Overall MFD Considerations in the MFD Services' Models

1 Introduction

1.1 Intent

The current effort to model the Services that could be supported by a Hardcopy Multifunction Device are sequentially dealing with the individual services. As with any activity spread out over an extended period and performed by different people, there will be a tendency to lose some of the cohesiveness originally conceived among the different Services, as well as to forget some of the basic contentions. This paper seeks to document the overview of the MFD services as was developed in the October 2008 face-to-face meeting, to establish a consistent terminology set, and possibly to document some the rationales used in outlining the overall model (such as the melding of the various types of facsimile services (with a small "s") into a FAX in Service and a FAX Out Service.

That is not to say that the information in this paper is fixed; it is expected that, as each service is considered in more detail, additions and adjustments may be necessary to the overall concept. The objective should be to reflect such additions and adjustments back into this discussion so that the impact upon previously identified services from an overall viewpoint can be illuminated.

1.2 MFD Semantics Background

Office imaging functions were once limited to copying, formed letter printing and primitive facsimile, each performed by a different device. Impact printers gave way to image printers using inkjet or electrophotographic technology. The high quality printing mechanisms and powerful computers used as controllers provided a path toward using a single device for multiple imaging capabilities. Utilization of the networking, the massive storage, and the internet capabilities that were brought to the office and home environments allowed further expansion of imaging device functionality. These multifunction devices, variously known as Multifunction Peripherals or Multifunction Printers (MFPs), or All-in-Ones are increasingly becoming the primary hardcopy imaging equipment in enterprise and SOHO environments.

There have been extensive efforts in the semantic definition of printing functionality in DPA and more recently in IPP. The operations and attributes in IPP were the basis for the PWG Semantic model, which in turn became the basis for Windows WSD-Print. To similarly provide a consistent client experience in using and administering the functionality provided by a Multifunction Device (MFD), the semantic model must be expanded to cover all of the services typically supported by an MFD.
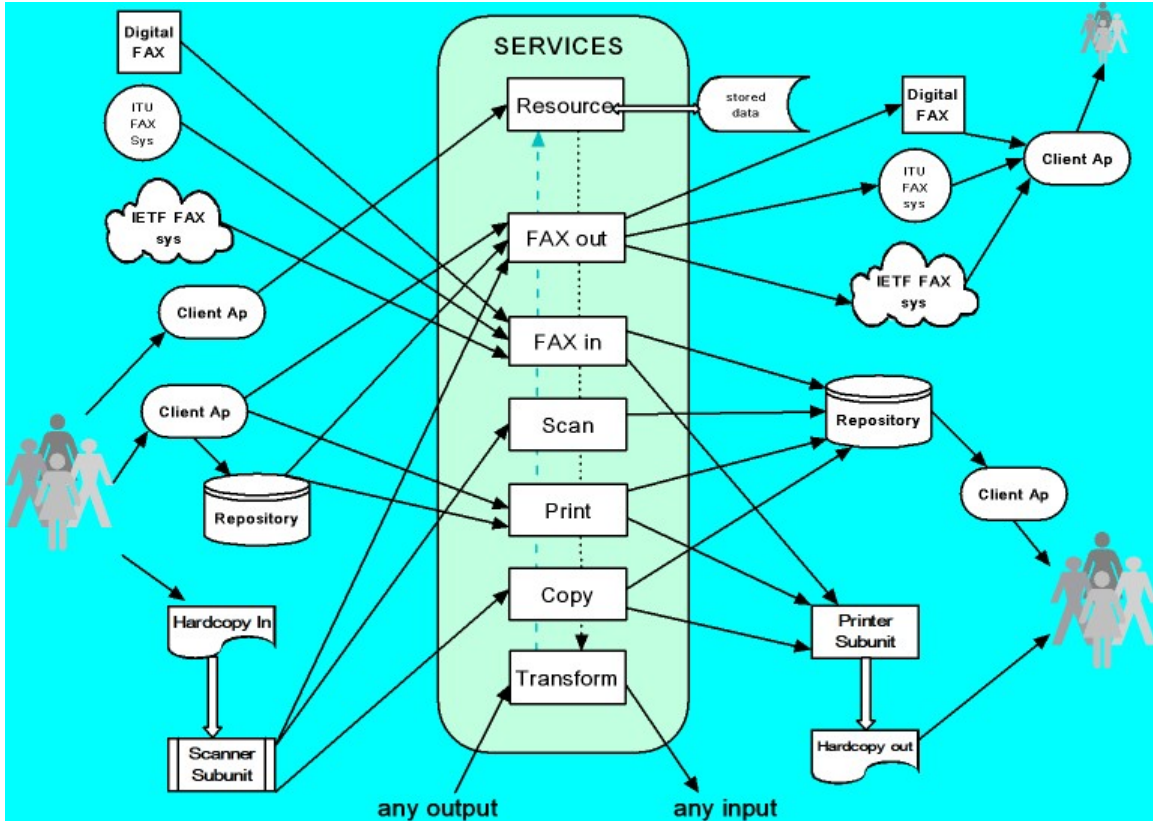
1.3 The Services

