


Internet Printing Events and Notification



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Agenda

- Background and Context
- Requirements and Solutions
- Conclusions and Recommendations

Printer Working Group (PWG)

- PWG is a loose coalition of companies interested in network printing products and systems
 - <http://www.pwg.org>
 - Printer Management
 - SNMP Alerts: Printer MIB, Job Monitoring MIB
 - Sense
 - IEEE 1284.1 (aka TIPSI, aka NPAP)
- Solid experience base for Printer and Printing related events and event semantics
 - e.g: "online" and "offline"

Internet Printing Protocol (IPP) IETF Working Group

■ Internet Printing Protocol (IPP)

■ Internet-Drafts

- | <http://www.ietf.org/internet-drafts/draft-ietf-ipp-model-10.txt>
- | <http://www.ietf.org/internet-drafts/draft-ietf-ipp-protocol-06.txt>

■ IPP/1.0

- | Query only (no event push semantics)
- | Extensible (new attributes, new operations)

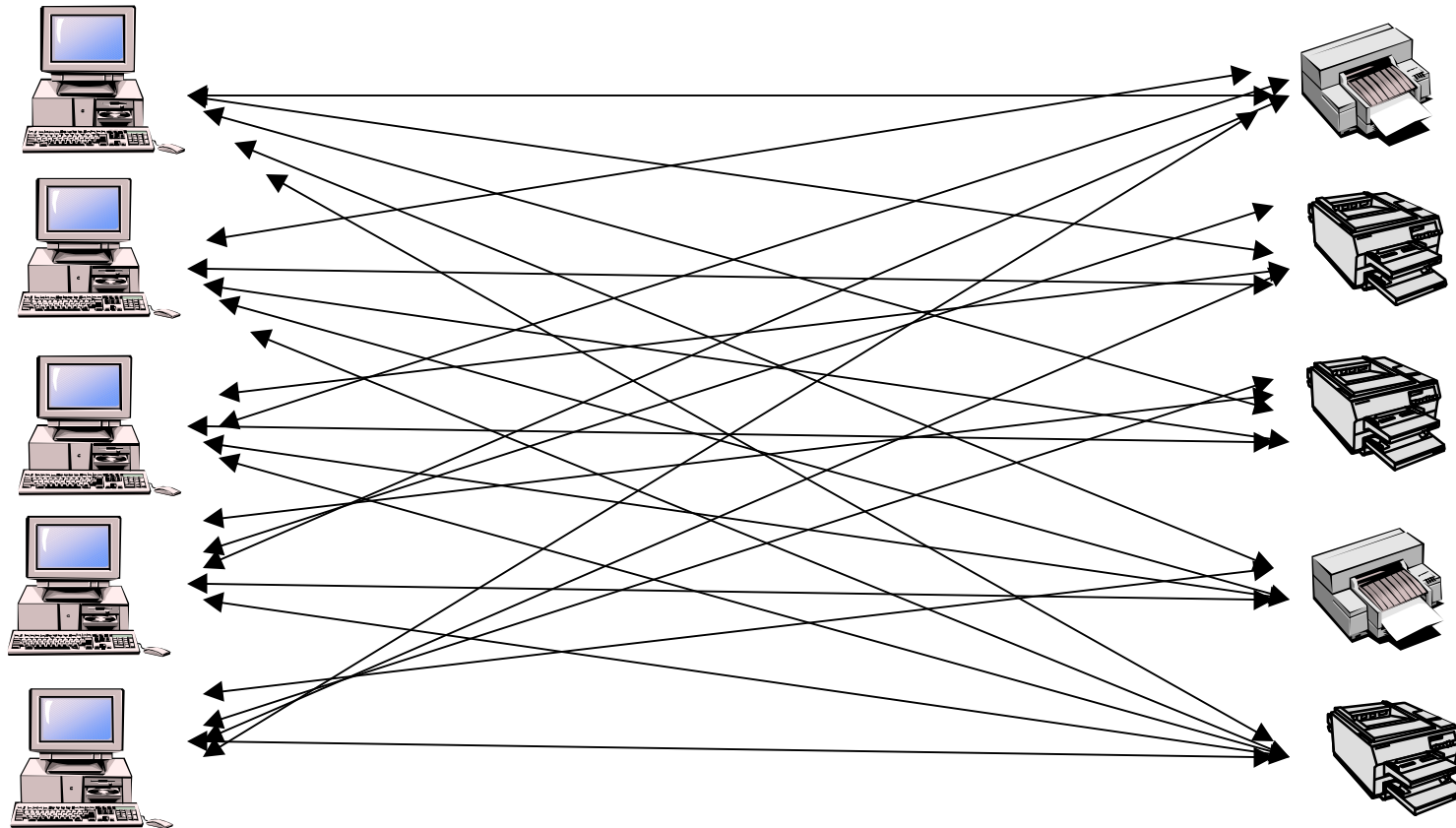
■ Working Group next steps (soon to be Internet-Drafts)

- ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/
 - | [ipp-notifications-very-short-980701.pdf](#)
 - | [ipp-notification-printer-980701.pdf](#)

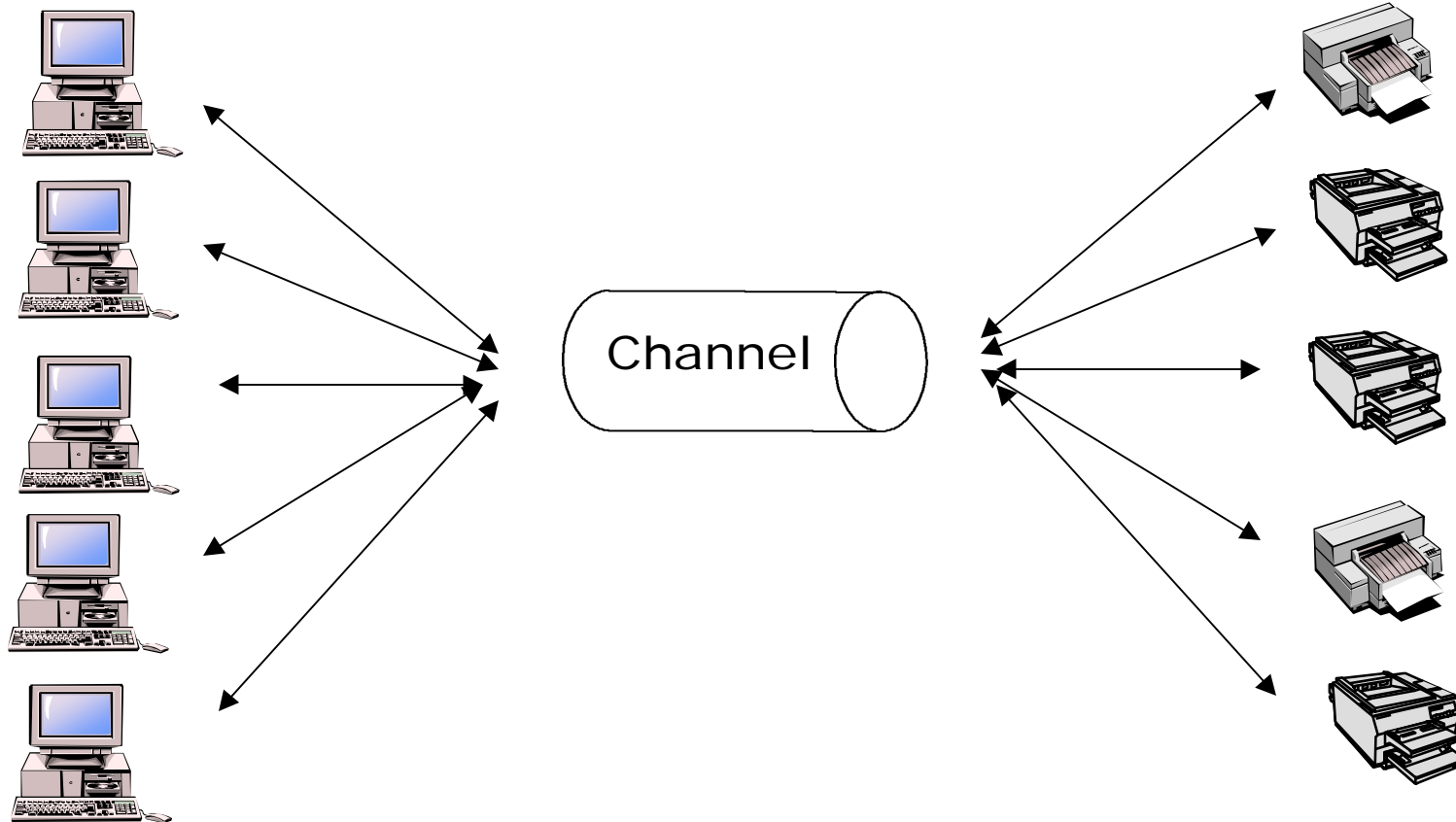
Industry "Standards" Survey

- **OMG**
 - Event Service
 - Notification Service
- **The Open Group**
- **Java Message Service (JMS)**
 - Topics and Queues
- **SNMPv3**
 - Traps and Informs
 - Event MIB
 - Notification MIB

