The Printer Working Group

PWG May 2020 Face-to-Face Plenary Session

Smith Kennedy, PWG Chair
May 6, 2020

- Administrivia

- PWG Steering Committee Updates

- PWG Workgroup Status [WG Chairs]

- Liaison Status

- Questions / Next Meeting / Any Other Business

Administrivia

- Welcome and Introductions
- Confirm Minutes Taker
- Review PWG Patent Policy
- Agenda

PWG IP Policy

- "This meeting is being held in accordance with the PWG Intellectual Property Policy"
  - https://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)

PWG Patent Statement

PWG standards may include the known use of essential patents and patent applications provided the PWG Chair receives assurance from the patent holder or applicant with respect to patents whose infringement is, or in the case of patent applications, potential future infringement the applicant asserts will be, unavoidable in a compliant implementation of either mandatory or optional portions of the standard. This assurance shall be provided without coercion.

PWG Patent Statement

This assurance shall be either:

- A general disclaimer to the effect that the patentee will not enforce any of its present or future patent(s) whose use would be required to implement either mandatory or optional portions of the proposed PWG standard against any person or entity complying with the standard; or

- A statement that a license for such implementation will be made available without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination.

PWG Patent Statement

The PWG is not in a position to give authoritative or comprehensive information about evidence, validity or scope of patents or similar rights, but it is desirable that any available information should be disclosed. Therefore, all PWG members shall, from the outset, draw PWG's attention to any relevant patents either their own or of other organizations including their Affiliates that are known to the PWG members or any of their Affiliates, although PWG is unable to verify the validity of any such information.

Do Not Discuss:

- The validity/essentiality of patents/patent claims
- The cost of specific patent use
- Licensing terms or conditions
- Product pricing, territorial restrictions, or market share
- Don't discuss ongoing litigation or threatened litigation

DO raise an objection if inappropriate topics are discussed

Agenda Overview – Day 1

(All times Eastern Daylight Time)

Tuesday, May 5

10:00 – 10:30	OpenPrinting Plenary
10:30 – 11:15	OpenPrinting: GSOC and Project Updates
11:15 – 12:00	OpenPrinting: Printer Applications
12:00 – 12:30	Break / Lunch
12:30 – 1:15	OpenPrinting: Status of Ghostscript and MuPDF
1:15 – 1:45	OpenPrinting: Status of Chrome OS Printing
1:45 – 2:00	Break
2:00 – 2:45	IPP WG: cups-filters and ippusbxd

Agenda Overview – Day 2

(All times Eastern Daylight Time)

Wednesday, May 6

10:00 – 11:00	PWG Plenary
11:00 – 11:15	IPP WG : Status
11:15 – 12:00	IPP WG: IPP Everywhere™ v1.1 · IPP Everywhere Self Certification v1.1
12:00 – 12:30	Break / Lunch
12:30 – 2:00	IPP WG: Job Accounting with IPP v1.0

(All times Eastern Daylight Time)

Thursday, May 7

10:00 – 12:00	IDS WG: Status and Discussion · PWG Hardcopy Device Security Guidelines v1.0
12:00 – 12:30	Break / Lunch
12:30 – 2:00	IPP WG: IPP Enterprise Printing Extensions v2.0

Agenda Overview – Day 4

(All times Eastern Daylight Time)

Friday, May 8

10:00 – 10:20	IPP WG: Production Printing Extensions v2.0
10:20 – 12:00	IPP WG: Driverless Printing Extensions v2.0
12:00 – 12:30	Break / Lunch
12:30 – 1:45	IPP WG: 3D Printing Liaisons: Status & Guidance
1:45 – 2:00	IPP WG: Next Steps

The Printer Working Group

Steering Committee Updates

- PWG Chair: Smith Kennedy, HP Inc.