Following the understood customer perception and the established models of accounting and billing, this set of semantic models is oriented around Services rather than functional

or physical modules. These Primary Services are Print, Copy, Facsimile and Scan. Because the two ends of Facsimile are typically remote, Facsimile is split into FAX In and FAX Out, which indeed are sometimes implemented as separate services. Because the primary services are structured to follow user perception, they are functionally complete in themselves; any one primary service could be reasonably implemented in a single-function device. Although the Service models do identify physical elements in terms of subunits and their components, they are not intended for nor are they optimum for supporting the maintenance and services of the physical devices.

In developing the MFD model, supporting services Resource and Transform were identified. The Resource Service is an outgrowth of the "Job Ticket" mode of client interface with these services and may supplement and enhance the usability of all of the other services. The Resource Service provides the primary services with quick access not only to job templates pre-configured with anticipated user's intent, but often-used data such as logos, fonts, forms, firmware, address lists, etc. that can be used to implement user's jobs or can be incorporated within these jobs. Resource Service provides operators and end users a convenient way to remotely store and manage resources so that they can be retrieved and shared later for effectual job submissions to the primary Multifunction Device Services

The modeling of a Transform Service is recognition that, although each service has some inherent transformation functionality that is integral to the specific service, an independent capability to transform imaging information from one form to another is necessary to achieve more complex functionality, particularly in supporting a workflow capability.

The supported Services all deal with images, either in hardcopy form or electronic form (digital). The hard or soft image interfaces are identified in the following diagram. Although the Services (except for Resource) are all integral in themselves, a work flow could route a job though multiple Services or otherwise use multiple Services to execute a complex job. However, the inclusion of MFD semantics in the PWG Semantic Model does not address work flow.

1.4 Terminology

Term	Definition
***<service>* Job Template**	A JobTicket data object representing an end user's preconfigured ***<service>*** Intent that is not bound to a specific Service or Job.
***<service>* DocumentTicket**	A data object that contains an end user's Intent for document processing and descriptive properties of a Document in a Job. Any document processing properties in the ***<service>*** DocumentTicket will override the values specified in the ***<service>***JobTicket's document processing properties. The content of a ***<service>*** DocumentTicket is configured by end user through a ***<service>*** Client.
***<service>* Intent**	The end user's preferences for the processing and description properties of a Job or Document.
***<service>* Job**	A data object, created and managed by a Service, that contains the description, processing, and status information of a job submitted by a user. The Job can contain one or more document objects.
***<service>* Job Resource**	A Resource associated with Job.
***<service>* JobReceipt**	An element of the Service that contains information on the actual values of processing elements used by the Service for processing a Job. The content of a ***<service>***JobReceipt is populated by the Service when a Job is processed.

Term	Definition
*<service>*Document Data	A Digital Document applied to a specific MFD Service. (See Digital Document above)
*<service>*JobTicket	A data object that contains an end user's Intent for document processing, job processing and descriptive job properties of a Job sent to an MFD Service.. Job elements apply to the entire Job. Document processing elements apply to all documents within the Job unless overridden at the document level (See ScanDocumentTicket). The content of a *<service>*JobTicket is configured by and end user through a *<service>* Client.
Active Jobs	A *<service>* instance specific queue containing all the Jobs that are waiting to be processed or are currently be processed by the *<service>*
ADF	Automatic Document Feeder. A mechanism for handling Hard Copy Documents for scanning. The mechanism selects a media sheet from its bin and passes it to the image acquisition subsystem of the Scan Device. After the Scan is complete the ADF transports the Hard copy Document's media sheet to its final destination (e.g. output bin, ADF bin)
Attribute	Attributes can decorate XML Elements and contain additional information about an Element.
CrossFeed direction	The direction perpendicular to the movement of the Hard Copy Document or the direction that the print head or scanner light bar moves.) For scanners that use a technology other that a light bar, this is the direction along which the image data is acquired most quickly. (Also called Fast Scan direction, X) This direction is sometimes referred to as X Feed direction.
Default<service>JobTicket	A <service>JobTicket data object that is bound to an instance of a Service. The Default<service>JobTicket values are used by the Service when the JobTicket for Job being processed does not specify a different value.
Destination	The end point network address (i.e. URI) of a storage location for a Digital Document output from a Service.
Destination URI	Alternative term for Destination. (See Destination above)
Digital Document	The input to or output from a Service containing the digitized data representing a Hardcopy Document. The Digital Document may also include metadata relative to the document. Digital documents are the inputs to Print, FAX out and Transform Services; the primary output from Scan, FAX out and Transform services. (note from the diagram that Print, FAX in and Copy services may also have a secondary Digital Document output.) See Hardcopy Document.
Directory Service	A software application or a set of applications that stores and organizes information about a computer network's users and resources, and that allows network administrators to manage user's accesses to the resources.
Discovery Client	A software application that performs service or resource discovery on a computer network.
Document Repository	A local or remote data store where Digital Documents are stored by or recovered from an MFD Service
Document Resource	A Resource associated with a document within a job of an MFD Service is a Document Resource.

