



# The Printer Working Group

IPP Workgroup Session, Day 1

November 3, 2020

# 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](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)

# Agenda (1/3)



## November 3, 2020 (US Eastern Standard Time)

When	What
10:00 - 11:15	PWG Plenary
11:15 - 11:30	IPP WG: Status
11:30 - 12:00	IPP WG: Job Accounting with IPP v1.0
12:00 - 12:30	Lunch
12:30 - 13:00	IPP WG: IPP INFRA and Cloud Proxy Registration
13:00 - 13:30	IPP WG: Production Printing Extensions v2.0
13:30 - 14:00	IPP WG: IPP Everywhere Evolution

# Agenda (2/3)



## November 4, 2020 (US Eastern Standard Time)

When	What
10:00 - 12:00	IDS WG: Status and Discussion
12:00 - 12:30	Lunch
12:30 - 14:00	IPP WG: IPP Enterprise Printing Extensions v2.0

# Agenda (3/3)



## November 5, 2020 (US Eastern Standard Time)

When	What
10:00 - 12:00	IPP WG: IPP Driverless Printing Extensions v2.0
12:00 - 12:30	Lunch
12:30 - 13:45	IPP WG: 3D Liaisons: Status and Guidance
13:45 - 14:00	IPP WG: Next Steps



- Current charter:
  - <https://ftp.pwg.org/pub/pwg/ipp/charter/ch-ipp-charter-20170615.pdf>
- New draft charter:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ipp-charter-20201009-rev.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, the PWG MIBs, and handle synchronization with changes in IPP



- **IPP WG Co-Chairs:**
  - Paul Tykodi (TCS)
  - Ira McDonald (High North)
- **IPP WG Secretary:**
  - Michael Sweet (Lakeside Robotics)
- **IPP WG Document Editors:**
  - Ira McDonald (High North) - IPP WG Charter
  - Michael Sweet (Lakeside Robotics) – IPP Encrypted Jobs and Documents v1.0, IPP Production Printing Extensions v2.0, Job Accounting with IPP v1.0
  - Smith Kennedy (HP Inc.) – IPP Driverless Printing Extensions v2.0, IPP Encrypted Jobs and Documents v1.0, IPP Enterprise Printing Extensions v2.0, IPP Finishings v2.2

# Status (1/3)



- PWG Specifications in development:
  - IPP Encrypted Jobs and Documents v1.0 - Prototype
  - IPP Enterprise Printing Extensions v2.0 - Interim
  - IPP Driverless Printing Extensions v2.0 - Interim
  - IPP Production Printing Extensions v2.0 - Prototype
- IPP Best Practices/Registrations in development:
  - Job Accounting with IPP v1.0 - Stable, PWG Last Call
- Recently published:
  - IPP Label Printing Extensions v1.0 (registration)
  - IPP System Service Discovery v1.0 (registration)
  - PWG 5100.14-2020: IPP Everywhere v1.1
  - PWG 5100.16-2020: IPP Transaction-Based Printing Extensions v1.1
  - PWG 5100.20-2020: IPP Everywhere Printer Self-Certification Manual v1.1



# Status (2/3)



- Up-to-date pending IANA registrations online:
  - <https://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>
  - ~~412~~ **625** printers currently listed from HP **and Lexmark**
  - 1.0 self-certification tools update 5 in June 2020, approved August 2020
  - 1.1 self-certification tools update 2 **approved October 2020**
- IPP Sample Code:
  - Github repository:
    - <https://github.com/istopwg/ippsample>
  - Fork of CUPS code includes ipp3dprinter, ippeveprinter, ippfind, ippproxy, ippserver, ipptool, ipptransform, and ipptransform3d



- Pending Errata:

