Proposed *List* of Objects/Attributes for the Printer Job Monitoring MIB/MIF

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File: **ftp-out.external.hp.com /snmpmib/jobs-mib/job-list.doc, .psr, .ps**

This document proposes a *list* of the job and document MIB/MIF objects/attributes for a new MIB/MIF that may be used in a printer implementing RFC 1759 (Printer MIB) for purposes of providing some job and document information to management clients and accounting daemon programs. Optional objects are provided for implementing agents that monitor higher-end printers. However, objects that a spooling printer might need are not included. Another MIB/MIF for spooling printers and spoolers should be developed if desired, which would augment this MIB/MIF.

In order to provide a good starting point, this proposal lists all of the ISO 10175 Document Printing Application (DPA) job and document attributes by ISO DPA name and indicates by an M, or O which *subset* of the ISO DPA job and document attributes are mandatory, which are optional for the proposed printer job monitoring MIB/MIF. Attributes with neither an M nor an O are proposed *not* to be included in the printer job monitoring MIB at all, but are listed just to show what is *not* being included in this MIB. The full ISO DPA standard is available via anonymous ftp at ftp-out.external.hp.com in directory: /pub/snmpmib/dpa in WORD (.doc) and PostScript(tm) (.ps) forms.

This proposal is for a printer job monitoring MIB. If monitoring job in a spooler is also wanted, it should be done in a separate MIB that augments this MIB. If management of jobs, such as cancelling or promoting jobs is also wanted, it should be a separate MIB that augments this MIB. Then the conformance claims to the printer job monitoring MIB and the job management MIB can be kept distinct, since some products will want to do just printer job monitoring and some others may want to do both.

Terminology

The following terms are used in this specification[1]:

A *job* is a data object instantiated by a *server* in response to one or more successful operations performed by a client on a service device object. The *client* is able to specify job attributes which control when and how the job is to be performed by the server. A job contains one or more *documents*.

A *document* is a data object that is contained in a job object and represents a set of related information that is identified by user's as a unit. The client is able to specify document attributes separately for each document in a job which control how the document is to be processed by the server. Sever implementation of more than one document per job is optional.

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[1] Existing systems use conflicting terms, so these terms are drawn from the ISO 10175 Document Printing Application (DPA) standard. For example, PostScript systems use the term *session* for what we call a job in this paper and the term *job* to mean what we call a document in this paper. PJL systems use the term ...

A *client* is a network entity that submits jobs to servers using some job submission print protocol. A client may be an end-user workstation or PC, or maybe a spooling system or supervisor control program that is controlling a printer.

A *server* is a network entity that accepts jobs from clients. A server may be a *printer*, a printer *supervisor* control program, or a print *spooler*.

A *printer* is a server that puts marks on media.

A *supervisor* is a server that contains a control program that controls a printer. A supervisor is a client to the printer.

A spooler is a server that accepts jobs, spools the data, and decides when and on which printer to print the job. A spooler is a client to a printer or a printer supervisor, depending on implementation.

An *agent* is a network entity that accepts SNMP operations from management stations.

A *management* station is a network entity that submits SNMP operations to agents.

An *attribute* is a name, value-pair that specifies an action, a status, or a condition in a job or a document object and in a DMTF MIF.

An *SNMP object* is a name, value-pair that specifies an action, a status, or a condition in an SNMP MIB.

The following diagram illustrates the relationships between the defined entities.