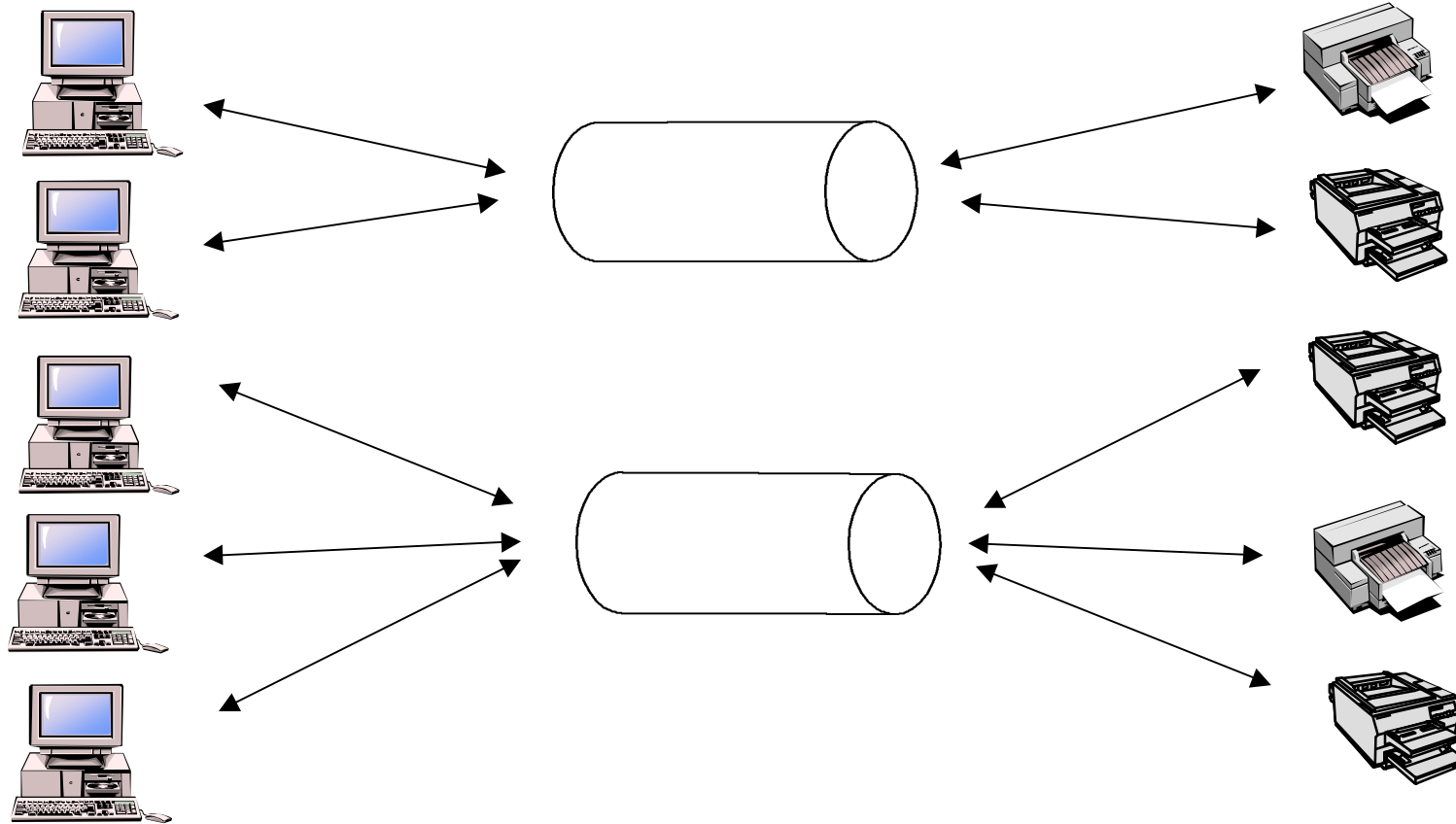
No Channel Abstraction



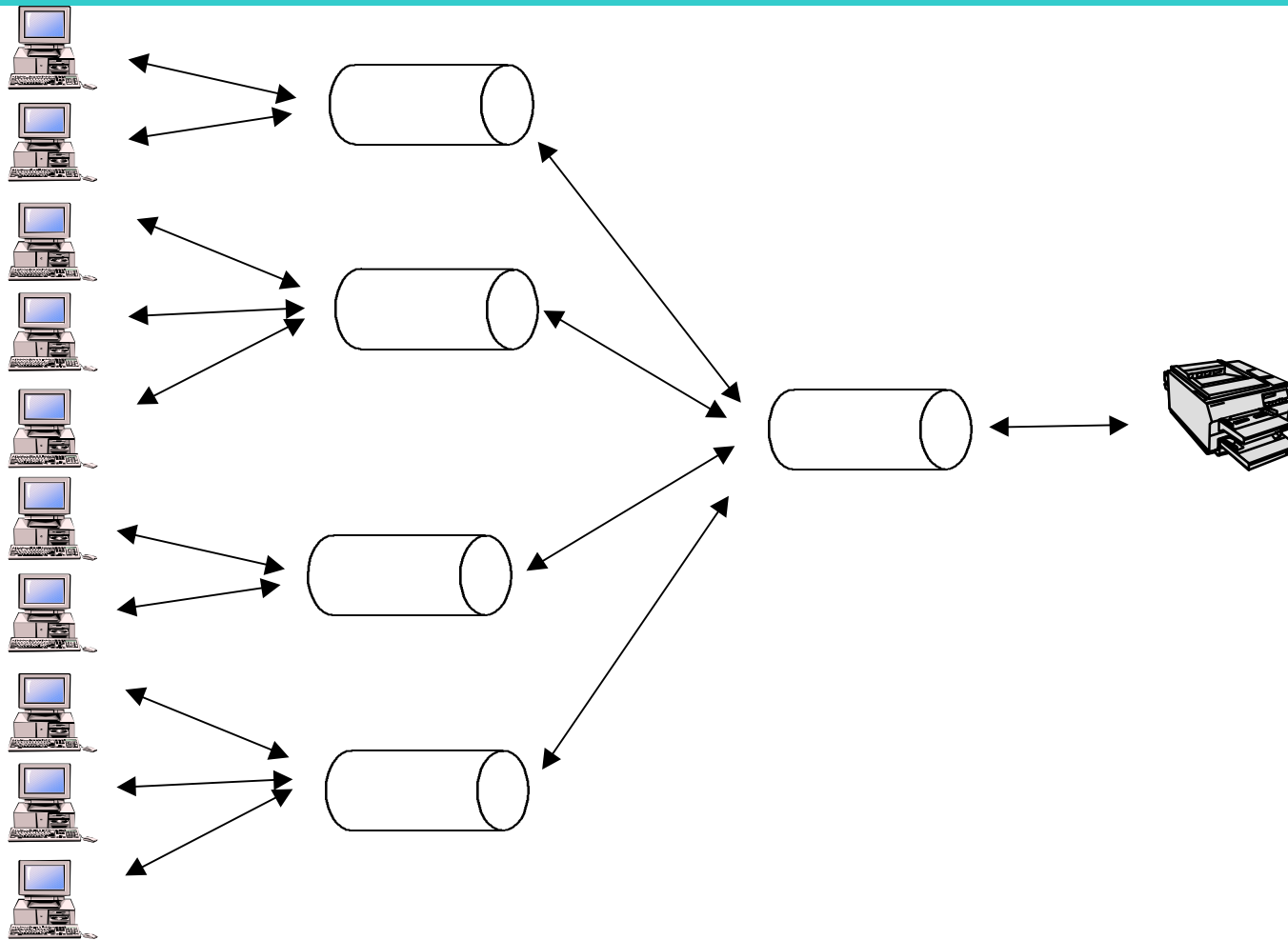
Scalability: Channel Abstraction



Communities of Interest: Multiple Channels



Very Large Numbers of Clients



Findings: Common Themes

- Event Consumer(s) and Event Producer(s)
- Intermediary “channel” abstraction
 - Queues, Topics, Items, Events, Push, Pull
- QoS
 - privacy, authentication, authorization, latency
- Variants
 - durable, once, at-least-once, at-most-once, maybe
- Event subsystem is not unique to Printing
 - No need to invent a print-specific mechanism
 - Only events semantics, groupings, and optimizations are unique

Printing and Event Notification

- Event Consumer(s)
 - Humans, programs, databases
- Event Producer(s)
 - IPP objects: "Printer" and "Print Job"
- Multiple notification methods
 - e-mail
 - programmatic
 - log file
 - etc.

Printing and Event Notification (cont.)

■ Multiple Human Roles

- Job Recipient
- Job Recipient Proxy
- Notification Recipient
- Notification Recipient Agent

■ Events

- Groups
- Job vs Device
- Errors, Warnings, or Reports
- Frequency (“Job Complete” vs “Page 3 Complete”)

Printing and Event Notification (cont.)

