

# Internet Printing Protocol IPP/1.0

BOF on Internet Printing  
IETF San Jose Meeting  
December 12, 1996

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## Problem Statement

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- Define a Protocol That Can be Used For Printing on the Internet
- Scope Requirements
  - draft-wright-ipp-req-00.txt
- Rapid availability and adoption
  - Goal: Deployable on top of existing products
  - Goal: No (minimize) client and server changes

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# Initial Proposals

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## ■ Lightweight Document Printing Application (LDPA)

- Novell and Xerox
- <ftp://ftp.pwg.org/pub/pwg/ipp/historic/ldpa>

## ■ Hypertext Print Protocol (HTPP)

- IBM
- <ftp://ftp.pwg.org/pub/pwg/ipp/historic/http>

## ■ Salutation

- <ftp://ftp.pwg.org/pub/pwg/ipp/historic/salutation>

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# ISO/IEC 10175 DPA

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## ■ Document Printing Application (DPA)

- MIT Palladium project (late 1980s)
- Final standard text (1996)

## ■ Products

- DAZEL Output Server (DAZEL)
- HP DPS (HP)
- NDPS (Novell, HP, Xerox)
- Printing Systems Manager (IBM)
- Printxchange (Xerox, Digital, Sun)

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# Synergy

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## ■ New Project in the Printer Working Group (PWG)

- <ftp://ftp.pwg.org/pub/pwg/ipp/>
- <http://www.pwg.org/>

## ■ Shared Goals for Producing Solutions

- Quick consensus
- Rapid prototyping
- Rapid deployment
- Focus on end-user requirements

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# Broad Participation

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- |                 |              |
|-----------------|--------------|
| ■ Adobe         | ■ Lexmark    |
| ■ Canon         | ■ Northlake  |
| ■ Data Products | ■ Novell     |
| ■ DAZEL         | ■ QMS        |
| ■ Digital       | ■ Sharp      |
| ■ DPI           | ■ Sun        |
| ■ HP            | ■ Tektronix  |
| ■ IBM           | ■ Underscore |
| ■ Intel         | ■ Unisys     |
| ■ Kyocera       | ■ Xerox      |

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## Solution = IPP

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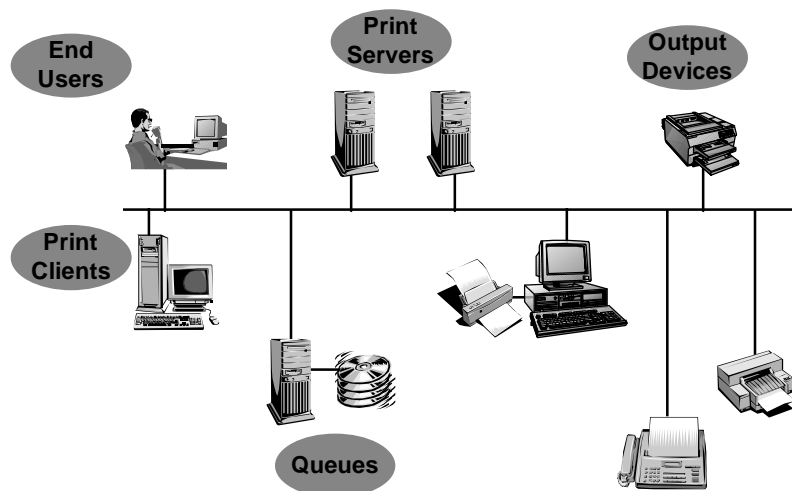
- “The Internet Printing Protocol (IPP) is an application level protocol that can be used for printing on the Internet”
  - draft-isaacson-ipp-info-00.txt
- Only End-user Functionality
- Heavily Influenced by DPA
  - Does not require DPA implementation
- Built on HTTP/1.0
  - Simple ASCII encodings for attributes and values

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## Common Print Systems Components