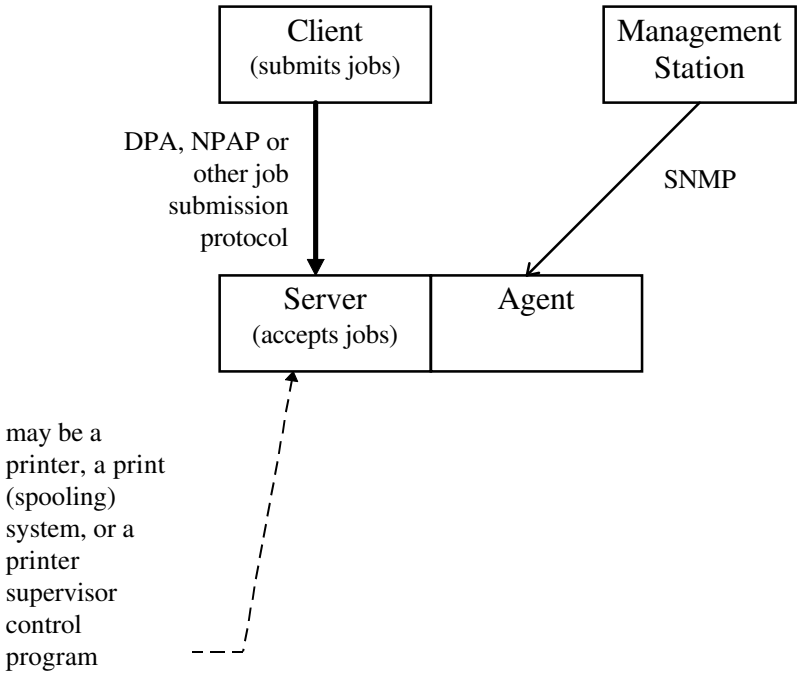
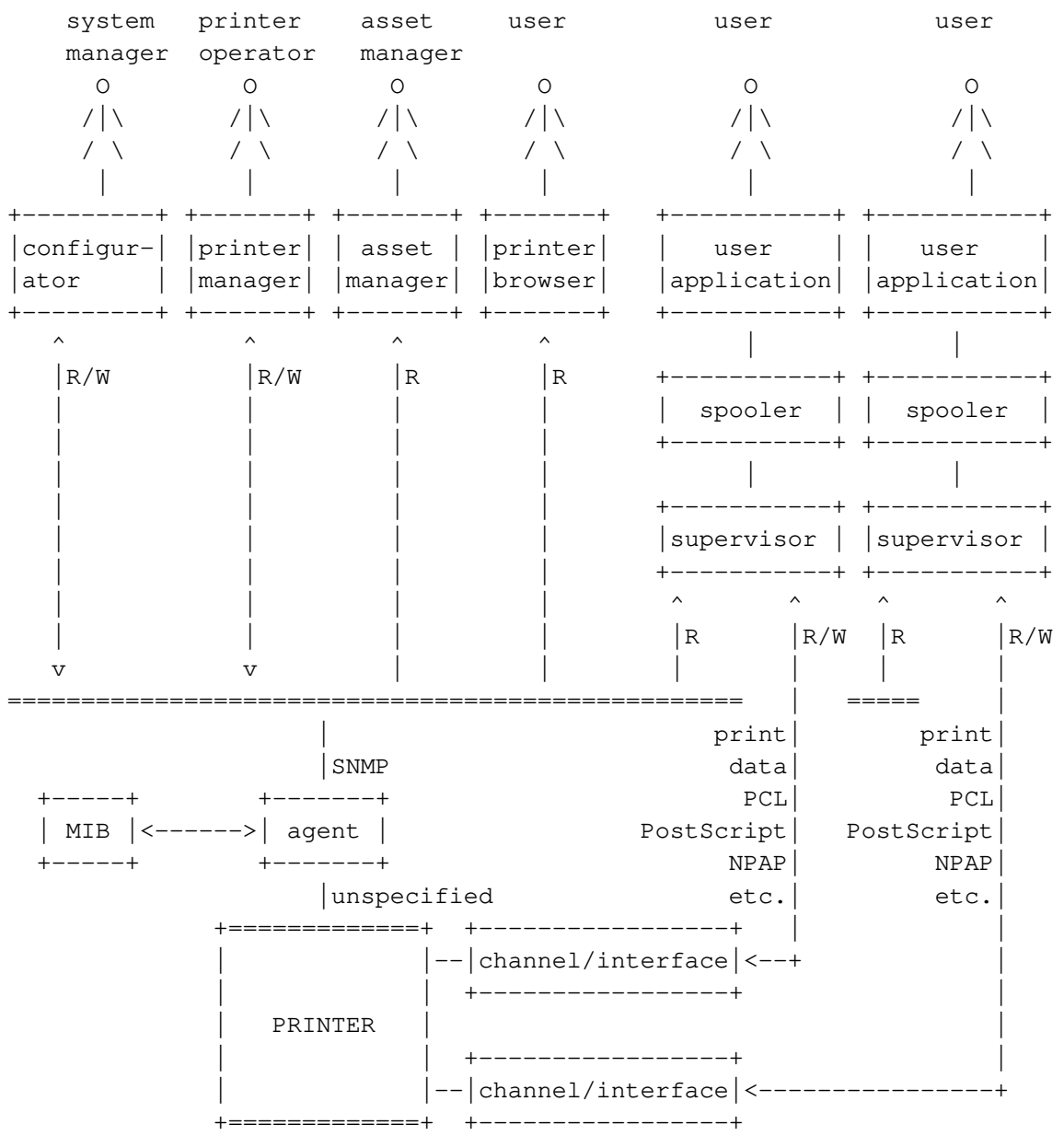


