continues the ill-advised use of printer-specific PDLs
- The "document-format-version (text(127))" member attribute is redundant (and potentially mismatched) with the "document-format-version" attribute; values are not registered making interoperability impossible



"document-format-details": Issues

- The "document-natural-language (1setOf naturalLanguage)" is redundant (and potentially mismatched) with the "document-natural-language (naturalLanguage)" attribute
- The "document-source-application-name (name(MAX))" and "document-source-application-version (text(127))" do not provide registered (needed for interoperability) or authenticated or validated (needed for trust) values and expose Personally Identifying Information (PII)
- The "document-source-os-name (name(40))" and "document-source-os-version (text(40))" do not provide registered (needed for interoperability) or authenticated or validated (needed for trust) values and expose PII
 - The IANA registry does not include common operating systems



"document-format-details": Interop

- From PWG Process/3.0: *"A PWG standard is a specification that is stable, well understood, technically competent and has multiple, independent implementations with substantial operational experience, demonstrated interoperability and significant public support."*
- Unregistered plain text values for operating system and application names and versions cannot be interoperable - there is no way for vendors to independently implement interoperable solutions



"document-format-details": PII

- The "document-source-xxx" member attributes provide information similar to the HTTP User-Agent header, which has been shown to help identify specific users:
 - <https://www.eff.org/deeplinks/2010/01/tracking-by-user-agent>
- Sending of PII requires informed consent under the EU's GDPR, even for transactions
- For this reason, major IPP Clients have chosen to never send these attributes to a Printer
 - CUPS 2.3 will also default to a sanitized HTTP User-Agent string



"document-format-details": Trust

- The "document-source-xxx" member attribute values are not authenticated or validated in any way
- Without authentication or validation, the values SHOULD NOT be used for access control, billing, or other processing reasons - too easy to subvert those things by substituting desired values in the print request



"document-format-details": Resolution

- The original decision was to make "document-format-details" OBSOLETE and come up with a replacement as it has not met the interoperability requirements for a PWG standard, has seen limited implementation in the 16 years since its original registration, and is explicitly *not* supported by many Client implementations due the PII and Trust issues noted on the previous slides
- Keeping it as a supported attribute is unacceptable (for Apple at least)
- Just deprecating "document-format-details" might send the wrong message - what is the incentive to replace it if we just say "you SHOULD NOT use this"?
- Q: What is the final disposition of "document-format-details"?



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Break

Resuming at 3:15pm EDT



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Job Accounting BoF



Job Accounting BoF: Definitions

- Job Accounting: Collection of Metadata to audit, bill, or otherwise report on the processing of Jobs and Documents
- Metadata: Information about a Job or Document such as name, owner, format, state, counters, dates and times, and template attributes
- Interoperability: The ability of systems and services that create, exchange and consume data to have clear, shared expectations for the contents, context and meaning of that data (<http://datainteroperability.org>)
- Personal Data: Information related to a person that can be used to identify the person such as a name, email address, government-issued identification, medical information, and so forth. [IPPPRIVACY]



Job Accounting BOF: Use Cases

- Auditing of printing usage - who prints, what kinds of jobs are printed, how are those jobs submitted, where are they printed, etc.
- Billing - charged per job, sheet/side, color vs. B&W, duplex vs. simplex, finishing options
- Supply/service management - track usage to know when to order paper, toner, etc.
- Ability of Client to query Printer for its accounting capabilities/requirements
- Others?



Job Accounting BOF: Requirements

- Authentication
- Collection of (potentially required) metadata from Client: owner, format, organization/account id, document information (subject, copyright, etc.), others?
- Generation of metadata by Printer: ID, state, dates and times
- Explicit privacy and data collection policies that are accessible to/discoverable by Client
- Data protection
- Validation of metadata
- Interoperability



Job Accounting BoF: Authentication

- **Client authentication:**
 - TLS X.509 certificate authentication
 - Others?
- **Printer authentication:**
 - TLS X.509 certificate authentication
 - "printer-uuid" validation
 - Others?
- **User authentication:**
 - Standard HTTP/TLS mechanisms supported by IPP
 - Others?



