



The Printer Working Group

IPP Workgroup Session, Day 1

February 14, 2017

Sunnyvale, CA (Apple)

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
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February 14, 2017

When	What
2:30 - 3:00	IPP Workgroup Status and Updates
3:00 - 5:00	IPP System Service & White Paper

February 15, 2017

When	What
9:00 - 9:45	IPP Finishings 2.1
9:45 - 11:45	IPP 3D and Related Standards
11:45 - 12:00	Next Steps



- Current charter:
 - <http://ftp.pwg.org/pub/pwg/ipp/charter/ch-ipp-charter-20151225.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 (SYSTEM)
 - Michael Sweet (Apple) – IPP System Service (SYSTEM), IPP 3D Printing Extensions
 - Smith Kennedy (HP Inc.) – IPP Finishings 2.1

Status (1/2)



- **PWG Specifications in development:**
 - IPP 3D Printing Extensions (3D) - Completed PWG Formal Vote
 - IPP Finishings 2.1 (FIN) - PWG Formal Vote
 - IPP System Service (SYSTEM) - Interim Draft
- **Recent Candidate Standards:**
 - PWG 5100.20-2016: IPP Everywhere Printer Self-Certification Manual v1.0 (SELFCERT)
- **Recent IETF RFCs:**
 - RFC 8010: Internet Printing Protocol/1.1: Encoding and Transport
 - RFC 8011: Internet Printing Protocol/1.1: Model and Semantics



- 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>
 - 25 printers currently listed
 - 1.0 self-certification tools update released in October 2016
- IPP Sample Code:
 - Github repository:
 - <https://github.com/istopwg/ippsample>
 - Fork of CUPS code includes ippfind, ippproxy, ippserver, and ipptool



IETF IPP/1.1 Updates

- RFCs 8010 and 8011 have been published which replace (obsolete) RFCs 2910, 2911, 3381 (deprecated job progress attributes), and 3382 (collection attribute syntax)
- Published RFCs:
 - <http://tools.ietf.org/html/rfc8010>
 - <http://tools.ietf.org/html/rfc8011>
 - *RFCs will eventually be advanced to IETF Internet Standard through status change (IESG process described in RFCs 2026 and 6410)*
- Proposed schedule:
 - Request IESG change of status in July 2017 (six months after the publication of RFCs 8010 and 8011)



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 1 of self-certification tools on October 28th, 2016
- Planning future 1.1 errata update for manual and tools in 2017:
 - More tests (Cancel-My-Jobs, Close-Job, Identify-Printer)
 - Other necessary changes that are not simple bug fixes in the tools/submission portal
- Proposed Schedule:
 - 1.1 errata update: Q1/Q2 2017



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Break



IPP System Service (SYSTEM)

- Current interim draft at:
 - <http://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippsystem10-20170212-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
- Proposed Schedule:
 - Prototype draft in Q1/Q2 2017



"Get-User-Printer-Attributes" Proposal

- White Paper:
 - <http://ftp.pwg.org/pub/pwg/ipp/whitepaper/tb-userop-20170201.pdf>
- Get-User-Printer-Attributes Operation
 - Provides a Get-Printer-Attributes response filtered by the most authenticated user
 - Useful for things like limiting which users can print in color, use a particular letterhead, etc.
 - Clients that support the operation will only show available print options to the user instead of reporting an error (or having the options silently overridden by the Printer) when the user submits the job
 - Needed because Get-Printer-Attributes is not defined as an authenticated operation (so no clients support it), nor does it include the "most authenticated user identity" as a filter criteria (which isn't something we can expose using "printer-get-attributes-supported")



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IPP Workgroup Session, Day 2

February 15, 2017

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IPP Finishings 2.1

- Current stable draft:
 - <http://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippfinishings21-20170111-rev.pdf>
- PWG Formal Vote ends February 17, 2017 (this Friday)
 - <http://www.pwg.org/pipermail/pwg-announce/2017/003777.html>
- One reported issue/question concerning how to include the 'jog-offset' finishing process
 - Answer is to use a "finishing-template" value of 'jog-offset'
 - Will investigate whether a "jogging" collection is necessary for "finishings-col" in a future update
 - Also 'mailbox' and 'stacker' values for "output-bin" Job Template attribute



IPP 3D Printing Extensions

- Current stable draft:
 - <http://ftp.pwg.org/pub/pwg/ipp/wd/wd-ipp3d10-20170110-rev.pdf>
- PWG Formal Vote Concluded on February 10, 2017
 - Results: PASSED with 8 votes - 5 yes and 3 abstain
- Editorial comments:
 - Two requests to change attribute names and values (next two slides)
 - One request to add (missing) Build Platform and Chamber "printer-state-reasons" values
 - Need to update RFC 8010/8011 references (new publication date)
 - Minor changes to definitions in terminology (harmonize with ISO/ASTM 52900:2015)
- Next steps:
 - Publication: ASAP
 - Interoperability testing: Q1 2018?
 - PWG Semantic Model Schema for 3MF
 - Continue to develop IPP sample code, add conformance tests?

