

# Internet Printing Protocol Meeting Minutes

## May 5-7, 2021

Meeting was called to order at 2:15pm EDT.

### Attendees

Aveek Basu (Lexmark/OpenPrinting)  
Zdenek Dohnal (Red Hat)  
Benjamin Gordon  
Sean Kau (Google)  
Smith Kennedy (HP)  
Jeremy Leber (Lexmark)  
Geoffrey Mayne (HP)  
Ira McDonald (High North)  
Piotr Pawliczek (Google)  
Michael Rhines (Qualcomm)  
Anthony Suarez (Kyocera Document Solutions)  
Michael Sweet (Lakeside Robotics)  
Paul Tykodi (TCS)  
Bill Wagner (TIC)  
Uli Wehner (Ricoh)  
Steven Young (Canon)

### Agenda Items

1. Antitrust and IP policies, minute taker
  - [https://www.pwg.org/chair/membership\\_docs/pwg-ip-policy.pdf](https://www.pwg.org/chair/membership_docs/pwg-ip-policy.pdf)
  - [https://www.pwg.org/chair/membership\\_docs/pwg-antitrust-policy.pdf](https://www.pwg.org/chair/membership_docs/pwg-antitrust-policy.pdf)
  - Antitrust and IP policies accepted, Mike taking minutes
2. Status
  - <https://ftp.pwg.org/pub/pwg/ipp/slides/ipp-wg-agenda-may-21.pdf>
3. IPP/2.x Fourth Edition
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippbase23-20210424-rev.pdf>
  - Status: Interim
  - Section 5:
    - ... that are RECOMMENDED or REQUIRED at each ...
    - Drop note above table
    - DISCUSS: Table 1: Should we make 2.2 REQUIRE RFC7472 - already required by STD92 if you support TLS (RFC8446)
  - Section 5.2:
    - DISCUSS: Should we make EPX required, even though it will break strict compatibility with our usual versioning process?
    - Mike: Do the normal document versioning requirements apply to this spec (vs. protocol version)

- Ira: Maybe not
- Ira: Couldn't we have a simple ipptool test for the levels?
  - Mike: Yes, and we can include the tests for each of the required specs
- Bill: So is the spec just going to be pointers to other specs?
  - Mike/Ira: Yes, mostly (just a couple attributes and operations for multiple document jobs and Create-Job/Send-Document)
- Stopped at section 6
- 4. IPP Everywhere v2.0
  - Q: Would accounting apply to everyone?
    - A: Only that Printers that implement accounting and all Clients that claim conformance to 2.0
  - Photo printing as a feature
    - Definitely include photo printing tests (scaling, etc.)
  - Q: How useful would an MFD spec with system service be?
    - What about controlling non-job services, non-IPP (e.g. eSCL) services?
    - Other services: Copy, EmailIn, EmailOut, FaxIn, Transform
    - Could we extend System service to control non-IPP services?
    - A: Possibly
  - Sean: Not sure System service is the same scope as IPP Everywhere 1.x
    - Ira: True, but IPP Everywhere has always looked to supporting all MFD functions
  - Sean: Would system service be required?
    - Mike: Maybe for IPP Everywhere servers, but recommended for regular printers
  - Smith: What about getting resource path for a printer (given an IP address or hostname)
    - Mike: Just support System service's Get-Printer-Attributes / hack to get the default printer URI
  - Smith: When do we work more on this?
    - Mike: Wait until we have EPX, NODRIVER, and PPX wrapped up
- 5. IPP Encrypted Jobs and Documents v1.0
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ipptrustnoone10-20210428-rev.pdf>
  - Consensus: S/MIME reuses TLS infrastructure, make it required
  - What about OpenPGP?
    - Smith: OpenPGP as optional or pull it out
    - Ira: I like leaving OpenPGP as recommended for environments where S/MIME doesn't fit
    - Mike: Concern is that we might not have implementations of OpenPGP
    - Ira: Link to OpenPGP implementations:
      - <https://www.openpgp.org/software/developer/>
    - Ira/Smith: No, better to just make it OPTIONAL or pull it
      - Smith: Can add OpenPGP in a 1.1
    - Mike: What about moving the OpenPGP content to an informative section?

