



# The Printer Working Group

IPP Workgroup Session

November 15, 2022



# Before We Begin...

- **PWG Antitrust Policy:**
  - [https://www.pwg.org/chair/membership\\_docs/pwg-antitrust-policy.pdf](https://www.pwg.org/chair/membership_docs/pwg-antitrust-policy.pdf)
  - The IEEE-ISTO Printer Working Group ("PWG") will not become involved in the business decisions of its Members. The PWG strictly complies with applicable antitrust laws. Every PWG meeting attendee shall comply with this policy. The PWG Officers and PWG Workgroup Officers are responsible to ensure that this policy is adhered to in all PWG activities.
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# Agenda (1/3)



## November 15, 2022 (US Eastern Standard Time)

When	What
10:00 - 10:45	PWG Plenary
10:45 - 11:00	IPP WG: Status
11:00 - 12:00	IPP WG: Prototype-Ready Specifications
12:00 - 12:45	Lunch Break
12:45 - 14:00	IPP WG: Evolution of IPP/2.x and IPP Everywhere

# Agenda (2/3)



## November 16, 2022 (US Eastern Standard Time)

When	What
10:00 - 11:00	IPP WG: IPP Production Printing Extensions v2.0
11:00 - 12:00	IPP WG: IPP Driver Replacement Extensions v2.0
12:00 - 12:45	Lunch Break
12:45 - 14:30	IPP WG: Evolution of IPP and OAuth

# Agenda (3/3)



## November 17, 2022 (US Eastern Standard Time)

When	What
10:00 - 12:00	IDS WG: Status and Discussion
12:00 - 12:45	Lunch Break
12:45 - 13:45	IPP WG: 3D Printing Liaisons
13:45 - 14:00	IPP WG: Next Steps



- Current charter:
  - <https://ftp.pwg.org/pub/pwg/ipp/charter/ch-ipp-charter-20210409.pdf>
- The Internet Printing Protocol (IPP) workgroup is chartered with the maintenance of IPP and the IETF IPP registry, and support for new clients, network architectures (Cloud, SDN), MFD/Imaging service bindings, and emerging technologies such as 3D Printing
- In addition, we maintain the IETF Finisher MIB, Job MIB, and Printer MIB registries, the PWG MIBs, the PWG Semantic Model schema, and handle synchronization with changes in IPP



- **Pending:**

- PWG 5100.5-2019 (Document Object v1.1): 4 issues
- PWG 5100.6-2003 (Page Overrides v1.0): 2 issues
- PWG 5100.8-2003 ("-actuals" v1.0): 1 issue
- PWG 5100.9-2009 (Printer State Extensions v1.0): 2 issues
- PWG 5100.15-2014 (FaxOut v1.0): 2 issues
- PWG 5100.18-2015 (Infrastructure Extensions v1.0): 8 issues
- PWG 5100.19-2015 (Implementor's Guide v2.0): 8 issues
- PWG 5100.22-2019 (System Service v1.0): 3 issues
- PWG 5107.3-2019 (MFD Alerts v1.1): 1 issue

- **In-Progress:**

- PWG 5100.3-2001 (Production Printing): 2 issues
- PWG 5100.7-2019 (Job Extensions v2.0): 8 issues
- PWG 5100.11-2010 (JPS2 - Enterprise Printing): 7 issues
- PWG 5100.12-2015 (IPP 2.0, 2.1, and 2.2): 2 issues
- PWG 5100.13-2012 (JPS3 - Driver Replacement): 15 issues
- PWG 5100.14-2020 (IPP Everywhere v1.1): 4 issues
- PWG 5100.20-2020 (IPP Everywhere v1.1 Self-Cert): 1 issue



# Prototype-Ready Specifications

- IPP Encrypted Jobs and Documents v1.0 (TRUSTNOONE)
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ipptrustnoone10-20210519.pdf>
- IPP Enterprise Printing Extensions v2.0 (EPX)
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippepx20-20211101.pdf>
- IPP Job Extensions v2.1 (JOBEXT)
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippjobext21-20221105.pdf>





# IPP Job Extensions v2.1

- Prototype draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippjobext21-20221105-rev.pdf>
- Updates PWG 5100.7-2019: IPP Job Extensions v2.0
- Primary focus is clarifications for "media-col", "media-col-database", "media-col-ready", "media-size", and "media-size-supported"
- Also adds:
  - Missing attributes: "job-hold-until-time-supported", "job-processing-time"
  - New values for "media-source" and "print-content-optimize"
- Q: Add "max-page-ranges-supported" from IANA registry?
- Proposed schedule:
  - Stable draft and IPP WG last call Q4 2022