IPP 3D Editorial Change Request 1

- Request to change name of "print-rafts" Job Template attribute to "print-base"
 - It is more than just rafts - values include 'brim', 'raft', and 'skirt'
 - Current name is a holdover from existing 3D printer UI which started with rafts and then added brims and skirts
 - No change in semantics, just a wording change
- Also affects the 'raft' value for "material-purpose"
- Change list:
 - "print-rafts" -> "print-base"
 - "print-rafts-actual" -> "print-base-actual"
 - "print-rafts-default" -> "print-base-default"
 - "print-rafts-supported" -> "print-base-supported"
 - "material-purpose" value 'raft' -> 'base'



IPP 3D Editorial Change Request 2

- Request to change name of "printer-bed-temperature" Job Template attribute to "platform-temperature"
 - We use both "Print Bed" and "Build Platform" in the document, but "Build Platform" seems to be the more common name
 - No change in semantics, just a wording change
- Change list:
 - "printer-bed-temperature" -> "platform-temperature"
 - "printer-bed-temperature-actual" -> "platform-temperature-actual"
 - "printer-bed-temperature-default" -> "platform-temperature-default"
 - "printer-bed-temperature-supported" -> "platform-temperature-supported"
 - Global change of "Print Bed" and "Printer Bed" to "Build Platform"
 - Global change of "build platform" to "Build Platform"



IPP 3D Editorial Change Request 3

- Request to add one Chamber and several Build Platform state keywords for "printer-state-reasons"
 - We have them for all other identified subunits, but not for the Build Platform
 - Missing the "failure" state keyword for the Chamber.
- Change list:
 - Add 'chamber-failure', 'platform-cooling', 'platform-failure', 'platform-heating', 'platform-temperature-high', and 'platform-temperature-low' to section 9.2 (printer-state-reasons)



PWG Semantic Model Schema

- Auto-generated XML schema from IANA IPP registry
- Current "draft" schema available on IPP registry project page:
 - <https://istopwg.github.io/ippregistry>
- Need to review and prepare example job tickets



Other 3D Standards Activities

- ANSI Additive Manufacturing Standardization Collaborative (AMSC)
 - <http://www.ansi.org/amsc>
- ASTM F42
 - <https://www.astm.org/COMMITTEE/F42.htm>
 - ISO/ASTM 52900:2015, "Additive manufacturing -- General principles -- Terminology"
- ISO TC 261
 - http://www.iso.org/iso/iso_technical_committee?commid=629086
 - ISO 17296-4:2014, "Additive manufacturing -- General principles -- Part 4: Overview of data processing"
 - ISO/ASTM 52915:2016, "Specification for additive manufacturing file format (AMF) Version 1.2"
- National Institute of Standards and Technology (NIST)
 - <https://www.nist.gov/topics/additive-manufacturing>
 - Involved with AMSC and others

- AMSC is trying to coordinate the standards activities of multiple organizations - not writing their own standards
- Current effort is a roadmap document spanning all areas of additive manufacturing development, which identifies known standards and "gaps" where standards are needed
- Five major working groups: Design, Process and Materials, Qualification and Certification, Nondestructive Evaluation, and Maintenance
 - The PWG's work mainly falls under the Process Control Sub-Group (part of Process and Materials)
- Focus is largely on material and device standardization and validation for metal powder printing
 - Quality control issues are a major driving issue - very hard to get consistent, repeatable results



AMSC - Process Control Sub-Group

- Machine interfaces are largely seen as an "unsolvable" problem
 - Probably due to the process orientation (implementation details differ wildly between vendors) - no attempt to develop an abstract data model or interfaces like we have in IPP/PWG SM
- Currently no recognition of document formats other than STL and AMF, e.g., 3MF and PDF with 3D content
- We have reached out to AMSC to be recognized as a standards organization that is addressing these issues
 - We have been added to the AMSC Roadmap document
 - Working with ISTO to establish proper liaison relationship with AMSC and other standards bodies
 - Formal liaison needed due to differing IP policies/openness



- Also responsible for the joint ISO/ASTM terminology document (which is basically part 1 of the 17296 series)
 - AMSC wants everyone to use/reference the terminology document
 - PWG can't use a normative reference to a non-free standard
 - but the terminology in the IPP 3D spec is already almost identical...
 - Still working out the details, but will not hold up publication of IPP 3D for this
- Data processing overview specification is all about data exchange requirements - no discussion of how to interface Clients to Printers, provide status and capabilities, etc.