Figure 1 - One Printer's View of the Network (extracted from RFC 1759):



Goals and Requirements for the Printer Job Monitoring MIB/MIF

The goals for the printer job monitoring MIB/MIF are:

1. Provide a limited set (25) of *mandatory* job and document attributes for a printer, plus 31 or so optional job and document attributes, *not* a complete set of job and document attributes that a high-

end printer might provide. This mandatory and optional subset is intended to be used with printer devices that do not include spooling.

2. Provide for printers that can contain more than one job at a time, but still be usable for low end printers that only contain a single job at a time. In particular, meet the needs of Windows and other PC environments for managing low-end networked devices without unnecessary overhead or complexity, while also providing for higher end systems and devices. Since the job monitoring MIB will also be transformed into a companion DMTF MIF, the job monitoring MIB/MIF should meet the needs for managing devices using the DMTF DMI when the devices are directly connected to PCs.

3. Provide for job information after the printer has finished printing the job. This job information on completed jobs is intended to be used by:

    - management stations that provide job status to system operators that are remote from the printer
    - a management station that is co-located with the printer to privide an enhanced console capability
    - end user job monitoring programs that give end users status on progress and completion of jobs during the complete life cycle of the job, including for a period after the job completes
    - system accounting programs that copy the completed job statistics to an accounting system. Such accounting programs can copy the data for implementation on low-end printers that cannot rely on the print system to reliably write the accounting information when the job completes. It is recognized that depending on accounting programs to copy MIB data during the job-retention period is somewhat unreliable, since the accounting program may not be running (or may have crashed).
    - system usage statistics gaterhing programs that copy the completed job statistics to system usage logs

4. Provide a compatible subset of job and document attributes of the ISO DPA standard, so that coherence is maintained between the two protocols and information seen by end users and system operators. However, the printer job monitoring MIB is intended to be used with printers that implement other job submitting and management protocols, such as IEEE 1284.1 (NPAP), as well as with ones that do implement ISO DPA. So nothing in the printer job monitoring MIB shall require implementaion of the ISO DPA protocol.

5. Design this printer job monitoring MIB so that an addtional MIB can be specified in the future for monitoring multifunction (scan, FAX, copy) jobs. Design this job monitoring MIB so that the future multifunction job monitoring MIB is able to use entire groups fromthis MIB.

6. Solve the security policy problem that unauthorized users cannot access job information for jobs that are not theirs. Solving the security problem requires SNMP V2 security. However, this MIB is also intended to be used with SNMP V1 by prividing essor conformance requirements when implementing V1.

