# Managed Print Services and Imaging Device Standards – The PWG

## The New Printing Environments

It has been observed that printers, and hardcopy devices in general (printers, scanners, copiers, and facsimile machines), are "mature" products. Until some new disruptive technology comes along, hardcopy devices will be undergoing modest feature improvement and function consolidation. However, hardcopy devices today are seldom standalone devices; hardcopy service providers typically need to operate within an IT-systems context. Therefore, both equipment manufacturers and service providers must address the continuing change in the environment in which these devices and services operate.

These changes are driven by issues of mobility, security, economy, environmental considerations, and legislated requirements, among other things. They affect where, how and when people use hardcopy services. They affect who has access and how maintenance and service may be performed. These are changes over which  neither the manufacturer nor the service provider have no control, but which they must somehow accommodate. By developing the industry standards that address how hardcopy devices can best operate in these environments, the PWG pursues its objective of allowing printers, multi-function devices and other hardcopy devices, and the applications and operating systems that support them, to work together better.

## Advantages of Industry Device Standards for Printers and MFDs.

Although product differentiation by features, functionality and cost is important, users have a right to expect basic compatibility among similar hardcopy devices. Further, users expect hardcopy devices and services to operate how and where they want to use them, to be reliably maintained in these environments, and to be compatible with the networks in which they operate. Basically, hardcopy devices and services must interface correctly and consistently with everything with which they interact.

Many of the protocols and applications on the networks were designed for servers and workstations. Hardcopy devices include all the components and complexity of servers and workstations, but they have the additional complications of direct human interaction, consumables, and hardcopy media (i.e., paper), and often a customized operating system. Therefore, there often must be some modification or extension of the way hardcopy devices and services interact with network protocols and applications, compared with other devices.

Establishing and implementing industry standards provides benefits at all levels. Standards are verified by multiple implementations and in different environments. Multiple implementations of standard features, and user feedback on advantages and problems allow the standard makers to refine and improve the standards, understand new requirements and develop new solutions. Therefore:

- manufacturers can have confidence that the interfaces will work,
- interfacing elements know what to expect with these devices,
- consumers can select products based on their features rather than being concerned whether they will work in the intended environment, and
- those responsible for installation and maintenance, both on the manufacturer and dealer side, can concentrate of quality of service and expanding features rather that getting bogged down with incompatibilities and irregularities.

## The PWG

The Printer Working Group (PWG) is a Program of the IEEE Industry Standards and Technology Organization (ISTO) with member organizations including

- Multi-function device manufacturers
- Print server developers
- Operating system providers
- Print management application developers, and
- Other interested parties

**Objective**

The PWG develops and publishes standards, 'best practice' documents and informational papers that allow printers, multi-function devices and other hardcopy devices, and the applications and operating systems that support them, to work together better.

The PWG and its predecessor standards groups have developed imaging-centric specifications in the past. However, recent and current efforts are primarily in determining how to consistently address the unique hardcopy device and service characteristics in a way that is optimum both for using and maintaining hardcopy services and that is compatible with the networking, security and mobility requirements of the user. The PWG has and continues to work with the major standards organizations that are defining our communications and computing environment to ensure that hardcopy products can operate optimally within the established capabilities and constraints. These organizations include the Advanced Function Presentation Color Consortium (AFPCC), Distributed Management Task Force (DMTF), IEEE Standards Association (IEEE), Internet Engineering Task Force IETF), Trusted Computing Group (TCG) and World Wide Web Consortium (W3C). The PWG is currently seeking to establish liaison status with the subcommittee for Office Equipment at the International Organization for Standardization (ISO-JTC1-SC28.)

Members understand that developing and implementing standards for hardcopy equipment and services is a necessary part of achieving the objective of allowing "… hardcopy devices, and the applications and operating systems that support them, to work together better."