# The Printer Working Group

Lunch Break

*Resuming at 12:45pm ET*



# IPP/2.x Fourth Edition

- Current interim draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippbase23-20220809-rev.pdf>
- Errata update of PWG 5100.12-2015:
  - Clarification about Get-Printer-Attributes operation
  - Definition of classes or categories of printers
  - Updated document references, including an informative reference to IPP Everywhere
  - Simplified reference tables and conformance requirements
  - New history of the development of the Internet Printing Protocol content to explain how we ended up with different protocol versions with the same encoding
- Proposed schedule:
  - Prototype draft after EPX 2.0 and JOBEXT 2.1

# IPP Everywhere v2.0



- Current prototype draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippeve20-20221107-rev.pdf>
- Major update of PWG 5100.14-2020: IPP Everywhere v1.1
  - Most RECOMMENDED items become REQUIRED
  - New CONDITIONALLY REQUIRED items
  - REQUIRE "printer-firmware-xxx" Printer Status attributes
  - REQUIRE Get-Printers from PWG 5100.22 for print servers
  - RECOMMEND IPP-USB support
- Proposed schedule:
  - Stable draft Q1/Q2 2023

# IPP Everywhere Printer Self-Certification Manual v2.0



- Initial draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippeveselfcert20-20220510.pdf>
- Major update to PWG 5100.20-2020
  - Synchronize with changes in IPP Everywhere v2.0
  - Add IPP-USB support (particularly for USB-only printers)
  - Add feature tests for duplex, finishings, roll, tray
  - Add Get-Printers test for servers
- Proposed schedule:
  - Prototype draft and beta tools Q1 2023

# IPP Everywhere™ v2.0 Printer Self-Certification Tests



- Existing tests:
  - mDNS/DNS-SD - required service types, TXT keys, and values
  - IPP - required operations, attributes, and values, 'media-needed'
  - Document - basic printing tests for PWG Raster, JPEG, and PDF
- New tests:
  - Color printing - verify print-color mode works to switch between color and grayscale for PWG Raster, JPEG, and PDF
  - Duplex printing - verify odd number of pages works, PWG Raster, JPEG (fail/ignore), PDF
  - Stapling, Folding, Punching - verify all supported staple values work for PWG Raster, JPEG, and PDF with different numbers of pages, duplex modes (as supported)
  - Trimming/cutting - verify cutter works for roll media (as supported)
  - Server - verify Get-Printers operation works, do IPP tests against each reported printer
- **JPEG and PDF tests only performed if the Printer supports them**



# Self-Certification Tools

- Platforms:
  - Linux: Drop Red Hat, Ubuntu 22.04 LTS for Intel/ARM?
  - macOS: macOS 12+ for Intel and Apple Silicon
  - Windows: Windows 10+ and higher for Intel
  - Mobile (Android/iOS/iPadOS) and other desktop OS's also possible
- Add command-line and GUI front-end (rather than running individual scripts)
- Look at publishing on corresponding App stores as free apps
  - Potential issues with using ISTO as "vendor"
  - Maybe have one PWG member publish the official apps instead?



# (New) Proposed Tool

- "ippevetool"
  - GUI and command-line
  - Run self-certification tests
  - Inspect TXT records, Printer attributes, resources (icon/profile/string), and X.509 certificates
  - Do ad-hoc print tests using canned and/or user-supplied files
  - Do ad-hoc ipptool tests using canned and/or user-supplied files
  - Look-up specs for attributes and values via IPP registry





# (New) Proposed Tool

- Implement using Flutter (GUI) and Dart (language)
  - One code base for all platforms
  - Compiles to native code
  - Potential for supporting Android, \*BSD, and iOS/iPadOS
  - Existing "nsd" mDNS/DNS-SD library can be used for Android, iOS/iPadOS, macOS, and Windows
    - Need to write Avahi nsd plugin ("nsd\_avahi") for Linux/\*BSD
  - Need to implement proper IPP library for Dart
- Also considered: native GUI (different for each platform), Electron (Javascript), and FLTK (C++)



# (New) Proposed Tool (con't)

The screenshot displays the IPP Everywhere Tool interface, which is used for testing and certifying printers. It consists of several overlapping windows:

- Printer List Window:** Shows a list of supported printer models, including Canon TS5100 series, DYMO LabelWriter 450 Twin Turbo, EPSON SC-P800 Series, EPSON WF-7520 Series, HP OfficeJet Pro 8030 series [692825], HP Officejet Pro X576dw MFP [3483FE], Lexmark MC3426adw, Rollo X1040, Zebra GX420d, and Zebra GX430t.
- Printer Details Window (HP Officejet Pro X576dw MFP [3483FE]):** Provides information about the selected printer, including its state (idle, accepting jobs, cover-open), location (Mike's Office), make and model (HP Officejet Pro X576dw MFP), and firmware (LZPICN2022AR). It also displays the DNS-SD TXT Record for the printer.
- Self-Certification Test Configuration Window (HP Officejet Pro X576dw MFP [3483FE]):** Allows users to configure and run tests. It includes a checklist with options for Production-ready firmware, Firmware update required, Print server, and Output was correct. It also has fields for Product Family (Input) and Product Webpage (https://). A list of Model Names (Model 1, Model 2, Model 3, ..., Model N) is provided. Buttons for Run All Tests, Run DNS-SD Tests, Run IPP Tests, Run Document Tests, and Run Feature Tests are visible.

The bottom window shows a placeholder for self-certification results, with a "Share" button and a "Submit Results" button.



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11:00 - 12:00	IPP WG: IPP Driver Replacement Extensions v2.0
12:00 - 12:45	Lunch Break
12:45 - 14:30	IPP WG: Evolution of IPP and OAuth

# IPP Production Printing Extensions v2.0 (PPX)



- Stable draft
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippppx20-20221109.pdf>
- Updates PWG 5100.3-2001: IPP Production Printing Attributes
- Prototyping completed in the ippsample project
- PWG Last Call completed, needs PWG Formal Approval
- 10 responses without objections, 35 comments:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/lcrc-ippppx20.txt>

# IPP Driver Replacement Extensions v2.0 (NODRIVER)



- Stable Draft:
  - <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippnodriver20-20221027.pdf>
- Updates PWG 5100.13-2013: IPP Job and Printer Extensions - Set 3 (JPS3)
  - Old title "Driverless Printing Extensions"
- Prototyping completed in the PAPPL project
- PWG Last Call ends November 28, 2022



# The Printer Working Group

Lunch Break

*Resuming at 12:45pm ET*





# Evolution of IPP and OAuth

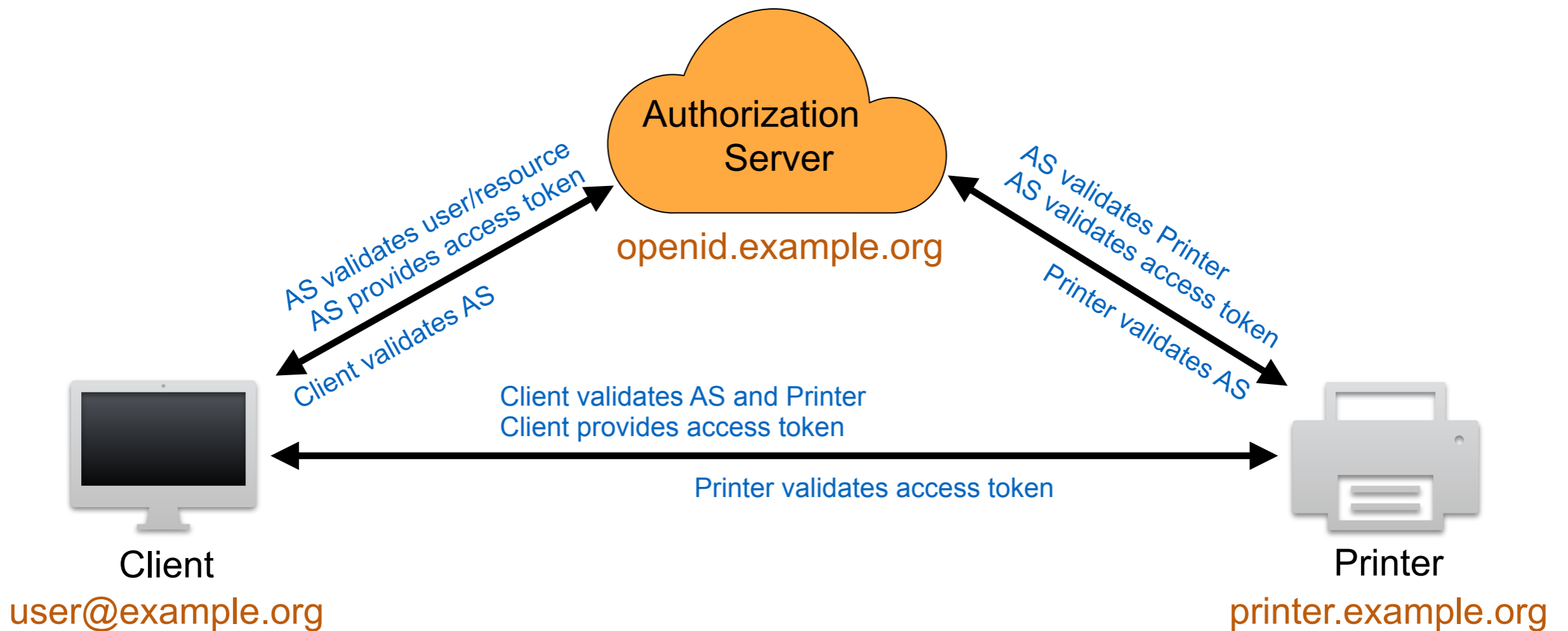
- Wiki:
  - <https://github.com/istopwg/ippsample/wiki/IPP-and-OAuth>
- Goals:
  - Define/reference best practices for using OAuth/OpenID with IPP
  - Prototype/deploy OAuth/OpenID support for printing
- Update existing IPP specifications:
  - PWG 5100.11-2010: IPP Job and Printer Extensions - Set 2 (JPS2) (*Now titled "IPP Enterprise Printing Extensions v2.0 (EPX)"*)
  - PWG 5100.18-2015: IPP Shared Infrastructure Extensions v1.0 (INFRA)
  - PWG 5100.22-2019: IPP System Service v1.0 (SYSTEM)
  - PWG 5199.10-2019: IPP Authentication Methods v1.0 (AUTH)
- Publish new IPP best-practice:
  - PWG 5199.x: Cloud Printing with IPP Everywhere v1.0