- PWG Vice-Chair: Jeremy Leber, Lexmark

- PWG Secretary: Ira McDonald, High North

27 Members – Welcome Alan Sukert!

Alan Sukert	**FUJI xerox** Google	**KYOCERA** Kyocera	**PaperCut** PaperCut Software	**TCS** Tykodi Consulting Services LLC. Tykodi Consulting Services LLC
Apple Apple Inc.	**Google** Google	**Lakeside Robotics** Lakeside Robotics	**QUALCOMM** Qualcomm	**xerox** Xerox
brother at your side Brother Industries, Ltd.	**High North Inc** High North, Inc.	**Lexmark** Lexmark	**RICOH** Ricoh	YSoft
Canon Canon	**hp** HP Inc.	**meteor network** Meteor Network	**Synaptics** Synaptics	
Danny Brennan	**(intel)** Intel	**Microsoft** Microsoft	Technical Interface Consulting	
EPSON Epson	**KONICA MINOLTA** Konica Minolta	**OKI** PRINTING SOLUTIONS Oki Data	**TOSHIBA** Leading Innovation >>> Toshiba Business Solutions	

Future Meeting Schedule

- 2020
  - August 26-27: Virtual

  - November 11-12: Virtual

- 2021
  - February 10-11: Virtual

  - May 4-6: (Joint PWG/OpenPrinting) - Hosted by ???

  - August 25-26: Virtual

  - November 9-10: Virtual

Contact chair@pwg.org if you are interested in hosting a PWG F2F event

IPP Everywhere™ Certified Printers

- https://www.pwg.org/ipp/everywhere.html

- IPP Everywhere™ Self Certification 1.0 Update 4
  - → Current certification toolset available on PWG website
  - → Released April 2020

- 412 printers now certified!
  - https://www.pwg.org/printers/ ← Newer URL
  - More on the way!

- More to come
  - IPP Everywhere™ v1.1 – In PWG Call for Objections
  - IPP Everywhere™ Self Cert v1.1 – In PWG Call for Objections
  - IPP Everywhere™ Self Cert Tools v1.1 – Available for review

Recently Approved

- IPP System Service v1.0 - Nov 22, 2019
  - https://ftp.pwg.org/pub/pwg/candidates/cs-ippsystem10-20191122-5100.22.pdf

- IPP Transaction Based Printing Extensions v1.1
  - https://ftp.pwg.org/pub/pwg/candidates/cs-ipptrans11-20200327-5100.16.pdf

- Registrations
  - Label Printing
    - https://ftp.pwg.org/pub/pwg/ipp/registrations/reg-ipplabel10-20200213.pdf

  - System Service Discovery Registration (Available for Review)
    - https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippsysdisc10-20200326.pdf

Public Relations Efforts

- Recent Press Releases
  - May 5: INCITS TC / PWG Liaison Announcement

- Pending press releases
  - Mopria / PWG Liaison Refresh

  - General IPP announcement (~May 2020)
    - IPP System Service v1.0
    - IPP Transaction-Based Printing Extensions v1.1
    - IPP Label Printing Extensions v1.0

  - IPP Everywhere™ v1.1 (~May 2020)

  - Recently approved 3D related PWG specifications (~May 2020)
    - IPP 3D Printing Extensions v1.1
    - PWG Safe G-Code Subset for 3D Printing v1.0

Process Updates

- Including Best Practices and Requirements documents in the numbering system
  - Update to "ipp-registry-policy.pdf" accepted 2020-04-20
  - Update to "pwg-namespace-policy.txt" in development

- Process v4.0 in development
  - Prioritized for completion in 2020

Process v4.0

- Original notion: Update existing Process 3.0 to merge in subsequently published PWG process documents
  - pwg-policy-call-for-obj-last-call-formal-vote-draft-2.txt (draft)
  - ipp-registry-policy-20191022.docx
  - pwg-billing-policy-20141001.txt
  - pwg-white-policy-20140505.txt
  - pwg-charter-policy-20140407.txt
  - pwg-prototype-policy-20121029.txt
  - pwg-namespace-policy-20190823.docx (latest draft)
- Revised notion: Refactor the Process document to describe the processes of the PWG to make them simple and obvious to the uninitiated reader:
  - Job Descriptions for all PWG officers and other officials
  - Proposing new work to the PWG
  - Approving new work and assigning to a PWG work group
  - PWG approval for various document types (whitepaper, standard, etc.)