- PWG 5100.1-2017 (Finishings v2.1): 3 issues
- PWG 5100.5-2019 (Document Object v1.1): 4 issues
- PWG 5100.6-2003 (Page Overrides v1.0): 2 issues
- PWG 5100.7-2019 (Job Extensions v2.0): 5 issues
- PWG 5100.8-2003 ("-actuals" v1.0): 1 issue
- PWG 5100.9-2009 (Printer State Extensions v1.0): 2 issues
- PWG 5100.12-2015 (IPP 2.0, 2.1, and 2.2): 2 issues
- PWG 5100.15-2014 (FaxOut v1.0): 2 issues
- PWG 5100.18-2015 (Infrastructure Extensions v1.0): 6 issues
- PWG 5100.19-2015 (Implementor's Guide v2.0): 6 issues
- PWG 5100.22-2019 (System Service v1.0): 2 issues
- PWG 5107.3-2019 (MFD Alerts v1.1): 1 issue

- In-Progress Errata:

- PWG 5100.3-2001 (Production Printing): 2 issues
- PWG 5100.11-2010 (JPS2 - Enterprise Printing): 7 issues
- PWG 5100.13-2012 (JPS3 - Driverless Printing): 15 issues



# IPP Everywhere Self-Certification

- Resources:
  - <https://www.pwg.org/ipp/everywhere.html> (for info)
  - <https://www.pwg.org/ippeveselfcert> (tools and submission instructions)
  - <https://www.pwg.org/printers> (printer list)
  - <https://github.com/istopwg/ippeveselfcert> (Github repo)
- Released v1.0 Update 5 of self-certification tools on June 17th, 2020 (approved on August 13th, 2020)
  - v1.0 is tracking CUPS 2.2.x (previous stable branch)
  - **v1.0 certifications will be accepted until June 30, 2021**
- Released v1.1 Update 2 tools on October 7th, 2020 (**approved on October 22nd, 2020**)
  - v1.1 tracks CUPS 2.3.x (current stable branch)
  - Future update 3 will address document format test issues identified by Lexmark



# Job Accounting with IPP v1.0

- Stable draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippaccounting10-20200827.pdf>
- Best Practice document defining how to support job accounting with existing IPP attributes and functionality
  - Like the Implementor's Guide but for standards-based job accounting
- In PWG Last Call, ends November 6, 2020 at 10pm PST
  - <https://www.pwg.org/pipermail/pwg-announce/2020/003934.html>
  - **Have reached quorum, but please do send your response if you haven't already!**



# The Printer Working Group

Lunch Break

*Resuming at 12:30 EST*

# IPP INFRA and Cloud Proxy Registration



- Working on IPP Registration to address:
  - X.509 certificate registration via Register-Output-Device extension
  - X.509 certificate authentication for Proxy operations
  - "output-device-x509-certificate (1setOf text(MAX))" operation attribute for Register-Output-Device
  - "output-device-x509-certificate-supported (boolean)" System Description attribute
  - Maybe an "output-device-database (1setOf collection)" Printer Status attribute as a replacement for "output-device-supported (name(127))" and "output-device-uuid-supported (1setOf uri)"
    - Member attributes would be "output-device-name (name(127))", "output-device-uuid (uri)", and "output-device-x509-certificate (1setOf text(MAX))"
- Meanwhile, X.509 certificates are seeing some use in a new cloud-based print service from Microsoft...



# Microsoft Universal Print Service

- Documentation:

- <https://docs.microsoft.com/en-us/universal-print/>
- <https://docs.microsoft.com/en-us/universal-print/hardware/universal-print-isv-connector>
- <https://docs.microsoft.com/en-us/universal-print/hardware/universal-print-oem-printer-registration>

- Uses:

- PWG 5100.18: IPP Shared Infrastructure Extensions (INFRA)
- OAuth 2.0 for authentication of the registration request
- X.509 certificates *and* OAuth 2.0 for authentication of IPP Proxy requests