# OAuth 2.0 Rich Authorization Requests

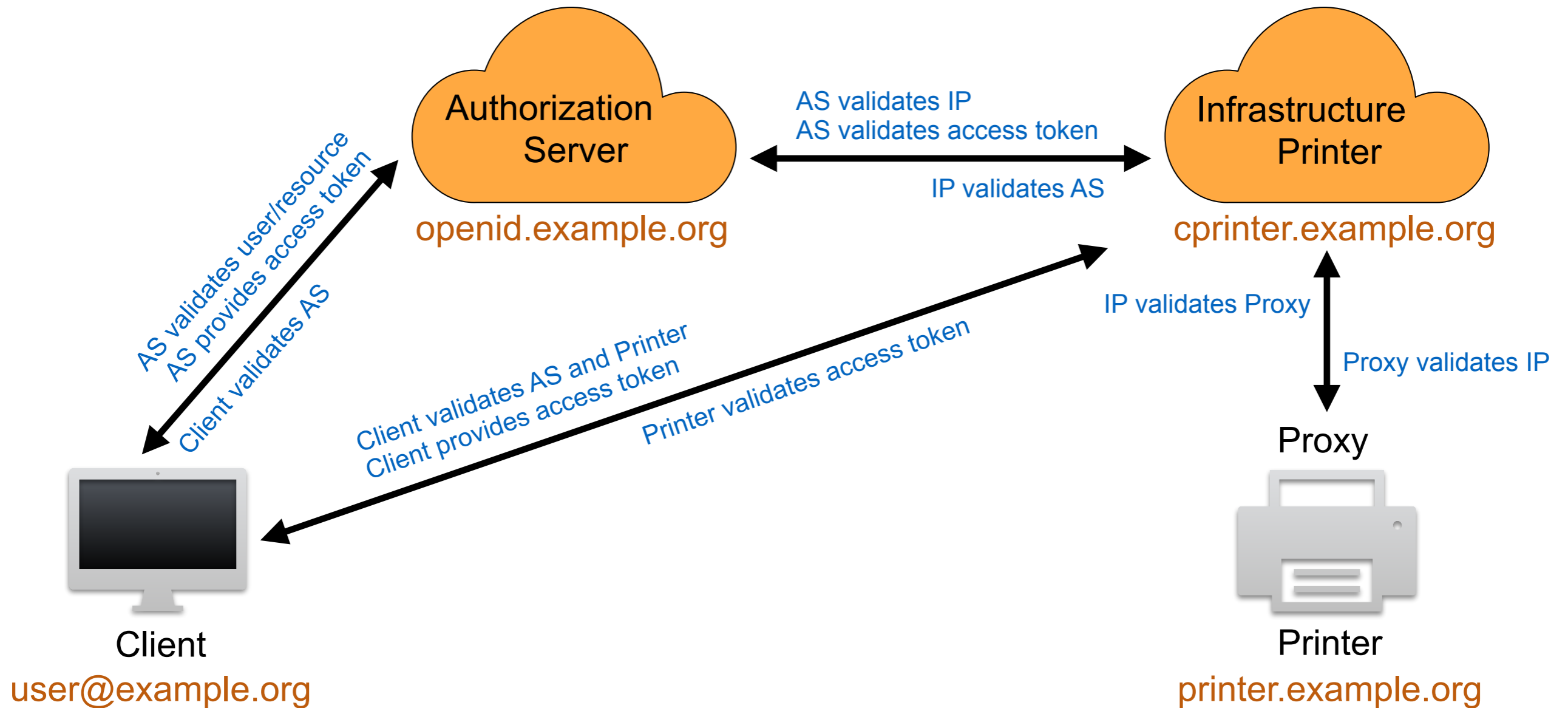


- Current IETF draft:
  - <https://datatracker.ietf.org/doc/draft-ietf-oauth-rar/>
- Abstract:
  - This document specifies a new parameter `authorization_details` that is used to carry fine-grained authorization data in OAuth messages.
- Expands on OAuth scopes to provide fine-grained authorization
- Possible application in IPP:
  - [https://ftp.pwg.org/pub/pwg/ipp/whitepaper/google-authorization\\_details-20221111.pdf](https://ftp.pwg.org/pub/pwg/ipp/whitepaper/google-authorization_details-20221111.pdf)

# OAuth Trust Model (Local Printer)



# OAuth Trust Model (Cloud Printer)





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13:45 - 14:00	IPP WG: Next Steps



# 3D Printing and Scanning Discussions

- 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)
  - PWG 5199.7-2019: PWG Safe G-Code Subset for 3D Printing v1.0
- Proposed future work (2023-2024):
  - IPP 3D Scan Service v1.0 specification to address 3D scanning
  - IPP 3D Production Printing Extensions v1.0 specification to address VDMA - OPC UA "Joint Working Group (JWG) for Additive Manufacturing" efforts
  - Updated PWG 3D Print Job Ticket and Associated Capabilities v2.0 (PJT3D) best practice to incorporate production extensions and IPP 3D v1.1
  - Create sample 3MF print files with embedded job tickets, do more IPP 3D prototyping



# 3D Printing Liaisons

- Have a new liaison agreement with the 3MF Consortium
  - Want to create some sample 3MF print files with embedded job tickets and do more IPP 3D prototyping