Website & Infrastructure Updates

- **Moving to new web hosting facilities**
  - Started in 2018
  - Slow progress because the shift requires a shift in how the various services are managed; not just a simple "lift and drop"
    - Static Website
    - Dynamic Website
      - IPP Everywhere Certification Portal
      - Blog / article / news reporting
      - Document errata issue reporting system
    - FTP Site
    - Mailing lists

  - Updated PWG IPP Registry Policy decouples registration process from reflector archives

Toolchain Updates

- ## Current Toolset
  - Microsoft Word for specifications
  - Microsoft PowerPoint for presentations
  - Plain text for policy documents

- ## Why change?
  - Authoring specifications with Word can be a very manual and error-prone process (e.g. references are awkward)
  - Check with similar groups and see if there are things we can adopt

- ## Possible alternatives
  - LibreOffice 6 for specifications and presentations
    - Smith "experimented" with this 2017-2018
      - Conclusion: painful...

  - Metanorma: Asciidoc / Asciidoctor extension for writing specifications
    - In limited use in IETF and other SDOs
    - Ira and Mike have been investigating; some undesirable qualities
    - Smith is experimenting with using Asciidoc / Asciidoctor for recent policy document drafts

PWG Design Principles

- Purpose:
  - A document that describes the PWG's core tenets and design principles that guide the design and creation of its IPP, Semantic Model, MIBs, and other technologies

- Scope / Topics to be Covered:
  - IPP
    - Late binding principle
    - Intent vs. process for Job fidelity
    - Value of separating Job attributes from Document content
    - IPP attribute types and design patterns
      - Printer Status vs. Printer Description
      - xxx / xxx-supported / xxx-default vs. xxx / xxx-configured / xxx-supported
      - Collections vs. textual encoding of MIB sequences ("printer-finisher")
  - Semantic Model
    - Creates comprehensible view of the elements in an Imaging System, allowing better communication with other standards organizations dealing with related matters.
    - Presents the basic features necessary in communicating with imaging services, independent of the protocols used in that communication
    - Allows exploitation of the inherent parallelism between different types of imaging services (Print, Scan, Fax, etc.)

Projects on GitHub

- PWG on GitHub:
  - https://github.com/istopwg

- IPP Sample
  - https://github.com/istopwg/ippsample

- IPP Everywhere Self Certification Tools
  - https://github.com/istopwg/ippeveselfcert

- IPP Registry
  - https://github.com/istopwg/ippregistry

- PWG Books:
  - https://github.com/istopwg/pwg-books

The Printer Working Group

Workgroup Status

Work In Progress

Name	2019					2020													2021	
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb