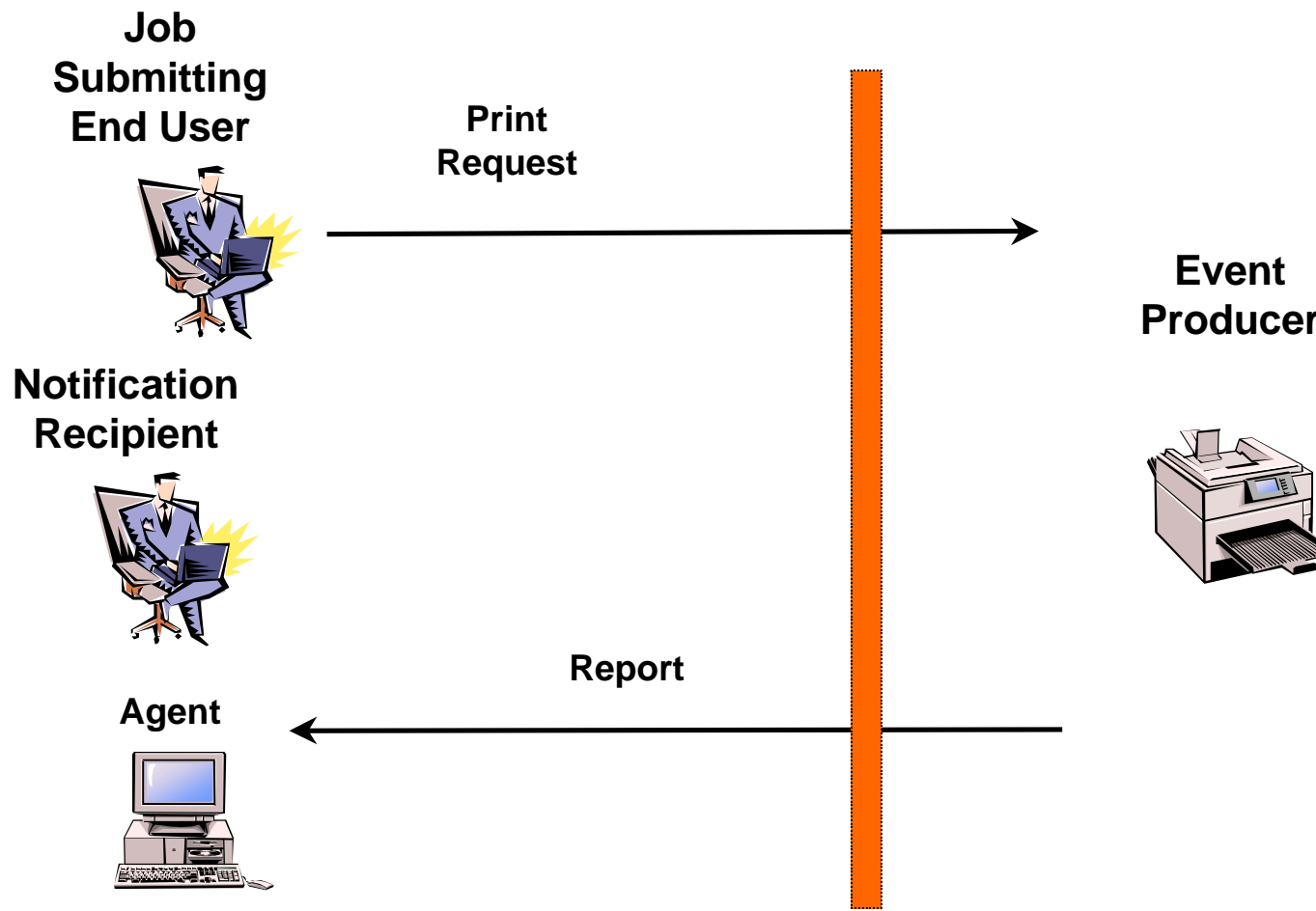
■ Event Report

- Fully describes the event (what the event was, where it occurred, when it occurred, etc.)
- Human Consumable
- Machine Consumable
- Mixed Format