- *Does not use PWG 5100.22: IPP System Service v1.0*

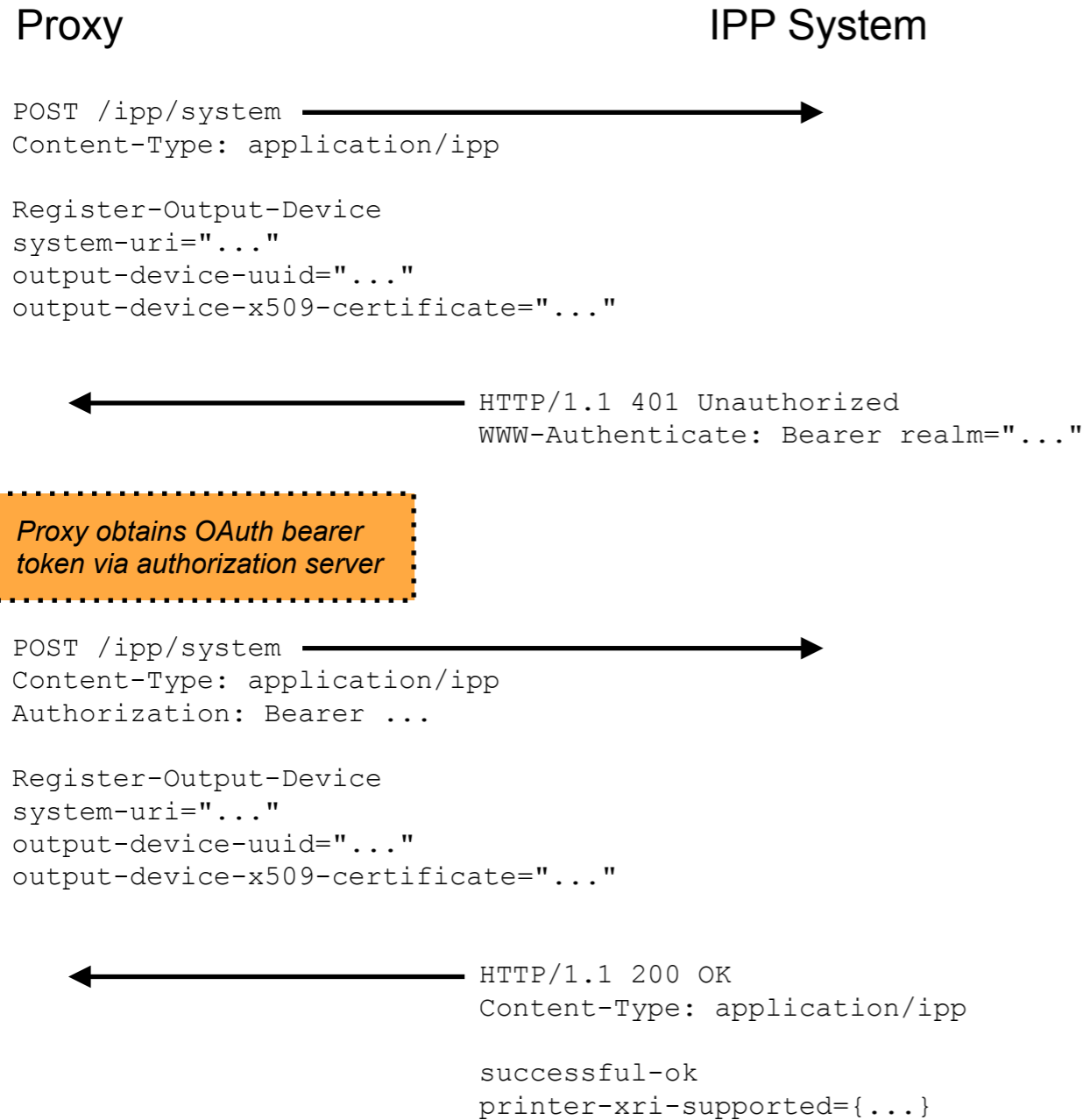
- Instead, uses a MS-specific RESTful registration endpoint
- Registration includes a 2048-bit RSA + SHA-256 X.509 certificate signing request (no support for ECDSA currently)
- The Universal Print service acts as a CA, generating the X.509 certificate the printer must use when authenticating IPP Proxy connections/requests