Term	Definition
Document Ticket	A data object that contains end user's intent for document processing and descriptive properties of a document within a job of a Service. The content of a Document Ticket is configured by end user through a network MFD Client application.
Element	Elements are used to convey structure and relationships in XML document instances. An Element can contain both content and Attributes.
Fast Scan direction	Same as CrossFeed direction or X.
Feed direction	The direction along which hardcopy document is moved, or the direction that the print head or scanner light bar moves relative to the Hard Copy Document. For scanners that use a technology other that a light bar this is the direction along which the image data is acquired most slowly. (Also called Slow Scan direction or Y)
Firmware	A computer program that is embedded in a hardware device. Firmware is a type of resource that can be retrieved and stored by PWG MFD Resource Services.
Font	A complete character set of a single size and style of a particular typeface. Most current computer fonts are based on fully scalable outlines. However, the term "Font" still refers to a single style. Times New Roman regular, italic, bold and bold italic are four fonts, but one typeface. Font is a type of resource that can be retrieved and stored by a MFD Resource Service.
Form	A document (printed or electronic) with spaces in which to write or enter data. Used in the context of the MFD specifications, the term "Form" refers to an electronic form, which is a type of resource that can be retrieved and stored by PWG MFD Resource Services.
Global Resource	TBD
Group Element	A collection of Elements that constitutes a complex Element.
Hardcopy Document	A document on physical media such as paper, transparency or film that is the input source to Scan, Copy and FAX Out MFD Services and the output from Print, Copy and FAX In Services.
ICC Profile	A set of data that characterizes a color input or output device, or a color space, according to standards promulgated by the International Color Consortium (ICC). Profiles describe the color attributes of a particular device or viewing requirement by defining a mapping between the device source or target color space and a *profile connection space* (PCS) (see definition below). This PCS is either CIELAB (L*a*b*) or CIEXYZ. Mappings may be specified using tables, to which interpolation is applied, or through a series of parameters for transformations. Every device that captures or displays color can have its own profile. ICC profile is a type of resource that can be retrieved and stored by a PWG MFD Resource Service.
Image	A digital electonic representation of the information captured by a Scan Device. One Image is produced as a result of a Scan Device scanning a Scan Region. One or more images are contained in the Digital Document produced by a Scan Service.

Term	Definition
Job History	An MFD Service instance specific queue containing all the *<service>*Jobs that have reached a terminating state. The terminating states are defined as Completed, Aborted and Canceled. The length of this queue is determined by the implementer. The Jobs SHOULD remain in the Job History for a time sufficient for interested parties to obtain information on completed jobs.
Job Resource	A Resource associated with a Job.
Job Ticket	A data object that contains end user's intent for job-level document processing, job processing and descriptive properties of a job of a Service. The content of a Job Ticket is configured by end user through a network MFD Client application.
Local Client	Alternative term for Local Scan Client. (See Local Scan Client and Scan Client below.)
Local Client	A software application entity that is co-located with the service it interacts on behalf of an end user. May also be referred to as Local <service> client, where <service> is one of the services supported by the MFD.
Logo	A graphical element, (ideogram, symbol, emblem, icon, sign) that, together with its **logotype** (a uniquely set and arranged typeface) form a trademark or commercial brand. Logo is a type of resource that can be retrieved and stored by a PWG MFD Resource Service.
MFD Service	A software service that accepts and processes requests to create, monitor and manage Jobs requesting a service. The software service accepts and processes requests to monitor and control the status of the service itself and its associated resources. A MFD Service is hosted either locally or remotely to the MFD,
Physical *<service>*DocumentTicket	An encoded hardcopy *<service>*DocumentTicket, directly marked by the end user, that becomes a *<service>*DocumentTicket data object after being scanned and processed. This may be used for Scan, Copy and Fax-Out Services
Physical *<service>*JobTicket	An encoded hardcopy *<service>*JobTicket, directly marked by the end user, that becomes a *<service>*JobTicket data object after being scanned and processed. This may be used for Scan, Copy and Fax-Out Services
Profile Connection Space (PCS)	A standard device independent color space defined by the International Color Consortium (ICC) that is used for mapping the color space of one device to the color space of another by describing the relationship of each device's color space to this device independent color space.
Remote Client	The Service Client application external to the MFD. (May also be Remote *<service>* Client .)
Resident Resource	
Resource Client	The local or remote software entity that interfaces with the end user and interacts with a Resource Service.
Resource Repository	A persistent storage for storing Resources. Access to the Resource Repository is through a Resource Service. Resource Repository may be embedded within a device, co-located with the Resource Service or hosted remotely.
Resource Service	A software service that provides the interfaces for storing, retrieving, and maintaining users' Resources.

