



The Printer Working Group

Release Printing with the Internet Printing Protocol

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Release Printing

- This presentation provides an overview of common release ("follow me") printing requirements and configurations
- These requirements and configurations can be satisfied using standard protocols and file formats:
 - The Internet Printing Protocol (IPP)
 - The IPP Shared Infrastructure Extensions (INFRA)
 - DNS Service Discovery (DNS-SD)
 - The OAuth Authorization Framework
 - Standard page description file formats like the Portable Document Format (PDF)
- Multiple vendors can independently develop solutions based on those standard protocols and file formats



- **Access Control:** Limiting access to a Service
- **Accounting:** Collection of metadata to audit, bill, or otherwise report on the origin, processing, and disposition of work done by a Service
- **Authentication:** Proving the identity of the End User
- **Authorization:** Providing authorization to access a Service as an End User
- **End User:** A person or software process acting on behalf of a person
- **Facility:** An office, building, or site that is managed by a single entity or organization



Terminology (con't)

- **Personal Data:** Information related to a person that can be used to identify the person such as a name, email address, government-issued identification, medical information, and so forth
- **Release Printing:** Printing where an End User submits documents to a Print Service and then releases those documents for printing at a printer
- **Service:** A network application that provides data storage, manipulation, presentation, communication or other capability

Common Release Printing Requirements



- All printing goes through a common Print Service
 - Print Service can be running on a server at the local Facility or remotely, e.g., a cloud or organization-wide server
- All printing uses Authentication, Authorization, and Access Control
 - Local or "home" End Users
 - Remote or "guest" End Users
 - *No anonymous printing*
- All authorization goes through a common Authorization Service
 - End User authentication is separate from authorization
- Access Control is configured on the Print Service and/or Authorization Service

Common Release Printing Requirements (con't)



- End Users print from any application on any mobile or desktop device using the standard print dialog
 - Capabilities are typically common for all managed printers
 - Solutions can also hook into the OS "sharing" interfaces (useful if the Print Service supports higher-level file formats - Word, OpenOffice, etc.)
- All printing usage- media, supplies, storage, and processing - is recorded for billing, maintenance, monitoring, and support
- Nothing is printed until the End User goes to a printer and releases their job(s)
 - "Follow me" printing model
 - Optionally with an additional per-job password/PIN code

Common Release Printing Requirements (con't)



- Other metadata may be required from the End User and/or their device such as a billing account number, billing user name, operating system name and version, and/or application name and version
- Print Service needs to expose explicit data retention and privacy policies
 - How document data is stored (where, when, etc.)
 - Who has access to the metadata and document data
 - What the metadata is used for
- End Users need to provide explicit consent for any use of Personal Data
 - Research has shown that a small amount of metadata can be used to uniquely identify a person
 - Many countries have strict data privacy laws

Common Release Printing Configurations



- **Common Configurations:**
 - Local Print Service and local Authorization Service on a single local network
 - Local Print Service and local Authorization Service on a partitioned local network
 - Local Print Service and remote Authorization Service
 - Single or partitioned local network
 - Remote Print Service and Remote Authorization Service
- **Other variations on these configurations are possible**
 - Generally cannot do remote Print Service and local Authorization Service due to connectivity issues between Print and Authorization Services