- *Not clear whether IPP Notifications are used...*

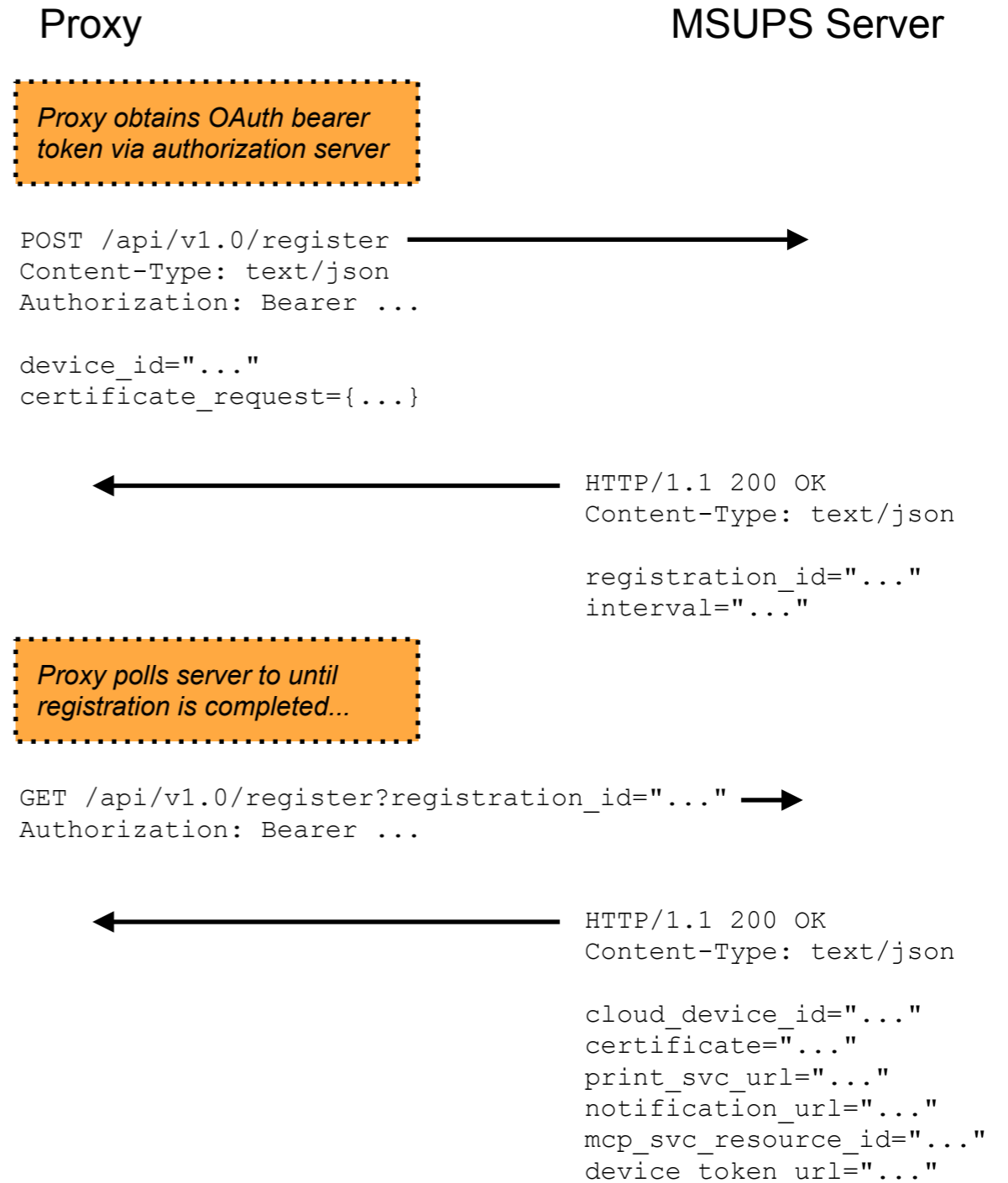


# Comparison of Registration Process

## IPP INFRA + IPP SYSTEM



## IPP INFRA + MSUPS







# Comparison of Data Elements

Description	IPP System	MSUPS
Cloud printer UUID	printer-uuid	cloud_device_id
Output device UUID	output-device-uuid	device_id
OAuth Authorization Server	oauth-authorization-server-uri (OpenID)	(Azure ActiveDirectory)
OAuth scope	oauth-authorization-scope	mcp_svc_resource_id
Cloud printer URI	printer-xri-supported	print_svc_url
Notification server URI	printer-xri-supported	notification_url *
Output device token server	oauth-authorization-server-uri (OpenID)	device_token_url

\* *Not clear whether this URL represents an IPP Infrastructure Printer or some other kind of RESTful notification service.*



# Potential Changes - X.509 Registration

- There is a security benefit to having the IPP System Service generate an X.509 certificate for the Proxy:
  - The generated certificate has a known (organization or service) root certificate, which allows both the Proxy and Infrastructure Printer to better validate/trust the X.509 certificate used for authentication
  - Perhaps the Register-Output-Device operation should accept "output-device-x509-request (1setOf text(MAX))" and "output-device-x509-public-key (1setOf text(MAX))" attributes, and return the "output-device-x509-certificate (1setOf text(MAX))" attribute?
- We should not limit certificate requests to 2048-bit RSA encryption