- Consensus is to do this - move OpenPGP attributes and values to section 16.1, remove from IANA considerations
  - If we get someone that prototypes the proposed attributes and values for PGP, then we can update the 1.0 document to formally define them
  - Action: Mike to post a message about changes to TRUSTNOONE to pwg-announce and ipp mailing lists when the draft is available
6. Cloud Printing and Scanning BoF
- <https://ftp.pwg.org/pub/pwg/ipp/slides/ipp-wg-agenda-may-21.pdf>
  - INFRA:
    - Proxy role for scanning is like a client printing to the Infrastructure Printer
    - Scan spec has content we can reuse
    - Bill: Use cases?
      - Yes, we need to fully define the use cases - scanning from the printer might not involve any Client device interactions
    - RFC 8628: OAuth 2.0 Device Authorization Grant
      - Specifically for situations where there is no way to authorize on the device, user visits a web page and provides a short string to do the authorization
    - Paul: PDF/R: PDF raster scan format?
      - TWAIN/PDF Association published it
      - <https://www.pdfrafter.org/>
      - ISO-23504, not freely available
      - Sounds an awful lot like PDF/IS
      - Paul will check whether he can get a copy through his PDF Association membership...
  - SYSTEM:
    - Same stuff as for INFRA, plus make sure example shows how the Register-Output-Device flow works with RFC 8628
  - MS UPS:
    - Using X.509 to authenticate OAuth requests - need to confirm that the OpenID spec provides the necessary info for the Proxy to provide it
  - Direct Printing:
    - Sean: What about using the UUID?
      - Mike: Yes, could look things up via DNS-SD
      - Smith: Easy to spoof UUIDs
      - Piotr: Would need to also use X.509 cert to validate after connecting
      - Mike: Then would need to have a copy of the cert in the Infrastructure Printer
    - Smith: what about not allowing local printing?
      - Mike: Would configure local access/discovery
      - Smith: Access might be restricted by user permissions vs. no local access
    - Bill: Wouldn't you want to use direct printing if the cloud is down?

- Smith/Piotr: Direct is a lot faster than round-trip through cloud
  - Piotr: Cloud printer might provide features local printer doesn't have (e.g. PDF support, etc.)
- Sean: Solution depends a lot on the use case
- Uli: Really secure would be pull (release) printing
  - Printers and clients on separate LANs, service in the middle/cloud
  - Can't really pull from client (lots of security issues there)
- Scan:
  - Defer discussion on Release Scanning until we can get a better understanding of the use cases and how it would be implemented
  - No discussion of eSCL to avoid potential antitrust/IP issues
- SNMP MIB Support
  - Have addressed the original MS request
  - printer-storage/-description can be registered now and added to PSX/MFDAlerts later
    - Action: Mike to add a PSX errata for printer-storage/-description
    - Review Storage registration at next IPP concall

## 7. IPP Enterprise Printing Extensions v2.0

- <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippepx20-20210423-rev.pdf>
- Section 4.1:
  - "This Job Release feature defines "push release" where the Document data resides on the Printer." (or merge into one of the other paragraphs - don't mention INFRA)
  - Action: Mike to file errata against IPP INFRA to add Job Release as a use case
- Section 4.4.1:
  - "job-state-reasons" Job Status attribute
  - A Client can use the Resume-Job operation to approve ...
- Section 5.1.1:
  - document-format: Client MAY supply and the Printer MUST support", resolve comment
- Section 6.1.2:
  - Line 765: ... "supplied in the same REQUEST"
  - Line 777: "A Client MUST use Secure Transport ..."
- Section 6.1.3:
  - "... specifies the action that causes the Printer to move the Job to the 'pending' state."
  - Table- moves to the pending state (not processing)
  - Add "Note: A Printer might move the Job immediately from 'pending' to 'processing' if there are no other Jobs in the 'processing' state [STD92]." (or something like that) - also on lines 801-804
  - Resolve comment about authentication (not needed)
  - For job-state-reasons keywords, point to section 8.2
  - Clean up remaining text
  - Provide reference to original 5100.11 for the original semantics