IPP Workgroup
- IPP System Service (SYSTEM) v1.0
- IPP Everywhere v1.1
- IPP Everywhere Printer Self Certification v1.1
- IPP Transaction-Based Printing Extensions v2.0
- IPP Enterprise Printing Extensions v1.0
- IPP Production Printing Extensions v2.0
- IPP Driverless Printing Extensions v2.0
- IPP Encrypted Jobs and Documents v1.0
- IPP Registrations / White Papers
  - Job Accounting with IPP v1.0
  - IPP Label Printing Extensions v1.0
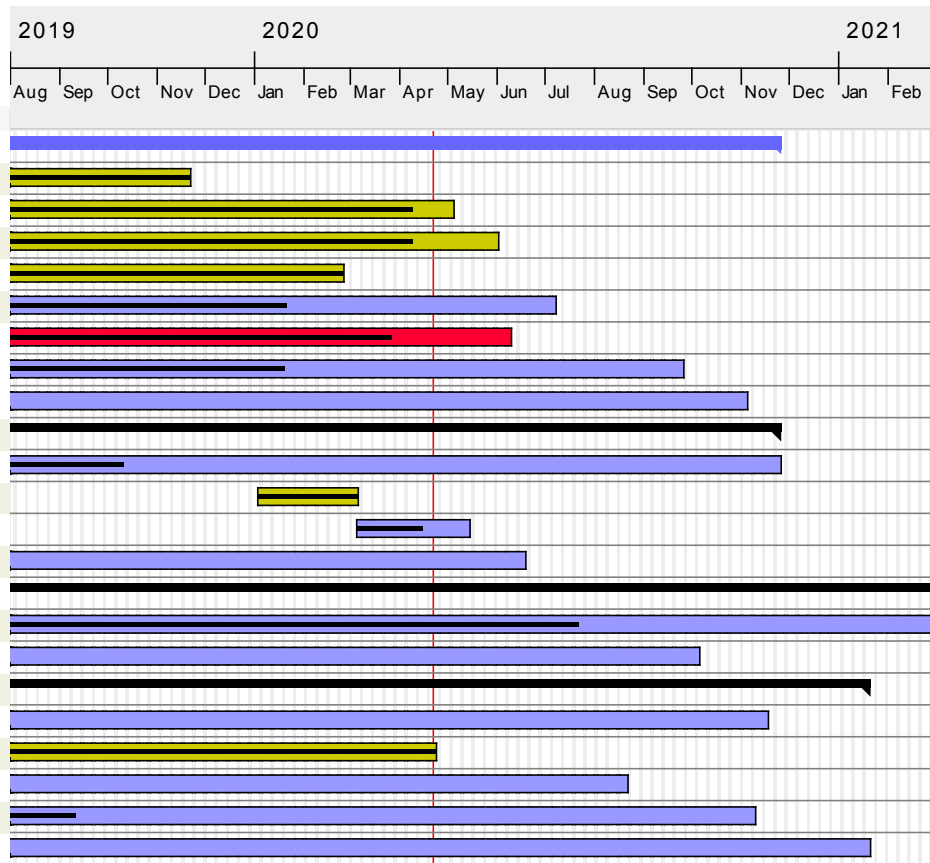 - IPP System Service Discovery v1.0
- Errata Updates

IDS Workgroup
- HCD cPP v1.0
- PWG HCD Security Guidelines v1.0

PWG SC
- Process 4.0
- PWG Design Pri...
- PWG Namespace Policy
- New Website
- PWG Design Principles

Planned **Interim** **Prototype** **Prototyped** **Stable**

IDS Workgroup Status

Alan Sukert (Xerox)

IDS: Original Charter

- Investigate and define standards for addressing general security attributes for imaging devices and services. Our general goals are to:
  - Define standard metrics and protocol bindings to assess the health of Hardcopy Devices to gauge if they should be granted access to a network.
  - Define a set of standard security and policy attributes and values for authorizing Hard Copy Devices, their services and users in a global workspace
  - Provide a general security model for other PWG standards to reference
- Provide a path for vendors to review and contribute to the definition of Common Criteria HCD Protection Profiles

IDS WG: Officers

- IDS WG Chair:
  - Alan Sukert
- IDS WG Vice-Chair
  - TBD
- IDS WG Secretary:
  - Alan Sukert
- IDS WG Document Editors:
  - Ira – HCD Security Guide

IDS: Current Status

- IDS Charter updated to reflect development of HCD Security Guide by Ira
- Focus now is on Common Criteria HCD Protection Profiles (PPs), HCD Security Guide and Hardcopy Device security standards
  - IDS Charter updated to focus the IDS WG on outreach with standards bodies involved in HCD security issues.
    - Monitoring development of Hardcopy Device collaborative PP
    - Looking at initiating interface with other standards efforts related to hardcopy devices
  - Conference Calls.
    - Reinitiated Regular IDS Conference Calls
    - Since last IDS F2F, calls held on 3/5, 3/25, 4/16 and 4/30
    - Next Conference Call tentatively scheduled for 04/14/2020

IDS: Current Status

- Focus now is on Common Criteria HCD Protection Profiles
  - HCD international Technical Committee (iTC) Bi-Weekly Meetings:
    - HCD iTC formally approved by CC Management Committee in Feb 2020
    - Since then have been holding bi-weekly HCD iTC Meetings; goal is to develop, review and publish an HCD collaborative PP v1.0 by 2Q 2022.
    - Will discuss the results of 3/20, 4/7 and 4/27 B-Weekly HCD iTC Meetings and the current HCD cPP v1.0 status at the IDS F2F Session on Thursday (May 7th)
  - Will also discuss the status of efforts at looking into establishing possible liaisons and/or more direct involvement with other standards efforts related to the security of hardcopy devices