IPP/OAuth Release Printing Configurations

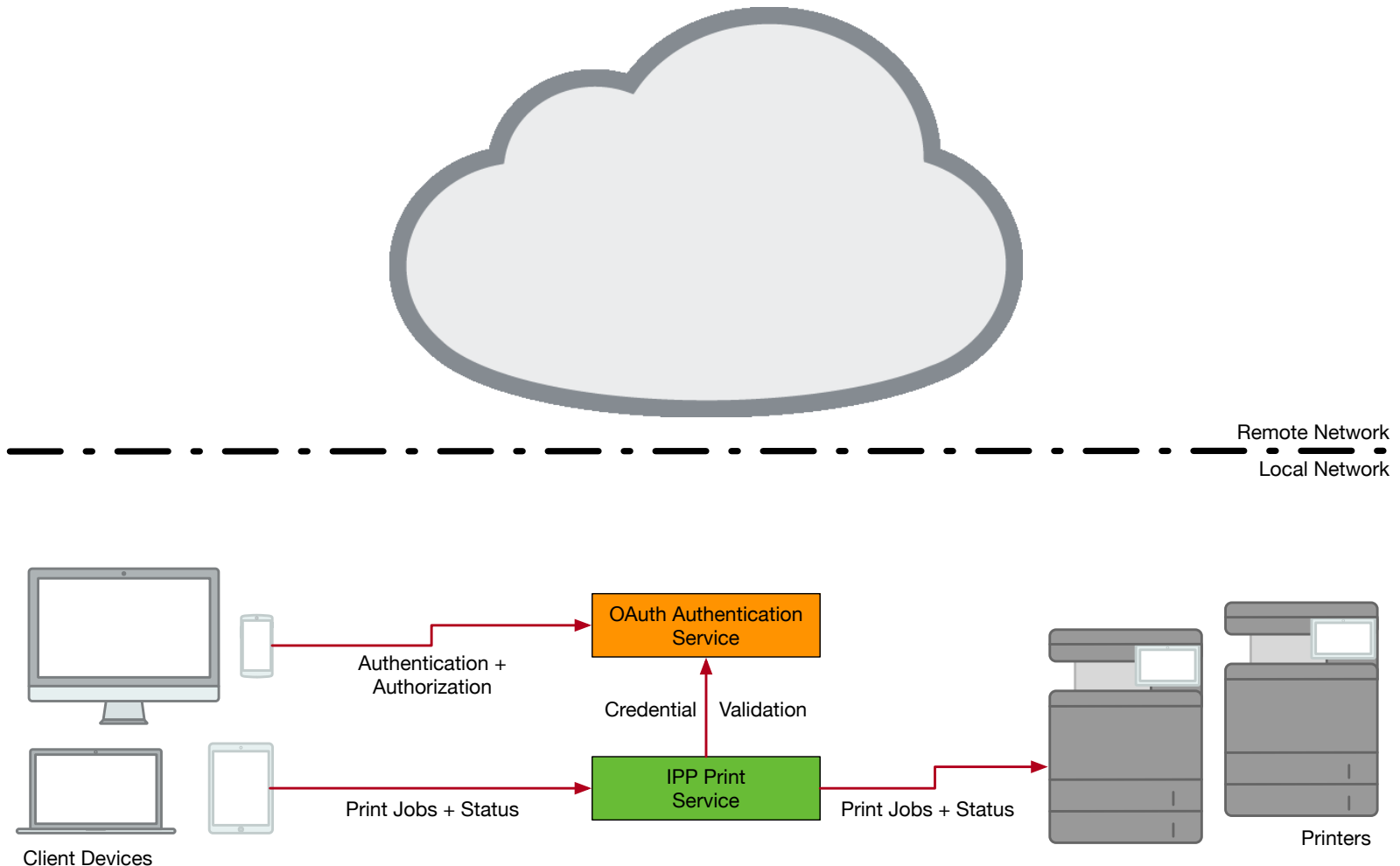


- Clients devices always talk directly to the:
 - OAuth Authorization Service to obtain an authorization token for printing
 - IPP Print Service to get Printer Capabilities, submit Print Jobs, and monitor Print Job status
- The IPP Print Service usually talks directly to the OAuth Authorization Service
 - Validates the authorization token sent by the Client device
 - Some OAuth implementations use JSON Web Tokens (JWTs) that are signed using X.509 certificates which can be validated and introspected without outside communication
- The IPP Print Service sometimes sends Print Jobs directly to the managed printers
 - Printers can also be configured to pull Print Jobs from the IPP Print Service using the IPP Shared Infrastructure Extensions

Local Print and Local Authorization (Single Local Network)