- Section 6.1.4.1:
  - Delete second sentence, already covered in 6.1.4
- Section 6.1.4.2:
  - Delete last sentence (do not remove)
  - Drop 'none' keyword from table, fix table title
- Section 6.1.4.3:
  - If the Client supplies the 'group' value for the "job-storage-access" attribute, it MUST also supplies this attribute to specify the group name.
- Stopped at section 6.2
- 8. 3D Scanning and Production BoF
  - <https://ftp.pwg.org/pub/pwg/ipp/slides/ipp-wg-agenda-may-21.pdf>
  - AMSC Presentation
    - <https://www.ansi.org/news/standards-news/all-news/2021/05/5-5-21-report-available-march-31-america-makes-ansi-design-for-additive-manufacturing-virtual-event>
    - Slide 3: Digital Printing Thread
      - Paul: Concern is that many have jumped ahead and appear to want to do printer drivers for 3D printing and lots of other independent software/solutions
      - Bill: IPP would fit between phase 2 and phase 3
      - Looking to get vendors to adopt/define a format for everyone to use
      - Current solutions are awkward, many manual steps
    - General Data Package (GDP) ~= PWG Job Ticket
      - Still a work in process, some parts are vetted, some are not
        - AMSC Vetted ~= PWG Prototyped
      - Paul will be talking to authors on May 10 about IPP TRUSTNOONE to "vet" the data security portion of GDP
    - Action: Paul to reach out to Pat at ASTM to determine contacts for IPP expansion
  - 3D Scanning
    - Does the size of point cloud data (potentially terabytes) could be an issue
    - Some regulated industries need to keep the original point cloud data and some just need the computed geometry
    - Animation studios use rendering farms to process large amounts of data
      - so there might be some usefulness in splitting up jobs into smaller sub-jobs that can be processed independently and merged at the end
    - Transform service could be used to farm out point cloud processing (IPP fan-out)
    - IPP Scan is geared more to a standalone scanner in an office/workshop and not a flying/driving LIDAR recorder
    - Associate scan data with a part/object
    - Also useful for QA/QC (process control/monitoring), not just

- reverse-engineering
- Hierarchy or scan data:
  - Raw data (measurements, images, etc.)
  - Point cloud (generated from raw data)
  - Geometry (generated from point cloud)
- Q: Is it important to support different vendors for the print and scan?
  - A: Rare to have vendors that make both printers and scanners
- E57:
  - Common for laser/LIDAR scanners
    - Bridges, buildings, landscapes, geography (large things)
    - [https://www.ri.cmu.edu/pub\\_files/2011/1/2011-huber-e57-v3.pdf](https://www.ri.cmu.edu/pub_files/2011/1/2011-huber-e57-v3.pdf)
  - Not common for structured light (picture) scanners (for smaller objects/parts) or the AM workflow
  - Geoffrey: Reminds me of AMF, well documented but not well used
- Smith: what would the best scan format for these use cases:
  - Reverse engineering: 3MF in, 3MF out?
  - Process control/monitoring: 3MF in, 3MF out?
  - Geoffrey: Yes, 3MF is being used in manufacturing and has support on Windows (easy to share things)
  - CAD to 3MF is easy, 3MF to CAD is more problematic (hard to get original geometry like cylinders/spheres/curved surfaces)
- Q: Should we make 3MF required for 3D Scan?
  - A: Maybe, still can list other formats but important to have a common MTI format for interoperability
- Metadata is very important for AM
  - Paul: Model Based Engineering (MBE) workflow for design and process control/monitoring, will check what formats they are using
  - Geoffrey: Another format called QIF
    - Not well supported
    - XML-based
    - Tries to pull in every possible bit of metadata
- Sean: Do we have an IPP job ticket format?
  - Mike: Yes, the PJT3D XML schema
  - Can be embedded in 3MF or PDF (or any XML-based format)
  - Sean: Need a tool for this
  - Smith: We'd rather people use IPP than PJT3D
- Production
  - Process control/monitoring requires a way to record all of the steps in the process
  - Traceability requirements:

- Source materials (lots, vendors, manufacturing dates, part numbers, etc.) used in production are part of the Job Receipt (also part of PJT3D XML schema)
- Sean: Do we know if this is a need, and has it already been specified?
  - A: It a need, nothing published yet
  - AMSC report (previously) talks about this, Boeing and Sanvick have been providing real data to help with this
- Sean: Is IPP used inside a manufacturing line?
  - Mike: Not yet, some prototyping with 3D service providers (customer job submission)
  - Another reason we defined PJT3D
  - Geoffrey: Vendors do want standards, however
- Geoffrey: Craft beer industry example - don't compete with each other, but support the industry to disrupt non-craft printing
  - Same thing for AM industry: focus on making AM competitive with traditional manufacturing