7. Do *not* provide for additional job management functions (job control functions), such as ModifyJob, CancelJob, PromoteJob, PauseJob, ResumeJob, InterruptJob. If these job control functions are desired, put them into a second job control MIB that augments this job monitoring MIB. Then the conformance to this printer job monitoring MIB is kept distict from the conformance to such a job control MIB, since some implementations may want to only do the printer job monitoring MIB and others may want to implement both. The ITEF/DMTF Printer Working Group (PWG) may wish to develop both MIBs in parallel. However, this document refers only to the printer job monitoring MIB.

8. Provide for monitoring of jobs that clients submit (1) directly to printers (end user clients, printer supervisor control programs, or spooling print systems acting as clients).

9. Provide SNMP MIB access to jobs submitted to the printer by any protocol, including printers that accept jobs using multiple protocols.

10. Only provide objects that are of interest to system operators and system managers. Implication: Do *not* need to include some objects that ISO DPA has corresponding attributes that are required for ISO DPA level 1 or level 2 conformance. Also include some attributes in the printer job monitoring MIB that are *not* ISO DPA level 1 or level 2 conformance requirements, if they are of particular use and importance to system operators and system administrators for monitoring jobs or for accounting. Note: the tables have been expanded to include a column that indicates the level of conformance requirements in ISO DPA.

Listing of job and document attributes

The DPA Datatype column indicates the data type of the ISO DPA attribute, using the following abbrievations:

A(255)	ASCII 255 octets maximum
T(4095)	Text (of 4095 octets maximum length). Tagged to be one of four standard coded character sets: (1) ASCII, (2) ISO Latin1, (3) T.61, or (4) Unicode - UCS-2.
O(255)	**OctetString**(of 255 octets maximum length).
Cardinal	32-bit **Cardinal**
Cardinal64	64-bit **Cardinal**
PosInt	32-bit **PositiveInteger**
NameOrOid	**NameOrOID**
Oid	**ObjectIdentifier**
GenTime	**GeneralizedTime**
NameOrOid/PosInt	**NameOrOid** and **PositiveInteger** pairs
MediumDimensions	2 **Reals**

The MIB/MIF Datatype column shows the corresponding data type for the MIB/MIF object/attribute.

A(255)	**DisplayString** (ASCII) 255 octets maximum
I(255)	**InternationalDisplayString** of 255 octets maximum, localized as specified by the GenCurrentLocalizationIndex. See General MIB (file: gen.doc, .ps, .txt) and the General textual conventions (file: gentc.doc, .ps, .txt).
T(255)	A single Text (maximum of 255 octets) attribute specified as **CodeIndexedStringIndex**, e.g., in one of the coded character sets that the server supports. See General MIB (file: gen.doc, .ps, .txt) and General MIB textual-conventions (file: gentc.doc, .ps, .txt). The server may store the attributes in the coded character set supplied by the client when the job was submitted, or the server may convert the coded character set to one of the other coded character sets that the server supports.

NOTE 1 -Code conversion from the character repertoire of ISO Latin 1 to Unicode representation is easy (add a leading zero octet). However, code conversion from Unicode to ASCII or Latin1 when there are characters outside the repertoire of the destination coded character set is harder. Alternatives:

1. Return the characters that the server cannot represent in the requested

coded character set using a closely related character, such as the unaccented latin letter, or some error condition such as * or ? for those characters that don't have obvious closely related characters.

2. Don't return anything; make the client request one of the other coded character representations (by writing a different value into the xcmGeneralCurrentCodedCharSet object).

3. Convert Unicode into the two character mnemonic representation contained in RFC 1345 which has a two character ASCII representation for all characters of Unicode Do the same for conversion of ISO Latin1 into ASCII. For example, RFC 1345 represents LATIN SMALL LETTER A WITH ACUTE as a' and MICRO SIGN as My.