- Collaborate with 3MF and AMSC to use IPP 3D to satisfy need to query device capabilities and securely submit content for printing



- **November 4th:** ASTM International Conference on Additive Manufacturing (ASTM ICAM 2022)
  - Alan presented and was well received
  - Invited to join one of their working groups
- **This Week:** International Common Criteria Conference in Toledo, Spain
  - Alan presented on 3D printer certification yesterday
- Transportation Research Board - 2nd International Conference on 3D Printing and Transportation: May 2023 in Anaheim, CA:
  - Planning to attend in person – on site
  - Possibility to make a presentation on safe G-code



# The Printer Working Group

## Next Steps



# Next Steps

- IPP/2.x Fourth Edition (Mike)
  - Prototype draft in Q1/Q2 2023
- IPP Driver Replacement Extensions v2.0 (Smith)
  - PWG Last Call ends November 28, 2022
  - PWG Formal Approval Q1 2023
- IPP Encrypted Jobs and Documents v1.0 (Mike/Smith)
  - Stable draft in Q2 2023
- IPP Enterprise Printing Extensions v2.0 (Smith)
  - Stable draft in Q1 2023
- IPP Everywhere v2.0 (Mike)
  - Stable draft in Q1/Q2 2023
- IPP Everywhere Printer Self-Certification Manual v2.0 (Mike)
  - Prototype draft in Q1 2023
- IPP Job Extensions v2.1 (Mike)
  - Stable draft and IPP WG last call in Q4 2022
- IPP Production Printing Extensions v2.0 (Mike)
  - PWG Formal Approval Q1 2023



# 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, December 8, 2022 and January 5, 2023 at 3pm ET