Term	Definition
Scan Client	The local or remote software entity that interfaces with the end user and interacts with a Scan Service.
Scan Device	The MFD subsystem that is responsible for image acquisition and media handling (i.e. the scanner).
Scan Document	The data object managed by a Scan Service that contains document level description, processing, status information of a document within a Scan Job.
ScanRegion	A rectangular region of the Scan Device's Platen that has been specified by an Administrator or End User as the bounding area in which a scan will occur.
Sequence	A type of XML structure that represents an ordered list of elements.
Service	A MFD service that accepts and processes requests to create, monitor and manage Jobs. The software service accepts and processes requests to monitor and control the status of the service itself and its associated resources. A Scan Service is hosted either locally or remotely to the MFD,
Slow Scan direction	Same as Feed Direction or Y
Software	A collection of computer programs that perform some tasks on a MFD system. Software is a type of resource that can be retrieved and stored by a PWG MFD Resource Service.
Template	A data object that contains descriptive information and the pre-configured content of a job or document ticket for a specific MFD service. A template is not bound to a specific job or document. It can be stored or retrieved from a Resource Service, collocated on the MFD or hosted on a remote system. Template is a type of resource that can be retrieved and stored by a PWG MFD Resource Service.
Watermark	A recognizable image or pattern when printed on paper used to identify authenticity. Watermark is a type of resource that can be retrieved and stored by a PWG MFD Resource Service.
X	An axis of the coordinate system. This axis is associated with the Fast Scan direction of the Scan Device. If the light bar or HardCopyDocument moves, they do not move in the X direction. They move in the Y direction. (See also CrossFeed direction, Fast Scan direction)
Y	An axis of the coordinate system. This axis is associated with the slow scan direction of the Scan Device. If the light bar or HardCopyDocument moves, they move in Y direction. (See also Feed direction, Slow Scan direction)

2   Jobs, Documents, Tickets and Templates

The MFD Semantic Model uses concepts that but may be misunderstood or may not be familiar. Because these concepts are integral to the definition of all MFD Services, this section attempts to provide not only definitions but use examples for each MFD Service.

A Document is text and/or graphic information that ultimately is displayed to humans visually, on media as hardcopy or on some monitor or display device. MFDs handle documents, which may be in hardcopy form or any number of electronic forms, by implementing services which:
  a. Convert documents between hardcopy and electronic forms (scan and print)
  b. Duplicate documents in hardcopy form (Copy)
  c. Transmitted documents electronically (Facsimile)
  d. Transform documents from one electronic form to another (Transform)

A Job is the work element by which one or more documents are submitted to a service. It generally includes
  a. the document(s) or reference to the document(s) which is the object to be serviced
  b. a Job Ticket, which contains instructions of how the document(s) is to be processed, identification information on the documents , the originator and the destination
  c. Possibly metadata information relating to the document(s)
As the job is serviced, the ticket may be updated with information about the servicing and the state of the job, useful for job management, tracking, billing.

A Ticket is a data object created by a service and bound to Job or Document that contains an end user's Intent for document processing and the descriptive properties of a Job or Document.
  a.   a Job Ticket relates to the job and all documents in the job, except those for which a Document Ticket is created.
  b. A Document Ticket relates to a specific document and any property specified in a Document Ticket overrides the value of that property that may be specified in the Job Ticket.

A Template, in this context, may be a Job Ticket Template or a Document Ticket Template.. It is a partially filled out Ticket not yet bound to a specific job or document, but which represents an often-used (or preferred by policy) set of instructions. Templates are completed and/or modified within the service to form specific Job or Document Tickets.
The Job Receipt is produced by a Service as a Job is processed. It contains the values of processing elements used by the Service for processing the Job, usually including some information from the Job Ticket.

The following diagram represents the relation of the Job Ticket to the other elements involved in processing a job.