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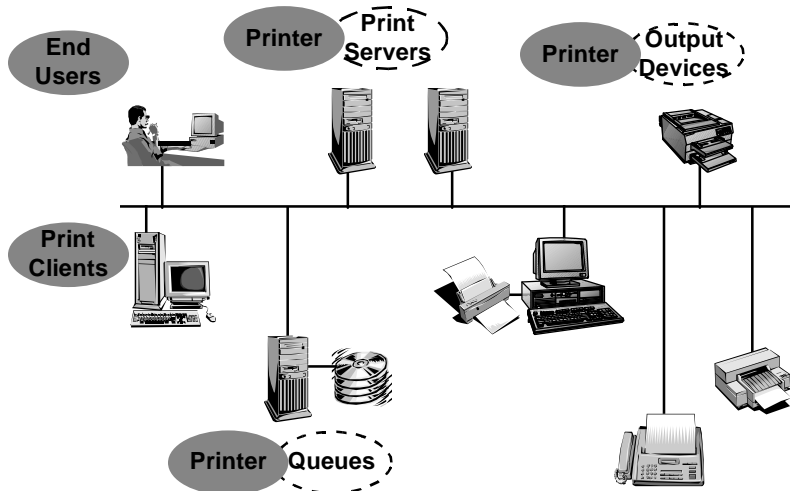


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# IPP Printing Model

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## Printer Object

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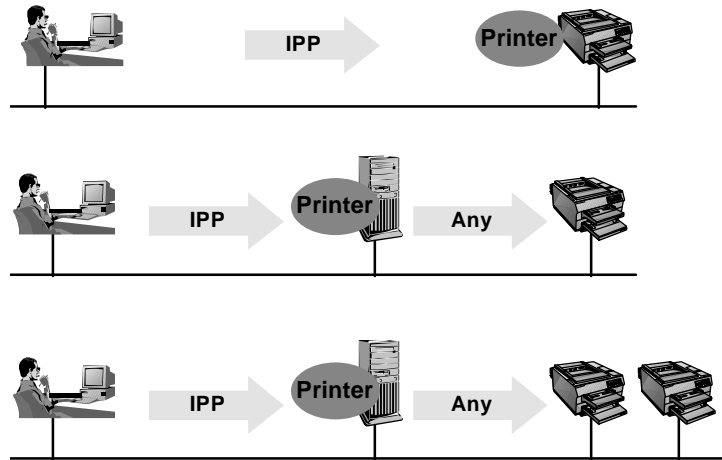
- A Printer is an Abstraction
  - Virtual or physical device
  - Implements IPP operations and interfaces
  - Example: printer, fax machine, imager, CD writer, etc.
- A Printer Optionally Supports
  - Multiple jobs
  - Queuing
  - Scheduling
  - Multiple Output Devices

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# Printer Configurations

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# Job Object

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## ■ Contains One or More Documents

- Some attributes repeated for each document
  - » Content Description
  - » URL Reference
- Some attributes are common and apply to all documents
  - » print-quality, finishing, media, etc.
- No explicit document object

## ■ Attribute Groupings

- Job Status, Job Sheet, Notification, Job Scheduling
- Job Production, Conversion of Text/HTML Files
- Job Resources, Document Attributes

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# Job Template Object

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- Models Job Defaults
- Can Have Several Templates per Output Device
- Each Template Represents a Possibly Different Set of Job Defaults

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# Naming

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- HTTP URL Scheme for Printers and Jobs
  - Printers:
    - » <http://some.domain.com/printer-1>
    - » <http://1.2.3.4:nnn/printer-2>
      - IANA registered port number nnn for IPP
  - Jobs:
    - » <http://some.domain.com/printer-1/0037>
- Expose Printer and/or Job Templates
  - <http://some.domain.com/two-sided-printer>
  - <http://some.domain.com/draft-printer>
  - <http://some.domain.com/hr-printer/resumes>
  - <http://some.domain.com/hr-printer/1040forms>

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# Directory Services Support