- Developing Security Guidelines to provide guidance on current security technology and security issues
  - Will review the latest status at the IDS F2F Session on Thursday (May 7th)

The Printer Working Group

IPP Workgroup Status

Paul Tykodi (TCS), Ira McDonald (High North)

- Current charter:
  - http://ftp.pwg.org/pub/pwg/ipp/charter/ch-ipp-charter-20170615.pdf

- *Will be doing a charter update in 2020*

- 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

Officers

- IPP WG Co-Chairs:
  - Paul Tykodi (TCS)
  - Ira McDonald (High North)
- IPP WG Secretary:
  - Michael Sweet (Lakeside Robotics)
- IPP WG Document Editors:
  - Michael Sweet (Lakeside Robotics) – IPP Encrypted Jobs and Documents v1.0, IPP Everywhere v1.1, IPP Everywhere Printer Self-Certification Manual v1.1, IPP Production Printing Extensions v2.0, IPP System Service Discovery v1.0, 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

- PWG Specifications in development:
  - IPP Encrypted Jobs and Documents v1.0   - Prototype
  - IPP Everywhere v1.1   - PWG CfO
  - IPP Everywhere Printer Self-Certification Manual v1.1   - PWG CfO
  - 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:
  - IPP System Service Discovery v1.0   - Stable
  - Job Accounting with IPP v1.0   - Interim

- Recently published:
  - IPP Label Printing Extensions v1.0 (registration)
  - PWG 5100.16-2020: IPP Transaction-Based Printing Extensions v1.1

- 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 printers currently listed
  - Fourth 1.0 self-certification tools update released in April 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): 2 issues
  - PWG 5100.5-2019 (Document Object): 3 issues
  - PWG 5100.6-2003 (Page Overrides): 1 issue
  - PWG 5100.9-2009 (Printer State Extensions): 1 issue
  - PWG 5100.12-2015 (IPP 2.0, 2.1, and 2.2): 2 issues
  - PWG 5100.15-2014 (FaxOut): 2 issues
  - PWG 5100.18-2015 (Infrastructure Extensions): 5 issues
  - PWG 5100.19-2015 (Implementor's Guide 2.0): 6 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): 4 issues
  - PWG 5100.13-2012 (JPS3 - Driverless Printing): 12 issues
  - PWG 5100.14-2013 (Everywhere v1.0): 11 issues
  - PWG 5100.20-2016 (Everywhere Self-Cert v1.0): 3 issues

The Printer Working Group

Liaison Status

Trusted Computing Group (TCG)

- **Next TCG Members Meetings**
  - **15-18 June 2020 – Brussels, Belgium – CANCELED – no Virtual F2F**
  - **12-15 October 2020 – New Orleans, LA – Ira to call in**
- **Trusted Mobility Solutions (TMS) – Ira is co-chair and co-editor**
  - **Scope: mobile phones, telecom networks, enterprises, NFV/SDN**
  - **Formal – GP (TEE, SE), ETSI (NFV/MEC), ATIS (5G Security)**
  - **Informal – 3GPP, ITU-T, GSMA, SAE, IETF, US NIST**
  - *TCG TMS Use Cases v2 – published September 2018*
- **Mobile Platform (MPWG) – Ira is co-editor**
  - **Scope: mobile phones, tablets, laptops, etc.**
  - **Formal – GP (TEE, SE), ETSI (NFV/MEC), ATIS (5G Security)**
  - *TCG Runtime Integrity Preservation for Mobile Devices – Nov 2019*
- **Recent Specifications**
  - **http://www.trustedcomputinggroup.org/resources**
  - *TCG Algorithm Registry r1.32 – review April 2020*
  - *TCG TPM 2.0 Library r1.59 – March 2020*
  - *TCG Guide to TPM Changes r1.38 to r1.59 – March 2020*
  - *TCG TSS 2.0 Feature API (FAPI) – review March 2020*
  - *TCG TSS 2.0 Enhanced System API (ESAPI) – review February 2020*