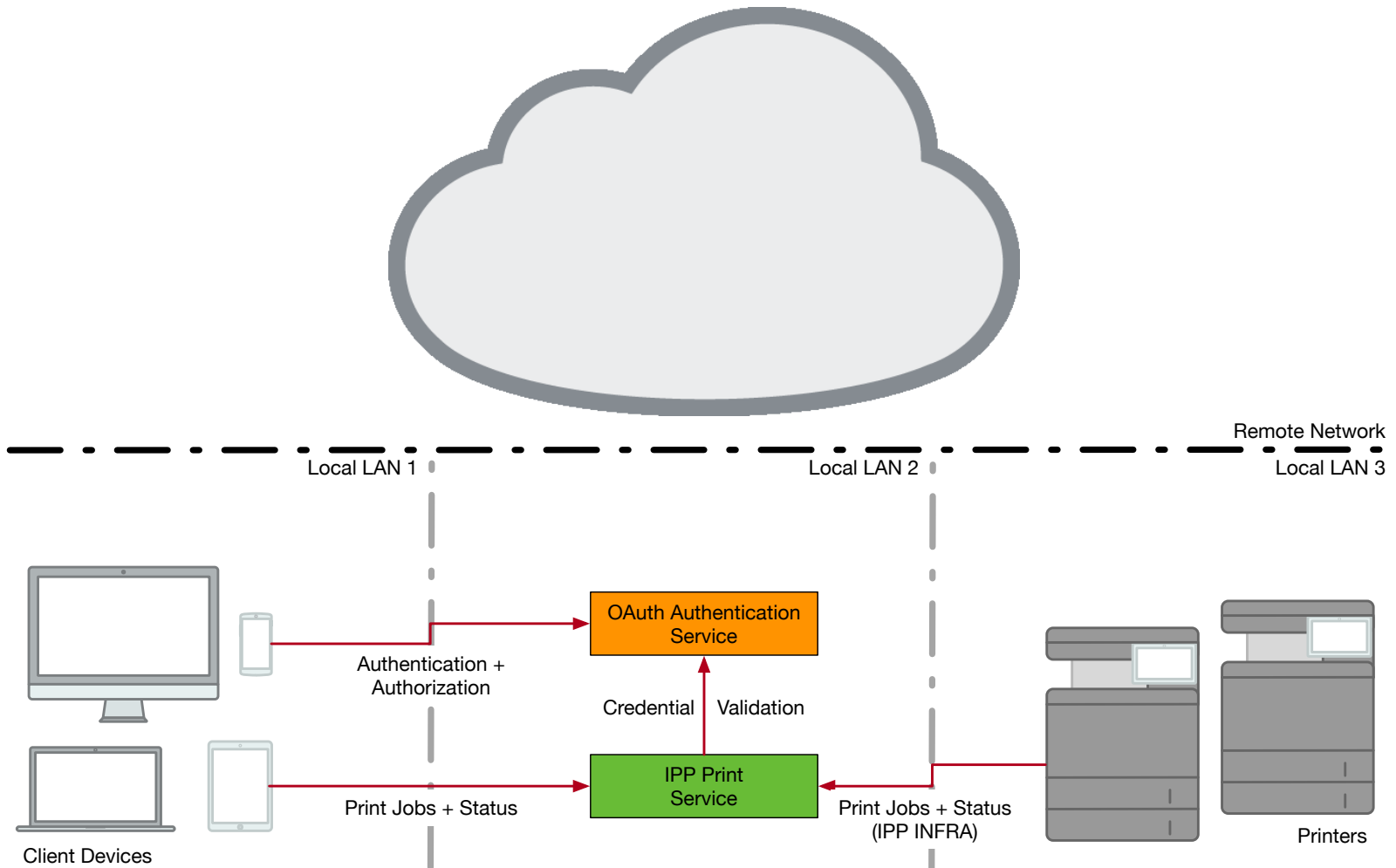
Arrows indicate direction of connection



Local Print and Authorization (Partitioned Local Network)