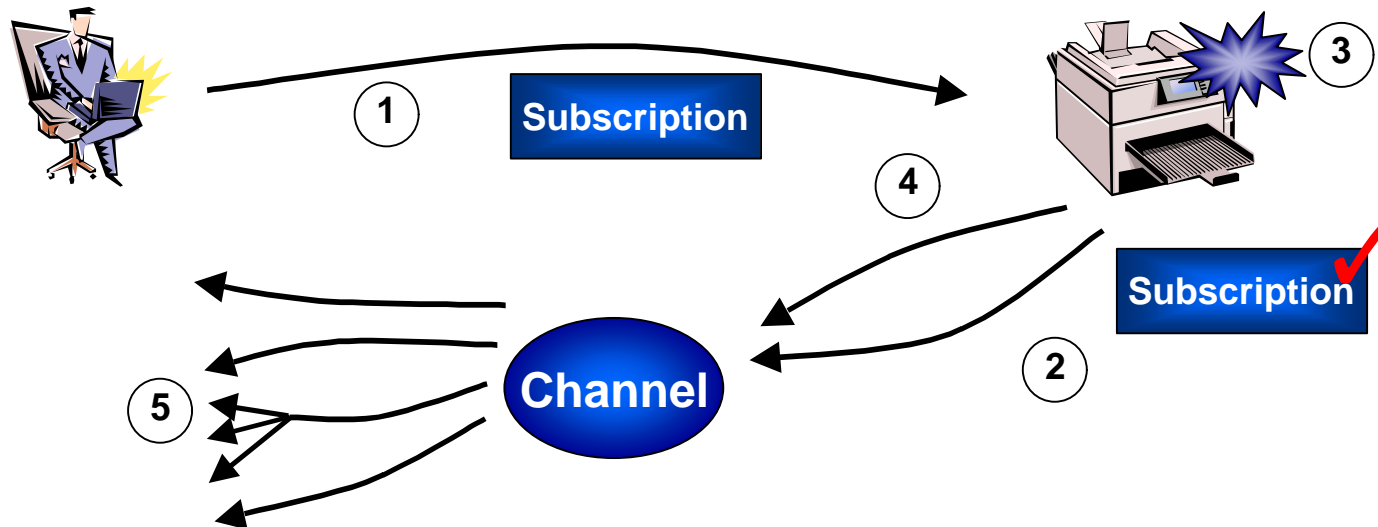
■ Types of Notification (tied to delivery method?)

- Immediate Notification
- Queued Notification

Notification Architecture without an Event Service



IPP Notification Scenario



1. Client sends a print request with a subscription
2. Printer forwards subscription (Optimization: remembers "what" not "who" or "where")
3. Something happens (an event occurs)
4. Printer publishes the event (Optimization: only if there is interest)
5. Channel forward publication to subscribers via subscribed methods

Printer Finds a Channel

- Admin configuration option
 - Name, address
- Browse a directory - LDAP
 - Directory object for the channel
- Service Location Protocol (SLP)
 - Registered "notification service"

Submitting a Subscription

■ Subscription with Job

- Policy: OK if end-user is allowed to print
- Job and Printer events
 - I Job events: Only this Job
 - I Printer events: Only while this Job is active

■ Profile outside of Job

- Policy: OK if "operator"
- Job and Printer events
 - I Job Events: All jobs
 - I Printer Events: Any/All printer event

I18N

- Client requests a “language” and “charset”
- Report Contains
 - Identifiers (not localized)
 - Strings (localized)
 - In client preference, if possible
 - In Printer default, otherwise
- Assume: Client has access to a “identifier to localized string” database/cache

Report Content: Format

- 'application/ipp'
 - machine consumable content using the 'application/ipp' MIME media type
- 'text/plain'
 - human consumable content type
- Others:
 - XML
- Format dependent on delivery method?

Subscription Options

- Subscribe by groups or events?
 - All Printer events
 - All Printer Error events
 - Specific Printer Error events
- Subscribe to multiple methods?
 - These events via email
 - Those events via beeper
- Ask for more info?
 - When the event happens, tell me this other things

Current Issues / Discussion Items

- Is there the difference in functionality between
 - end-user to IPP Printer (job complete)
 - printer server to device (flow control)
- What are the “standard” delivery methods
 - email - SMTP
 - log file - FTP, HTTP
 - programmatic - ??
 - Others - ??
- What are the methods that MUST be supported?

Conclusions and Recommendations

- Do not invent a print-specific event subsystem
- Subscribe via the Printer
 - Print clients already interact with the Printer
 - No need to find a separate Topic or Message Queue
 - Subscription is sent along with the print request
- Support Internationalization/Localization
- Support for additional attributes data
- Allow for multiple delivery methods
- Standardize on Printer MIB, Job MIB, and IPP defined events and semantics