#### 10. IPP Driverless Printing Extensions v2.0

- <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippnodriver20-20210501-rev.pdf>
- Abstract: Changes good
- Section 4.8:
  - "very savvy" -> "sophisticated"
  - "could implement" instead of "might implement"
  - Line 920: double provide, "Presets" instead of "Preset sets"
    - "which lists Presets for its Clients, and allows a Client to define new Presets that can be added to a Printer."
- Section 4.9:
  - The "print-quality" Job Template attribute [STD92] is not easily extensible.
  - Therefore, this specification defines a "preset-category" member attribute value to identify Presets that represent different print quality choices for a Printer.
  - .... that names all the Job Template attributes that affect the visual processing of a Job.
- Section 6.2.3:
  - Resolve/delete comment
- Section 6.2.5:
  - Resolve/delete comment
- Section 6.4.2:
  - Document (capitalized)
  - Delete comment
- Section 6.4.6:
  - MUST NOT use this attribute as the target in IPP Job requests.
  - job-uuid is for tracking jobs over a longer period of time
  - job-id's can be reused
    - Note: require unique/preserving job-id values across power cycles for IPP Everywhere 2.0

- Global:
  - "Printer support" -> Printer Conformance
- Section 6.5.5:
  - Delete comment
- Section 6.5.8:
  - Simplify description
  - except "preset-name" and "preset-category"
- Section 6.5.9:
  - Delete comment
- Section 6.5.12:
  - Delete comment
- Section 6.5.17:
  - Delete comment
- Section 6.5.18:
  - Delete comment
- Section 6.5.19:
  - Add PDF/R for new ISO-23504 standard
- Section 6.5.24:
  - Fix section reference for print-rendering-intent
  - Sean: Do we need to include standard keywords?
    - Mike: Yes, otherwise how does a client support a new standard attribute?
  - What about existing printers that don't have this attribute?
    - Clients would assume the standard list of attributes and might not show others
  - Might include a note for Clients to use the standard list if the printer doesn't support the attribute
  - "MUST list the supported attribute names"
  - Sean: We wouldn't separate these attributes from others listed in job-creation-attributes-supported
    - Mike: Apple will
  - Sean: Conformance requirements to protect against abuse?
  - Piotr: How can we group these attributes?
    - Just one group - print processing/quality
  - Sean: Can we limit the kinds of attributes?
    - A: Yes, limit Job Template attributes to boolean, enum, integer, keyword, and resolution, Printer Description attributes to boolean, 1setOf enum, 1setOf integer | rangeOfInteger, 1setOf keyword, and 1setOf resolution
  - Add a reference to printer-strings-uri for localization
  - Add counter examples that must not be in there (media, copies, sides, finishings, etc.)
- Stopped at 6.5.25

## 11. IPP Production Printing Extensions v2.0

- <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippxxx20-20210424-rev.pdf>
- Section 5.1.9:
  - Job (capitalized)



- Drop xxx-default stuff
- Section 5.2.24:
  - Move to obsolete
- date-/time-at-completed-estimated Job Status proposal
  - best effort estimate based on queued Jobs
  - Consensus is to add as RECOMMENDED
- date-/time-at-processing-estimated Job Status proposal
  - best effort estimate based on queued Jobs
  - Consensus is to add as RECOMMENDED
- job-complete-before-/time proposal
  - Best effort
  - Printer can refuse job creation if it knows it can't complete on time
  - Consensus is to add as RECOMMENDED

#### 12. Next Steps

- Review IPP Storage registration at next concall
- Continue EPX, FIN, NODRIVER, and BASE reviews at next concalls
- Mike will update PPX and TRUSTNOONE per F2F comments
- Mike and Smith will work on getting beta of IPP Everywhere 1.1 tools out

### **Next Steps / Open Actions**

- Next conference calls May 20 and June 3, 2021 at 3pm EST
- Action: Mike to post a message about changes to TRUSTNOONE to pwg-announce and ipp mailing lists when the draft is available
- Action: Mike to add a PSX errata for printer-storage/-description
- Action: Mike to file errata against IPP INFRA to add Job Release as a use case
- Action: Paul to reach out to Pat at ASTM to determine contacts for IPP expansion
- Action: Mike, Ira, and Smith to develop IPP Everywhere value proposition content (PENDING)