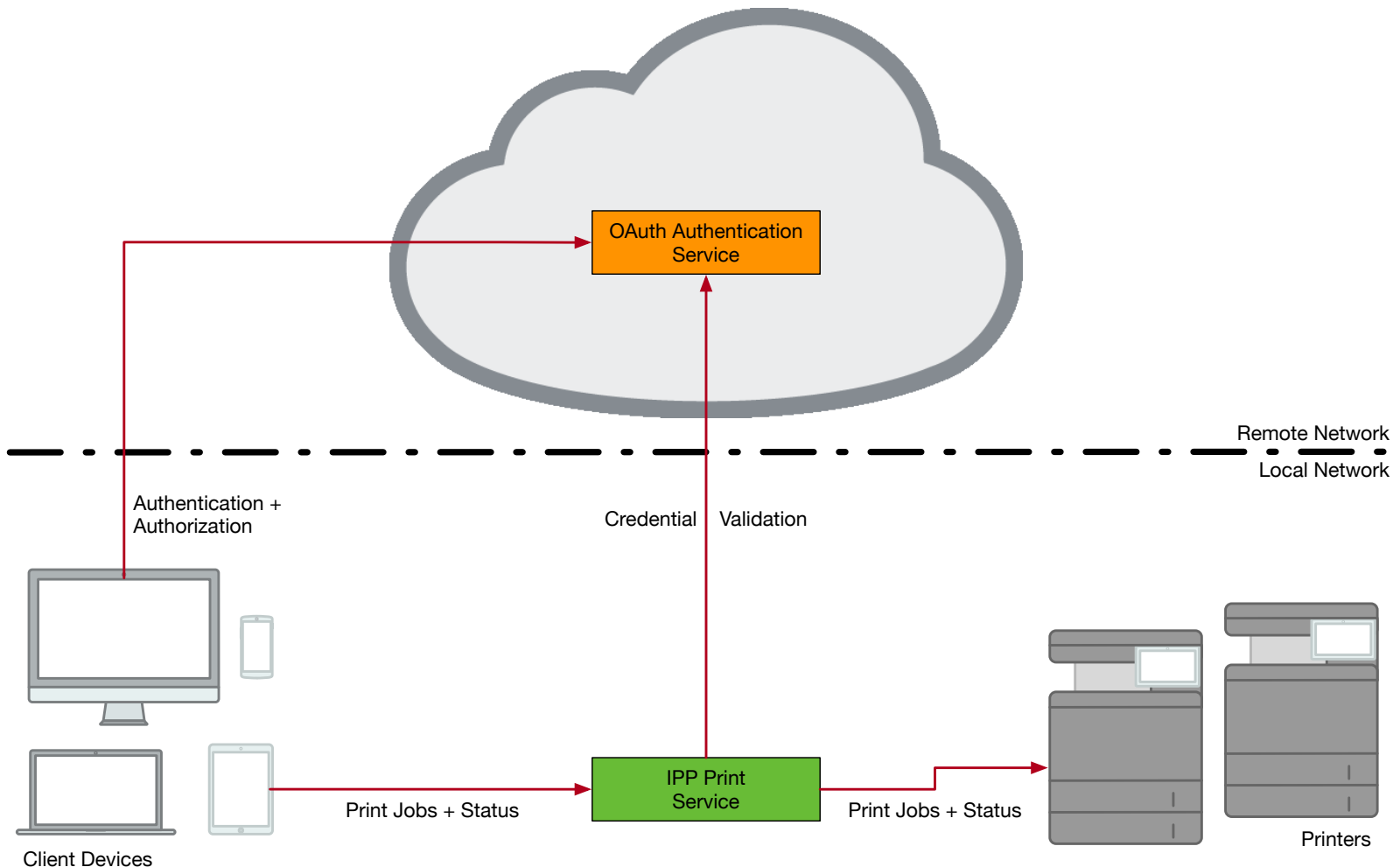


Arrows indicate direction of connection



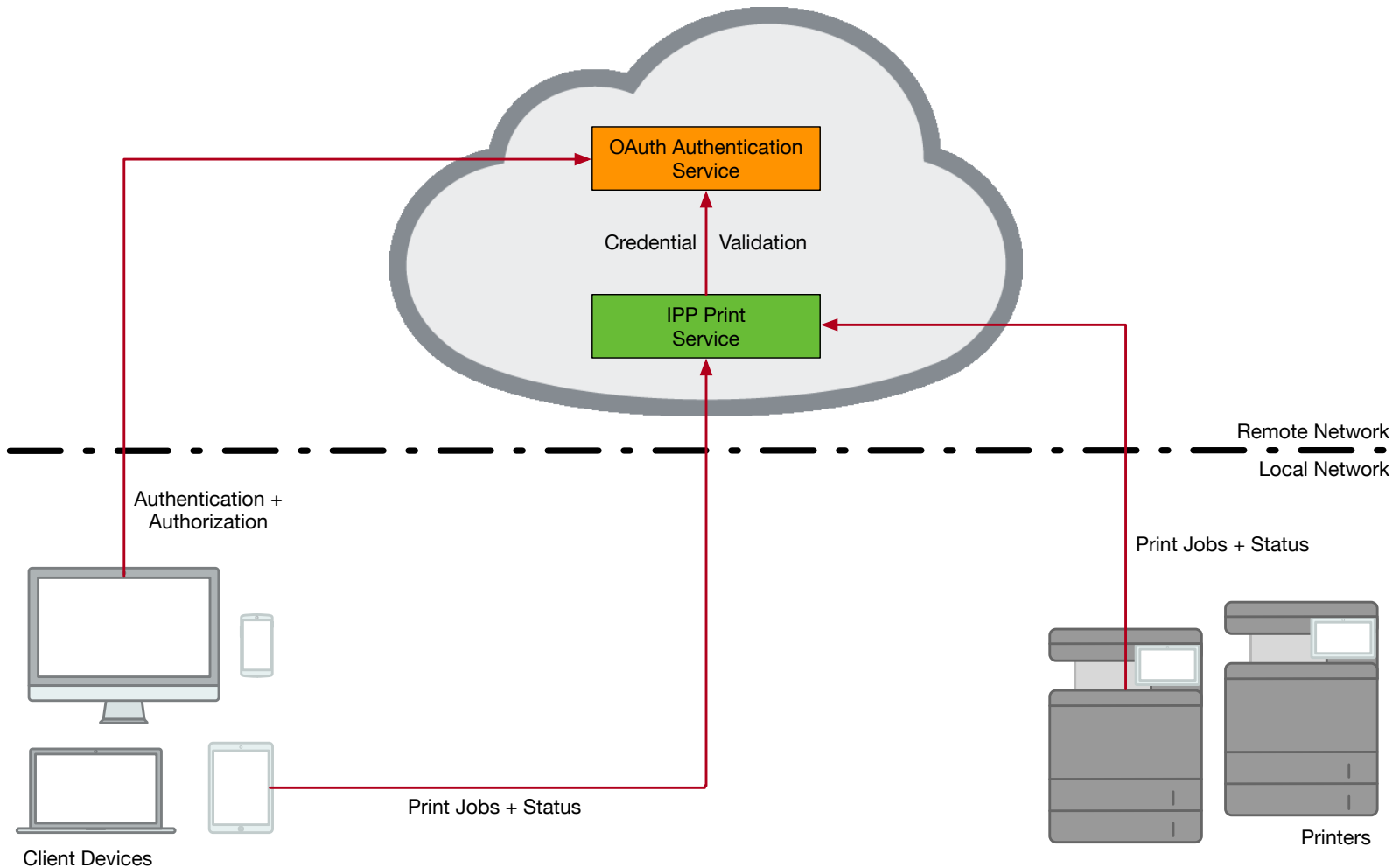
Local Print and Remote Authorization

Arrows indicate direction of connection



Remote Print and Authorization

Arrows indicate direction of connection





IPP Print Job Metadata

- Print Options ("Job Ticket")
 - Color mode, copies, duplex, finishings (fold, punch, staple, etc.), media, password/PIN, print quality, print resolution, etc.
- Personal Data
 - Application name and version, authenticated user, billing account, billing user, document name, job name, operating system name and version
- Metrics ("Job Receipt" - actual print options, page counts, etc.)
- Document Data (print-ready content/pages)
- Status
 - Job state and detailed reasons
 - Generally the job state will be 'completed' once the job can be released at a printer (differs from direct printing)