  - Some concern about long-term security of 2048-bit RSA
  - Should require support for at least 2048-bit RSA and p256/p384/p521 ECDSA with SHA-256
  - Should list supported signing algorithms so Proxy can discover what is supported and act accordingly



# IPP Production Printing Ext v2.0

- Prototype draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippppx20-20201029-rev.pdf>
- Awaiting prototyping
- Proposed schedule:
  - Stable draft and last call Q1 2021



# IPP Everywhere Evolution

- Thinking about v2.0 (after NODRIVER, EPX, and PPX)
  - Make current RECOMMENDED attributes REQUIRED or CONDITIONALLY REQUIRED
    - General attributes: "job-mandatory-attributes-supported", "job-presets-supported", "job-privacy-xxx", "jpeg-xxx-supported", "max-page-ranges-supported", "pdf-xxx-supported", "print-content-optimize-xxx", "print-scaling-xxx", "printer-current-time", "printer-dns-sd-name", "printer-firmware-xxx", "printer-input-tray", "printer-output-tray", "printer-privacy-policy-uri", "printer-strings-xxx"
    - Job Accounting and Transaction attributes: "charge-info-message", "job-account-id-xxx", "job-account-type-xxx", "job-accounting-user-id-xxx", "job-authorization-uri-xxx", "job-charge-info", "job-impressions-estimated", "printer-charge-info-xxx"
    - Enterprise attributes: "job-password-xxx", etc.
  - Make IPPS/TLS support REQUIRED (all current 1.0/1.1 printers do)
  - Maybe add RECOMMENDED/COND. REQUIRED for IPP INFRA/SYSTEM Proxy with OAuth support?