Where IPP 3D Fits

- IPP provides a high-level vendor-neutral machine interface between Clients and Printers (or print services) that allows Clients to discover Printers, query for status and capabilities, submit jobs, and then query the status of those jobs
- Capabilities can be extended to include things like material or process conformance to a particular standard (currently being defined by ANSI/ASTM/ISO)
- Finishing processes can be extended to include things like annealing, polishing, etc., although typically such things are done by separate machines
- Job processing already supports multiple document formats identified by MIME media type, i.e., supporting STL and AMF is already possible
- In short: we are right in the middle

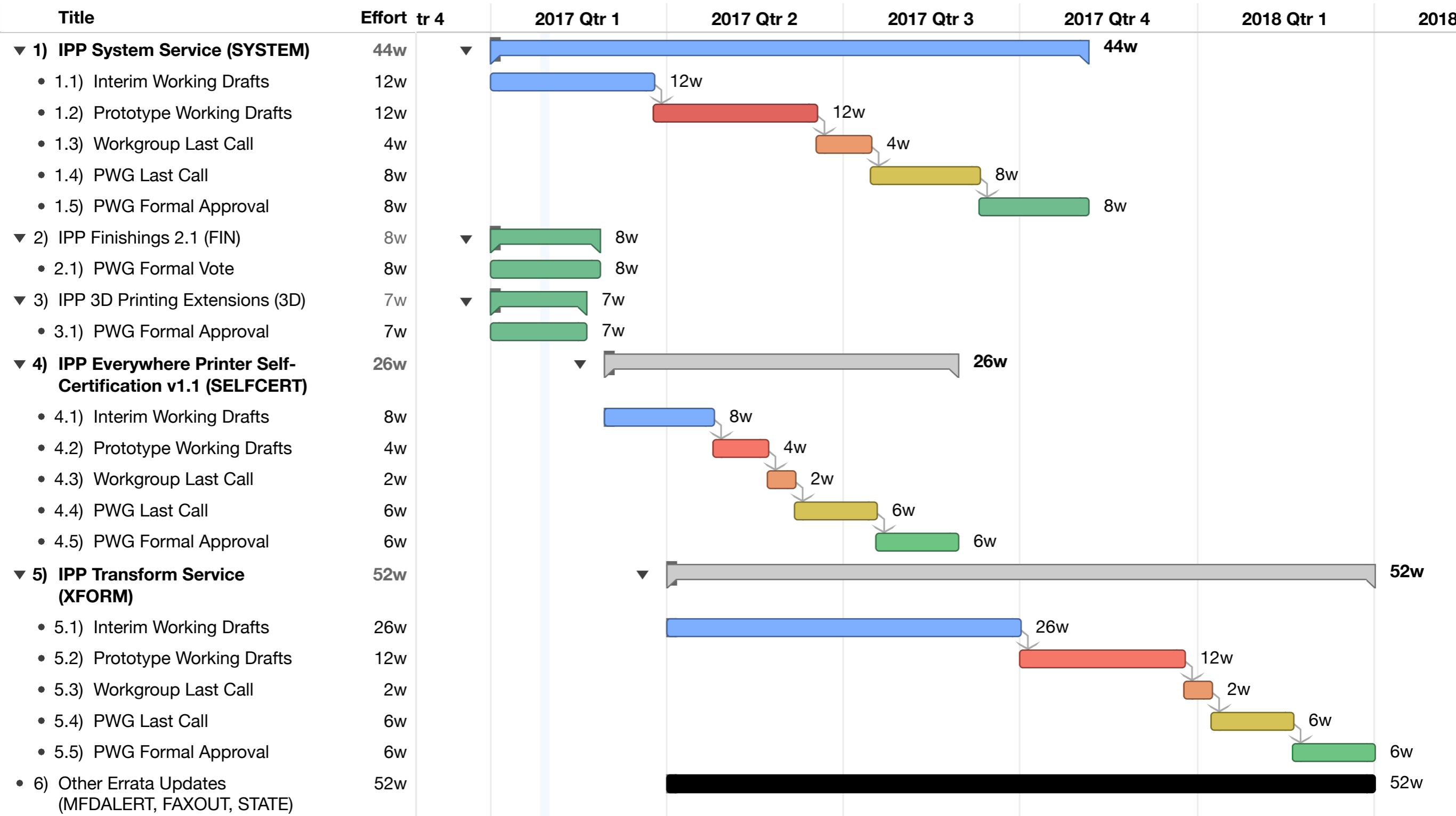


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Next Steps



Next Steps





Next Steps

- Advance IPP/1.1 to IETF Internet Standard
 - Request change of status in July 2017
- IPP System Service
 - Prototype working draft in Q1/Q2 2017
- IPP 3D Printing Extensions
 - Publish approved candidate standard
 - Other work/liaisons as appropriate
- IPP Finishings 2.1
 - Complete PWG Formal Vote
- IPP Everywhere Printer Self-Certification Manual v1.1
 - Interim working draft in Q1/Q2 2017
- IPP Transform Service v1.0
 - Initial working draft in Q2 2017
- Other errata (MFD Alerts, etc.) in 2017
 - Specific documents for 2017?
 - Volunteers?



More Information

- We welcome participation from all interested parties
- IPP Working Group web page
 - <http://www.pwg.org/ipp/index.html>
- Subscribe to the IPP mailing list
 - <https://www.pwg.org/mailman/listinfo/ipp>
- IPP WG holds weekly phone conferences announced on the IPP mailing list
 - Discuss: Move IPP calls to Thursdays at 2pm or 3pm ET?
 - Next conference calls currently scheduled for Wednesday, March 1, 2017 and March 15, 2017 at 1pm ET