IPP Printer Metadata

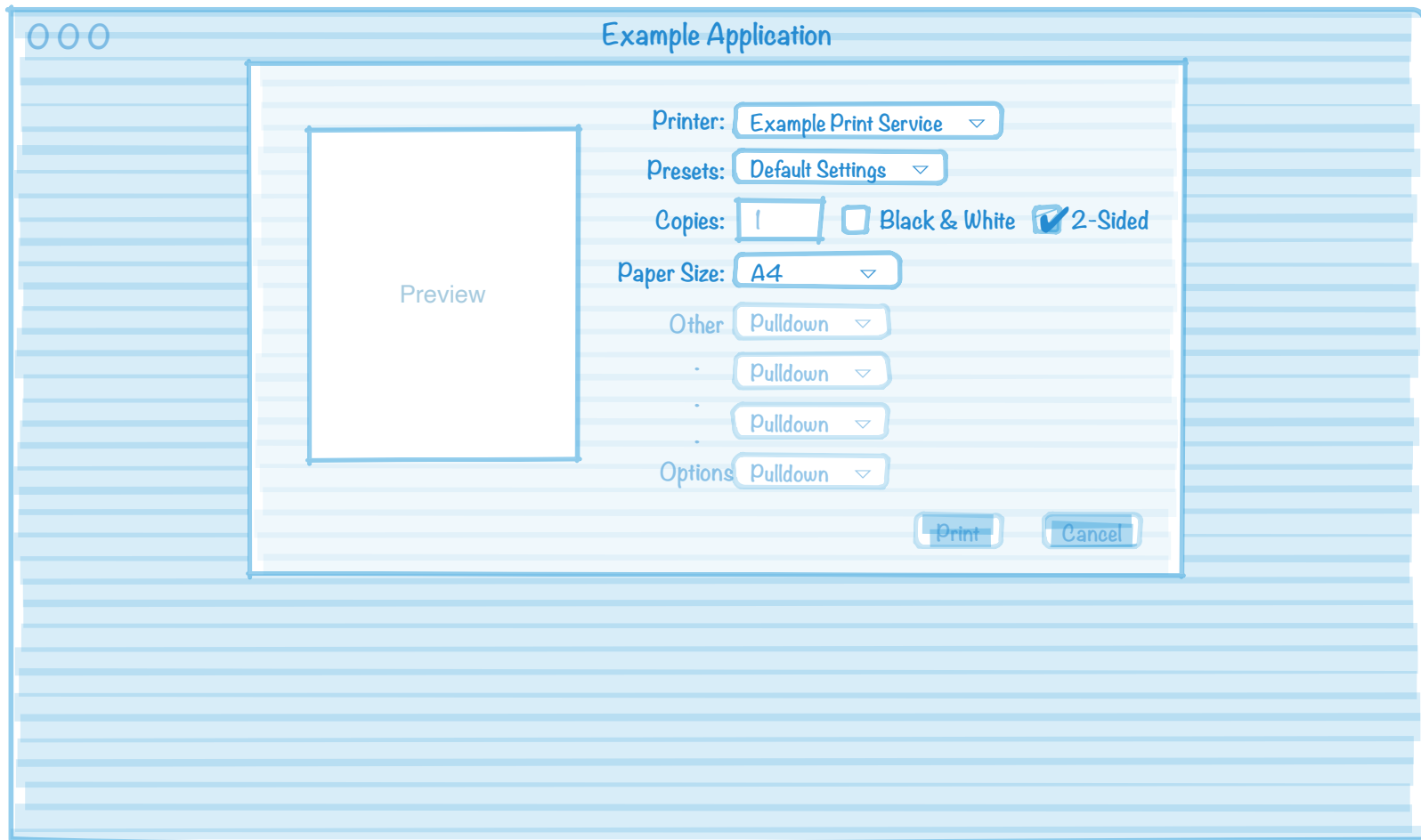
- Supported and Default Print Options ("Printer Capabilities")
 - These are generally configured by the Print Service administrator to be a common set for all managed printers
 - Can be customized per End User, e.g., guest users cannot print in color
- Requested/Required Personal Data
 - Allows client to show UI for explicit consent to the sending of the Personal Data to the printer
- Status
 - Print Service state and detailed reasons
 - The state of each managed printer is generally not exposed to End Users