# The Printer Working Group

IPP Workgroup Session, Day 2

November 4, 2020

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# Agenda (2/3)



## November 4, 2020 (US Eastern Standard Time)

When	What
10:00 - 12:00	IDS WG: Status and Discussion
12:00 - 12:30	Lunch
12:30 - 14:00	IPP WG: IPP Enterprise Printing Extensions v2.0



- Current interim draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippepx20-20201029-rev.pdf>
- Update of PWG 5100.11-2010: IPP Job and Printer Extensions - Set 2 (JPS2)
  - Obsoleted "job-save-disposition (collection)", replaced by new Job Storage feature
  - Obsoleted "pages-per-subset (1setOf integer(0:MAX))", replaced by "job-pages-per-subset (integer(1:MAX))" in 5100.1
  - Deprecated "proof-print (collection)", replaced by "proof-copies (integer(1:MAX))"
  - Obsoleted "sheet-collate (type2 keyword)" - base attribute from RFC 3381 is obsolete
  - Added "job-release-action (type2 keyword)" to support Job Release
  - Some non-enterprise-specific attributes were moved to PWG 5100.7
- Proposed schedule:
  - Prototype draft in Q1 2021





# The Printer Working Group

IPP Workgroup Session, Day 3

November 5, 2020

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# Agenda (3/3)



## November 5, 2020 (US Eastern Standard Time)

When	What
10:00 - 12:00	IPP WG: IPP Driverless Printing Extensions v2.0
12:00 - 12:30	Lunch
12:30 - 13:45	IPP WG: 3D Liaisons: Status and Guidance
13:45 - 14:00	IPP WG: Next Steps



# IPP Driverless Printing Ext v2.0

- Current interim draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippnodriver20-20201029-rev.pdf>
- Updates PWG 5100.13-2012: IPP Job and Printer Extensions - Set 3 (JPS3)
- Proposed schedule:
  - Prototype draft in Q2 2021



# The Printer Working Group

Lunch Break

*Resuming at 12:30 EST*



# 3D Printing Discussions

- Organizations and workgroups:
  - 3MF Consortium: <https://www.3mf.io>
  - AMSC: <https://www.americamakes.us/>
    - **New!** AMNOW: <https://www.americamakes.us/ncdmm-and-catalyst-connection-announce-next-phase-of-amnow-program-to-support-additive-manufacturing-technology-insertion-into-the-u-s-army-supply-chain/>
  - ASTM Committee F42: <https://www.astm.org/COMMITTEE/F42.htm>
  - ISO/IEC JTC 1 WG 12: <https://www.iso.org/committee/45020.html>
  - PDF Association + ISO/IEC TC171: <https://www.iso.org/committee/53674.html>
  - SME iRAMP: <https://www.sme.org/iramp/>



# 3D Printing Discussions (con't)

- Current documents:
  - PWG 5100.21-2019: IPP 3D Printing Extensions v1.1
  - PWG 5199.5-2017: PWG 3D Print Job Ticket and Associated Capabilities v1.0 (PJT3D)
- Proposed future work (2021-2022):
  - IPP 3D Production Printing Extensions v1.0 specification to address AMSC AMNOW efforts
  - Updated PWG 3D Print Job Ticket and Associated Capabilities v2.0 (PJT3D) best practice to incorporate production extensions and IPP 3D v1.1



# The Printer Working Group

## Next Steps





# Next Steps

- IPP Workgroup Charter Update (Ira)
  - Stable draft in Q1 2021
- IPP 2.0, 2.1, and 2.2 Update (Mike/Ira)
  - Initial draft in Q3 2021
- IPP Driverless Printing Extensions v2.0 (Smith)
  - Prototype draft in Q2 2021
- IPP Encrypted Jobs and Documents v1.0 (Mike/Smith)
  - Prototyping/stable draft in Q3 2021
- IPP Enterprise Printing Extensions v2.0 (Smith)
  - Prototype draft in Q1 2021
- IPP Finishings v2.2 (Smith)
  - Prototype draft in Q1 2021
- IPP Production Printing Extensions v2.0 (Mike)
  - Stable draft in Q1 2021
- Cloud Registration with X.509 Certificates (Cihan/Mike)
  - Initial draft in Q4 2020
- Job Accounting with IPP v1.0 (Mike)
  - PWG Formal Vote Q1 2021



# 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, November 19, December 3, and December 17, 2020 at 3pm ET