Job Accounting BoF: Client Metadata

Attribute	Attribute	Attribute
copies	job-authorization-uri	number-up
cover-back	job-error-sheet	orientation-requested
cover-front	job-hold-until	output-bin
document-charset	job-impressions{-col}	overrides
document-format	job-impressions-estimated	page-delivery
document-message	job-k-octets	page-order-received
document-metadata	job-mandatory-attributes	page-ranges
document-name	job-media-sheets{-col}	presentation-direction-number-up
document-natural-language	job-name	print-color-mode
finishings{-col}	job-originating-user-name	print-content-optimize
insert-sheet	job-originating-user-uri	print-quality
ipp-attribute-fidelity	job-pages{-col}	print-rendering-intent
job-account-id	job-priority	print-scaling
job-account-type	job-sheets{-col}	printer-resolution
job-accounting-sheets	media{-col}	separator-sheets
job-accounting-user-id	multiple-document-handling	sides

Job Accounting BoF: Printer Metadata



Attribute	Attribute
date-time-at-completed	job-state
date-time-at-creation	job-state-message
date-time-at-processing	job-state-reasons
errors-count	job-uuid
job-id	number-of-documents
job-impressions{-col}-completed	output-device-assigned
job-k-octets-processed	time-at-completed
job-media-sheets{-col}-completed	time-at-creation
job-pages{-col}-completed	time-at-processing
job-printer-up-time	warnings-count
job-printer-uri	xxx-actual



Job Accounting BoF: Other Metadata?

- **Criteria:**
 - Attributes/values must not be solely for analytics/data mining/marketing since that violates GDPR
 - Information needed for job assignment, billing, quality/type of service, etc.
 - Well-known values must be registered for interoperability
- Do we need a replacement for "document-format-details"?
- Other metadata needed?



Job Accounting BOF: Policies

- Privacy policy - IPP Privacy Attributes:
 - "xxx-privacy-attributes" attributes list the attributes that are covered by the privacy policy
 - "xxx-privacy-scope" attributes specify who has access to the attributes covered by the privacy policy
 - "printer-privacy-policy-uri" attribute specifies a web page with a human-readable privacy policy
- Data use/protection policies
 - No attributes defined yet
 - Add "printer-data-policy-uri (uri)" to specify a web page with the data use and protection policies?
 - Are there suitable standards for data protection levels we can reference and use for Printer Description attributes, e.g. Common Criteria standards?



Job Accounting BoF: Data Protection

- TLS can protect data in transit
- Self-encrypting drives and proper internal access controls can be a solution for data at rest
 - How to specify?
 - Need additional descriptive attributes?



Job Accounting BOF: Validation

- How to validate that the metadata sent from a Client to a Printer is accurate?
 - Current Printers implicitly trust what the Client sends
- How to validate that the metadata sent from the Printer to a Client is accurate?
 - Current Clients implicitly trust what the Printer sends
- Is validation always required?



Job Accounting BoF: Next Steps

- Summary of discussion so far
- What are the next steps?



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IPP Workgroup Session, Day 2

April 18, 2019

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April 18, 2019 (Eastern Daylight Time)

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09:00 - 11:00	IDS WG: Status and Discussion
11:00 - 12:15	IPP WG: Encrypted Jobs and Documents
12:15 - 12:30	IPP WG: Next Steps
12:30 - 13:30	Lunch



IPP Encrypted Jobs and Documents

- Interim draft:
 - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ipptrustnoone10-20190131-rev.pdf>
- Proposed schedule:
 - Prototype draft Q3 2019



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Next Steps



Next Steps

- **IPP Document Object v1.1 (Mike)**
 - Finalize status of "document-format-details"
 - PWG Call for Objections ASAP
- **IPP Encrypted Jobs and Documents (Mike/Smith)**
 - Prototype draft in Q3 2019?
- **IPP Enterprise Printing Extensions v2.0 (Smith)**
 - Prototype draft in Q3 2019?
- **IPP Everywhere and Self-Certification v1.1 (Mike/Smith)**
 - Stable working drafts/beta tools in Q2 2019
- **IPP Job Extensions v2.0 (Mike)**
 - Finalize status of "document-format-details"
 - PWG WG Last Call in Q2 2019
- **IPP System Service v1.0 (Ira/Mike)**
 - Stable working draft and IPP WG Last Call in Q2 2019



More Information

- We welcome participation from all interested parties
- IPP Working Group web page
 - <https://www.pwg.org/ipp/index.html>
- Subscribe to the IPP mailing list
 - <https://www.pwg.org/mailman/listinfo/ipp>
- IPP WG holds bi-weekly phone conferences announced on the IPP mailing list
 - Next conference calls scheduled for Thursday, April 25, 2018 and May 9, 2019 at 3pm ET