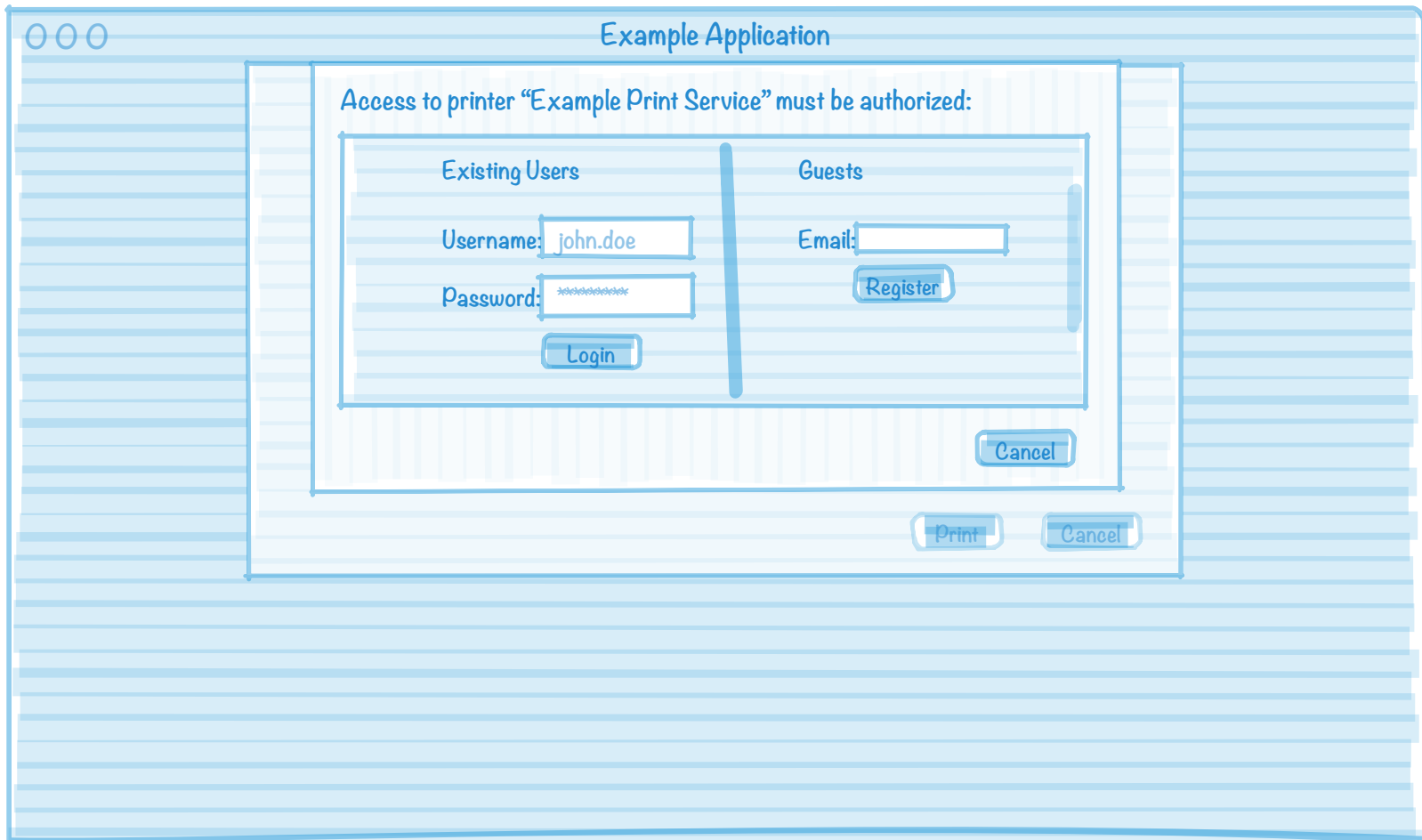
IPP Client Configuration

- Client devices are typically configured using ActiveDirectory or DNS-SD to discover the IPP Print Service automatically
 - Manual configuration using "wizards" or configuration profiles also common
- Once configured, the client device:
 - Queries the IPP Print Service to get the OAuth Authorization Service URL, OAuth scope(s), and required and requested metadata
 - If necessary, authorizes with the OAuth Authorization Service
 - If necessary, gets explicit consent from the End User for required and requested metadata
 - Queries the IPP Print Service to get Printer Capabilities

Standard OS Print Dialog



OAuth Authorization from Print Dialog



Explicit End User Consent from Print Dialog