- **Next IETF Members Meetings**
  - **IETF 108 – 25-31 July 2020 – Madrid, Spain – Ira to call in**
  - **IETF 109 – 14-20 November 2020 – Bangkok, Thailand – Ira call in**
- **Transport Layer Security (TLS)**
  - **TLS 1.3 Extension Cert-Based Auth with External PSK – March 2020
    https://tools.ietf.org/html/rfc8773**
  - **Applying GREASE to TLS Extensibility – January 2020
    https://tools.ietf.org/html/rfc8701**
  - **TLS/1.3 – RFC 8446 – August 2018
    https://tools.ietf.org/html/rfc8446**
  - **Hybrid key exchange in TLS 1.3 – draft-00 – April 2020
    https://datatracker.ietf.org/doc/draft-ietf-tls-hybrid-design/**
  - **Importing External PSKs for TLS – draft-04 – April 2020
    https://datatracker.ietf.org/doc/draft-ietf-tls-external-psk-importer/**
  - **DTLS/1.3 – draft-37 – March 2020 – IETF Last Call
    https://datatracker.ietf.org/doc/draft-ietf-tls-dtls14/**
  - **TLS Certificate Compression – draft-10 – January 2020 – RFC Editor
    https://datatracker.ietf.org/doc/draft-ietf-tls-certificate-compression.txt**

- **Security Automation and Continuous Monitoring (SACM)**
  - **SACM Endpoint Posture Collection Profile – draft-01 – February 2020 – WG Last Call**
    https://datatracker.ietf.org/doc/draft-ietf-sacm-epcp/
  - **Concise Software Identifiers – draft-13 – November 2019 – WG Last Call**
    https://datatracker.ietf.org/doc/draft-ietf-sacm-coswid/
  - **SACM Architecture – draft-04 – October 2019**
    https://datatracker.ietf.org/doc/draft-ietf-sacm-arch/
- **Concise Binary Object Representation (CBOR)**
  - **Concise Binary Object Representation – draft-13 – March 2020 – to IETF Last Call**
    https://datatracker.ietf.org/doc/draft-ietf-cbor-7049bis/
  - **CBOR Tags for Typed Arrays – RFC 8746 – February 2020**
    https://tools.ietf.org/html/rfc8746
  - **CBOR Sequences – RFC 8742 – February 2020**
    https://tools.ietf.org/html/rfc8742
  - **Concise Data Definition Language (CDDL) – RFC 8610 – June 2019**
    https://tools.ietf.org/html/rfc8610 - **JSON/CBOR schema**

- **Remote ATtestation ProcedureS (RATS)**
  - **TPM-based Network Device RIV – draft-05 – April 2020**
    https://datatracker.ietf.org/doc/draft-fedorkow-rats-network-device-attestation/
  - **YANG Data Model for CHARRA using TPMs – draft-01 – March 2020**
    https://datatracker.ietf.org/doc/draft-ietf-rats-yang-tpm-charra/
  - **RATS Architecture – draft-02 – March 2020**
    https://datatracker.ietf.org/doc/draft-ietf-rats-architecture/
  - **Time-Based Uni-Directional Attestation – draft-02 – March 2020**
    https://datatracker.ietf.org/doc/draft-birkholz-rats-tuda/
  - **Entity Attestation Token (EAT) – draft-03 – February 2020**
    https://datatracker.ietf.org/doc/draft-ietf-rats-eat/
- **IRTF Crypto Forum Research Group (CFRG) – future algorithms**
  - **Randomness for Security Protocols – draft-11 – April 2020**
    https://datatracker.ietf.org/doc/draft-irtf-cfrg-randomness-improvements/
  - **Pairing-Friendly Curves – draft-03 – March 2020**
    https://datatracker.ietf.org/doc/draft-irtf-cfrg-pairing-friendly-curves/
  - **KangarooTwelve – draft-02 – March 2020 – RG Last Call**
    https://datatracker.ietf.org/doc/draft-irtf-cfrg-kangarootwelve/