**Members**

Although meetings and conference calls are open, formal voting to adopt standards is limited to members in good standing. Current members of the PWG are:

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| Apple | MPI Tech |
| Brother Industries | MWA Intelligence Inc. |
| Canon | NEC Display Solutions |
| Coretronic | Northlake Software, Inc. |
| Dell | Oki Data |
| Epson | Samsung Electronics |
| Fuji Xerox | Sharp Labs of America |
| Hewlett-Packard | Technical Interface Consulting |
| High North, Inc. | Toshiba |
| Ricoh | Tykodi Consulting Services |
| Konica Minolta | Xerox Corporation |
| Kyocera Corporation | Zoran Imaging Division |
| Lexmark International | David Whitehead |
| Microsoft | |

**You Are Using PWG-Developed Standards**

The PWG and its forerunner organizations have been working for over 20 years on developing standards for Printing and Hardcopy Services. These included:

*MIBs*

Management Information Base (MIBs) are highly structured representations of the elements necessary to manage a device or service. MIBs are the information structure supported by devices and used by the most prevalent network management protocol, the Simple Network Management Protocol (SNMP), to determine the capabilities and state of devices, services and individual jobs and, as applicable, to configure these things. Although usually hidden by a management application, whatever remote management of hardcopy devices and services you perform probably uses MIBs.

MIBs can be public standards or private proprietary implementations. By establishing and encouraging the use of public standard MIBs, the PWG allows more consistent management of hardcopy devices and

services across different products and different manufacturers. Some of the MIBS for which the PWG is responsible are:

- Printer MIB: An almost universally implemented MIB for determining the capabilities and state of, and for configuring, a printer
- Finishing MIB: Widely implemented MIB in higher end devices for external finishing units.
- Job MIB: Definitive MIB for determining the nature and state of an imaging job.
- Printer Port Monitor MIB: The minimal set of device characteristics used to support automatic installation of printers in Microsoft Windows and Apple Mac OS X operating systems
- Imaging State and Counter MIBs: An extensive set of device and service state and counter objects primarily used in accounting and charging applications.

*Printing Protocols and Languages*

Communications protocols define a sequence of request and response messages, typically including the format of these messages. Printer Languages refer to the way in which the information to be printed is represented and formatted. Some printer languages, such as Printer Command Language (PCL) consist of both a set of defined operations and response formats and an encoding scheme for print image information. Most PWG efforts have been adapting or re-defining how network protocols and communication capabilities can be used to best effect for printing.

- Internet Printing Protocol: Print Jobs used to be delivered over a network by a "raw port" (just TCP/IP) or by Line Printer Daemon protocol (LPR/LPD). These methods provided virtually no information on the capabilities or the state of a printer or a print job. IPP was created to use standard Internet tools and technologies to query printer capabilities, submit print jobs, inquire, about the status of print jobs and printers, and cancel print jobs. IPP is the primary print protocol for Macintosh and Linux systems and defined the printing model used by the Microsoft WS-Print protocol.
- XHTML-Print: With the advent of internet capable cell phones and internet appliances, users needed to print content from sources that did not have the capability to create or format complex printing jobs. This need was addressed by an adaptation of the eXtensible Hypertext Markup Language (XHTML) to printing to become the basic print language for Bluetooth and UPnP Printing.

## Current Activities & Working Groups

As Hardcopy Services become more fully enmeshed into the changing IT environment, the PWG is dealing with how the unique characteristics of these Services can be addressed. There are four semi-permanent working groups currently active and one group in the formative state.

### WIMS - Device and Service Management

With the increased concern with power management, WIMS has deveeloped a Imaging Power Management model specification. To allow access to these management and status elements via SNMP. a companion Power Management MIB has also been developed. These documents are close to being approved.

The workgroup recently completed the remapping of the primary Printer MIB objects into a Distributed Management Task Force (DMTF) Common Information Model (CIM) format in preparation for the eventual phase over to Web Services-based management. Future efforts include continuing MIB maintenance and update, completion of the CIM Print Profile, and addressing logging for Accounting and Maintenance in a way compatible with the audit trail logging being defined for security purposes.