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- Directory Services Used for Naming & Browsing
- Each Printer Has an Entry in the Directory
  - Name, Description, Location , Resolution,
  - Color Supported, Maximum Speed, Make and Model,
  - Marker Type, Document Formats Supported,
  - Sides Supported, etc.
- Show a Mapping for LDAP
  - Schema
  - Query

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# IPP Operations

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- Print
  - Submit Multiple Documents in one Request
    - » Submit content directly
    - » Submit content by referencing a URL
- Cancel Job
- Get Attributes
  - Used for Printer, Job, and Job Template objects
- Get Jobs
  - Directed at a Printer
  - Returns a list of Jobs at that Printer

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## IPP Messages over HTTP/1.0

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- IPP messages contained within HTTP methods
  - Define Entity Headers
  - Use MIME Encodings
- POST method is used for:
  - Print, and
  - Cancel Job
- GET method is used for:
  - Get Attributes, and
  - Get Jobs

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## Object Attributes

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- Attribute Names
  - Use DPA and Printer MIB where applicable
- Attribute Semantics
  - Use DPA and Printer MIB where applicable
- Attribute Syntaxes
  - Simple, ASCII encoding
  - Use RFC 822 notation

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# Security

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- Rely on Existing Authentication Mechanisms
  - Take advantage of growth path
- Introduce a Simplified Authorization Mechanism
  - “end-user-acl” Attribute Control List
  - List contains “names” of authorized end-users
  - Names are opaque, support for any “name space”
- Support for Public Access Printing
  - No authentication or authorization

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# Work Items and Issues

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- Can the proposed HTTP mapping for IPP be implemented on existing products (HTTP servers, browsers, CGI scripts, etc.)?
  - Are there other mappings?
    - » New raw protocol over TCP, HTML forms, etc?
  - Are other mappings required?
- Is the current HTTP mapping correct?
  - Use of HTTP Headers, Entity Headers, and MIME encodings

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## Work Items and Issues (cont.)

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- Objective vs. Subjective Directory Attributes
- Job Templates
- Conformance Requirements
  - Optional vs. Mandatory Attributes
- Internationalization and Localization Issues
- Security Issues
- Coordination With Other Groups
  - IETF Fax, etc.

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## Open Invitation

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- Get Involved
- Companies and Individuals Representing:  
Browsers, NOS, Client OS, ISP, Printers, etc.
- Join the IPP Mailing list
  - General Discussion: [<ipp@pwg.org>](mailto:ipp@pwg.org)
  - To Subscribe: [<ipp-request@pwg.org>](mailto:ipp-request@pwg.org)
  - Archive: <ftp://ftp.pwg.org/pub/pwg/ipp/>
  - Web Site: <http://www.pwg.org/>
- Attend PWG meetings on IPP
  - January 9, 1997, Albuquerque NM

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# IPP Scenario: Query Printer



## IPP Request

```
Post http://some.domain.com/printer-1 http/1.0
Get-Attributes IPP/1.0
printer-state :
sides-supported :
media-supported :
document-formats-supported :
```

## IPP Response

```
http/1.0 201 "Created" (a response)
IPP/1.0 xxx "attribute list returned"
printer-state : idle
sides-supported : 1-sided
media-supported : iso-a4-white,iso-b4-white
document-formats-supported : Postscript/2.0
```

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# IPP Scenario: Submit a Job



## IPP Request

```
Post http://some.domain.com/printer-1 http/1.0
Print IPP/1.0
Print-Job-Object Header
job-name : My Job
medium : iso-a4-white
notification-events : Job-completion
notification-address : joe@pc.domain.com
Document Header
document-name : Letter to Mom
Document-Content Header
(Content type = Postscript/2.0)
<Document in Postscript
Level 2 format>
```

## IPP Response

```
http/1.0 201 "Created" (a response)
IPP/1.0 xxx "print job accepted and queued"
job-identifier : some.domain.com/printer-1/0037
current-job-state : pending
printer-state : needs-attention
```

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