- **Linux Foundation OP Google Summer of Code 2019**
  - **Thanks to OpenPrinting coordinators, mentors, students!**
  - **Lots of good work & contributions to PWG GitHub projects**
  - **Close reading of PWG specs revealed additional errata**
- **Linux Foundation OP Google Summer of Code 2020**
  - **https://developers.google.com/open-source/gsoc**
  - **Student project selections from Admins on 30 April 2020**
  - **Accepted student projects announced on 4 May 2020**
- **Linux Foundation OP New Website**
  - **https://openprinting.github.io/**
  - **https://openprinting.github.io/news/**
  - **Driverless Printing pages w/ PWG IPP Everywhere™ logo https://openprinting.github.io/driverless/01-standards-and-their-pdls/**
  - **OP website issues page https://github.com/OpenPrinting/openprinting.github.io/issues**

Mopria

- Mopria liaison to PWG : Michael Rhines (Qualcomm)

- New 2-year liaison agreement signed April 3, 2020

- Discussing new opportunities synergies

INCITS TC

- PWG / INCITS TC Liaison established April 15, 2020

- Paul Tykodi will represent the PWG in INCITS TC activities

- INCITS Digital Manufacturing Technical Committee
  - The IEEE-ISTO Printer Working Group has established a liaison relationship with INCITS Digital Manufacturing Technical Committee https://www.businesswire.com/news/home/20200505006085/en/International-Committee-Information-Technology-Standards-INCITS-IEEE-ISTO.
  - The INCITS Digital Manufacturing TC is the current US TAG for ISO/IEC JTC 1 WG 12 (3D Printing and Scanning). The Printer Working Group is monitoring the activities of JTC 1 WG 12 via the INCITS liaison relationship
    - ISO/IEC JTC 1 WG 12 3D Printing and Scanning eCommittee - https://www.web3d.org/sites/default/files/attachment/node/2326/edit/06_ByoungNamLee_JTC1_WG12_report_3D_Printing_and_ScanningSeoulJanuary2019.pdf

3D / Additive Manufacturing Liaisons

- America Makes & ANSI Additive Manufacturing Standardization Collaborative (AMSC) -
  - https://www.ansi.org/standards_activities/standards_boards_panels/amsc/America-Makes-and-ANSI-AMSC-Overview. The IEEE-ISTO Printer Working Group is participating in the AMSC initiative.

- ASTM Committee F42 on Additive Manufacturing Technologies - https://www.astm.org/COMMITTEE/F42.htm
  - The IEEE-ISTO Printer Working Group standardization efforts intersect with the activities of at least two ASTM F42 subcommittees.
    - Subcommittee F42.08 Data
    - Subcommittee F42.91 Terminology
  - The purpose of the liaison agreement is to keep the standardization efforts of ASTM F42 and the IEEE-ISTO PWG synchronized in areas where both organizations are actively working.
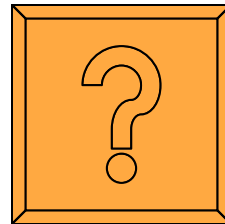
- 3MF Consortium
  - https://www.3mf.io

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Possible Future 3D / Additive Manufacturing Liaisons

- ISO TC171 SC2 WG12 (PDF Metadata) - https://www.iso.org/committee/53674.html
    - The IEEE-ISTO Printer Working Group has been asked to form a Category C liaison with ISO TC171 SC2 in order to participate in a new foundational metadata for 3D content contained in a PDF file standardization effort to be undertaken by WG12.

- 3D PDF Consortium - www.3dpdfconsortium.org
    - The 3D PDF Consortium is currently the US TAG for ISO TC171 SC2. The IEEE-ISTO Printer Working Group will likely be working with the 3D PDF Consortium in some fashion as part of the proposed ISO TC171 SC2 Category C liaison effort.

- Society of Manufacturing Engineers (iRAMP)
    - Interactive Rapid Additive Manufacturing Portal – www.sme.org/iramp/

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Other Questions / Comments

Next PWG Face-to-Face Meeting

August 26-27: Virtual

Monitor pwg-announce@pwg.org or the PWG meeting page for more info.

Contact chair@pwg.org if you are interested in and willing to hosting a PWG face-to-face meeting