### IPP – Print Protocols and Mobile Printing

The printing model defined by IPP is so flexible that there have been almost 30 standards extending and expanding upon it. The IPP workgroup is completing an effort to consolidate the features in these various documents into three well-defined IPP implementation levels: IPP/2.0, IPP/2.1 and IPP/2.2. The workgroup is also embarking on a further extension to IPP called IPP Everywhere. This is envisioned to define a set of protocols including basic IPP, a "discovery" protocol, and one or two Print Languages. It

will provide a printing capability including discovery, "driverless" printing, and extensive ability to report printer and job capabilities and status information to the user. Although IPP Everywhere is focused on mobile printing, many of its features will be very useful for all applications. IPP Everywhere is distinct from Cloud Printing but shares many of the same feature requirements, and it may be considered for addressing at least one link in the Cloud Printing communications chain.

## Imaging Device Security – Network, Device, Content

Whether it is protection from hackers, disgruntled employees, industrial espionage, foreign or terrorist intelligence operations, noisy co-workers, or just inadvertent mistakes, security is a big issue with many aspects. The IDS group is working to allow hardcopy devices to come under Network Access Control with the definition of HCD Health Assessment Attributes and Remediation methods. Also being addressed are the application of standard Authentication and Authorization solutions and Security Audit Logging to hard copy devices. Future activities will consider how to address the other security threats and vulnerabilities identified in IEEE Std 2600™ -2008, IEEE Standard for Information Technology: Hardcopy Device and System Security.

## Modeling of Imaging Services and Operations

Historically, printing from computers, image scanning, copying and fax have had distantly different origins and have involved different cultures in manufacturing, sales, maintenance and use. But the growing ubiquitousness of the computer and development of the digital page printer, which bears little resemblance to the old character or line printers, opened the way for integrating the different hardcopy functions. With its extensive computing and network communication capabilities and the addition of a scanning mechanism, the printer evolved into a hardcopy processing device variously called an MFP (multifunction printer, multifunction peripheral), MFD (multifunction device) or All-in-One. Whether one thinks of the devices providing these services as expanded printers or digital copiers with print and scan capability, printing, scanning, copy and fax have now merged into hardcopy services. There is benefit to the manufacturer, the application generator, service supplier and the user to drop the historical distinctions in terminology and operations and consider these as parallel hardcopy services. The MFD Workgroup is developing a model of these services, based upon the IPP model, which defines a standard terminology, set of interface operations and imaging job handling capabilities for all hardcopy services.

## Cloud Printing Initiative

With several different approaches being marketed as "Cloud Printing", the PWG has invited interested parties to discuss this topic at Cloud Printing sessions held in conjunction with Plenary meetings. The PWG has also established a mailing list for the continued exchange on ideas to assist in the developing a stable, standard set of terminology and techniques. Most of the Cloud Printing approaches, including Google Cloud Print, make use of a "Cloud" server to which the user sends his job and from which the print service receives the job. This is a main distinction from IPP Everywhere, which does not require the intermediary server. There are many common requirements among the various Cloud Printing approaches and between them and IPP Everywhere. The PWG intent is to address the common requirements in compatible ways. This would make it more practical for printers to support multiple Cloud Printing implementations.

## Questions and Feedback

Over the next few months, the MPSA will be including PWG-generated articles on those imaging subjects that we believe are of significant importance to the Managed Print Services industry. An outline is given below. To improve these articles and provide the information that you would most like, it would be helpful to have your feedback on the subjects and level of detail most appropriate to your needs. Further, although the specification writers are members of the imaging services and equipment industry, we would like to solicit information identifying your needs, use cases and problems independent of and unbiased by any specific supplier. Therefore, each article will reference a survey on the subject matter of the article , querying things we would like to know and things you would like know about. If you are interested in the subject, we request you take the survey after you read the article. There is also a survey associated with this article, dealing with general topics. If you think this series of articles may be useful and particularly if

you want to know about something specific (or want us to know about something specific), please participate in this survey.

Schedule

1. **(October)**　　**Managed Print Services and Imaging Device Standards – The PWG**
   a. The New Printing Environments
   b. Advantages of Industry Device Standards for Printers and MFDs.
   c. The PWG
      i. Objectives
      ii. Members
      iii. PWG-Developed Standards
   d. Current Activities & Working Groups
      i. Device and Service Management
      ii. Protocols – Mobile and Cloud Printing
      iii. Security – Network, Device, Content
      iv. Modeling of Imaging Services and Operations
   e. Questions and Feedback

2. **(November)**　**Hardcopy Security– Network Access Control**
   a. What, Why, How?
   b. Registering Hardcopy Devices
   c. Recovering from Rejection - Remediation
   d. Questions and Feedback

3. **(December)**　**Hardcopy Device Power Management**
   a. What, Why and How? Concept and Objectives
   b. Examples/ Scenarios
   c. The guts - Management Elements and the Power Management MIB
   d. What are your Power Management needs?

4. **(January)**　　**Management, Accounting and Device Utilization Issues**
   a. Access – Authentication and Authorization
      i. Device and Information Security Issues
      ii. Miss-Use and Unauthorized Use
      iii. Affect on external maintenance and support
   b. Logging
      i. For Security - Audit Trail
      ii. Accounting – Billing and Charge Assignment
   c. Questions and Feedback

5. **(February)**　　**The New Printing/Hardcopy Environments - Cloud Printing, Mobile Printing, Driverless Printing, Wireless Printing, Green Printing –**
   a. Definitions
   b. Commonalities and Differences
   c. Objectives in Development and Evolution
   d. Questions and Feedback

6. **(March)**　　**Cloud Printing**
   a. Why are there so many different implementations?
      i. Cloud Server -Goggle-Type
      ii. Email Type
      iii. Other
   b. How will it affect Printers/MFDs and how they are supported?
      i. Printer Registration
      ii. Discovery

iii. State and Status Information
iv. Job Delivery
c. Questions and Feedback

7. **(April)        Mobile Printing**
    a. Different implementations
    b. Impact on Devices and support

8. **"(May)        Green Printing"**
    a. Design, Set-up and Use considerations
    b. Power Efficiency
    c. Consumables Efficiency
    d. Environmental vs Economic Considerations
    e. Questions and Feedback

9. **(June) Hardcopy Security – User and Administrative Information Security**
    a. What needs to be secured, what from, and why?
        i. User's Information Security
        ii. Device and Administrative Data Security
    b. Regulatory Compliance Issues
    c. Methods
    d. Questions and Feedback

Survey Questions.

1. As someone involved in the print services industry, do you think that this series of articles about what the standards that the hardcopy industry is working on will be useful to you in your business?
2. What level of detail would you like to see in these articles:
    a. Identification of the subject, a general idea how it might affect Managed Print Services, and what sort of solutions are being considered or have been identified in what standards?
    b. A description of the issue and the proposed solutions, with references to more details.
3. Are you seeing in your MPS activities increased interest in support for:
    a. printing from remote locations to some main office?
    b. printing while on the road to some local printer (perhaps a printer for which you are responsible)?
4. Have any of the aspects of network security and/or security of information on the network:
    a. Affected the way you install or maintain networked printers or multifunction devices?
    b. Been a factor in which products you select?
5. Is network security an important issue in your MPS activities now or do you see becoming an important issue in the near future?
6. Is the security of information being sent to printers and other hardcopy devices an important issue in your MPS activities now or do you see it becoming an important issue in the near future?
7. The use of SNMP for the management of networked hardcopy devices and acquisition of use data for billing has faced some problems because of security issues and firewall blocking of SNMP.
    a. Have you experienced such device management problems in your MPS activities?
    b. Are some of the environments in which you operate going to a "Web Services" approach for network device management?
8. Do you think it important that manufacturers implement standard solutions to interface issues such as MIBs and Protocols rather than proprietary solutions, even if the proprietary solutions may be better?
9. When considering new products
    a. Are you aware of what formal standards you want the product to satisfy?

b. Would you like to know what formal standards might be applicable, and what they encompass?
c. Does the vendor advertizing tell you about what standards are implemented?
d. Is the vendor representative knowledgeable about the applicable standards and to what extent his products are compliant to these standards.

10. What would you like to see in this series of articles? What subjects would you like addressed? What would you like as "take away" from them?