4. RFC 1345 was designed for use by software and implementors and, therefore, avoids the use of so-called national-use characters (ACCENT GRAVE (`), CIRCUMFLEX ACCENT (^), TILDE (~). This fourth alternative is to use better two-character approximations than those in RFC 1345 that would be recognized by end-users without special training and would use the obvious national-use characters I such approximations.

O(255)	**OctetString**(of 255 octets maximum length).
Cardinal	32-bit **Cardinal** - but don't use the sign bit to avoid implementation problems with signed vs. unsigned representation.
Cardinal64	64-bit **Cardinal** - but don't use the sign bit to avoid implementation problems with signed vs. unsigned representation.
Ordinal32	32-bit **Ordinal** - but don't use the sign bit to avoid implementation problems with signed vs. unsigned representation.
Ordinal16	16-bit **Ordinal** - but don't use the sign bit to avoid implementation problems with signed vs. unsigned representation.
DateAndTime	**DateAndTime** from SNMPv2 textual-conventions
index32	32-bit index into another table. Need to specify whether a 0 value is allowed and, if so, what is its significance.
index16	16-bit index into another table. Need to specify whether a 0 value is allowed and, if so, what is its significance.
enum	enumerated data type
bit-vector	32-bit integer with each bit being significant

Listing of job attributes

The jobs table is like the alerts table, in that the printer (SNMP agent) adds jobs to the end of the table as the jobs are submitted to the printer and removes jobs from the beginning of the table when they have exceeded the time that completed jobs remain in the table. The job table is indexed by the **hrDeviceIndex** and the **job-identifier** generated by the server when the server accepted the job.

The following tables lists all the ISO DPA job and document attributes from the table of contents of the Final Text, dated May 1995 and indicates which *subset* of those ISO DPA attribute are being proposed for the Printer Job Monitoring MIB and the spooler job monitoring MIB/MIF:

Legend

Column Heading	Description
Section	The section number in the ISO DPA standard that describes the attribute that corresponds to the object. A blank section number indicates an object that doesn't have a corresponding ISO DPA attribute. PSIS indicates that the attribute is specified by the X/Open Print Systems Interoperability Specification (PSIS) draft standard.
MIB	Indicates which MIF/MIB the attribute/object is intended: **P**: printer job monitoring MIF/MIB **S**: spooling job monitoring MIF/MIB (future) **<blank>**: not proposed for either MIF/MIB
L	Level of Conformance in ISO DPA: **1**: level 1 **2**: level 2 **1m**: level 1 with multiple documens **2m**: level 2 with multiple documents. **<blank>**: not required for conformance to ISO DPA
M/O	Proposed conformance for the job monitoring MIB: **M**: mandatory **O**: optional **<blank>**: proposed *not* to be included in the either the printer or the spooling job monitoring MIB
E	**E** indicates an event - generates a trap when the value changes
DPA Datatype	The data type of the corresponding ISO DPA attribute
MIB Datatype	Proposed datatype for the MIB object
Attribute	Name of the corresponding ISO DPA attribute
page no	Page number of the ISO DPA attribute specification. A blank page number indicates that this object does not have a corresponding ISO DPA attribute

The following general group contains a single object to control localization of job attributes for all jobs:

Section	MIB	L	M/O	E	DPA Datatype	MIB/MIF Datatype	Attribute	page no
	P		M			Ordinal16	GeneralCurrentLocalization	

Section	MIB	L	M/O	E	DPA Datatype	MIB/MIF Datatype	Attribute	page no
9.2.1							*job information attributes:*	104

9.2.1.1	P	1	M		A(255)	A(255)	Job-identifier	104
9.2.1.2	P?		O?		A(255)	A(255)	Job-identifier-on-printer	104
9.2.1.3	P		O		A(255)	A(255)	Job-identifier-on-client	104
9.2.1.4	P		M		T(4095)	T(255)	Job-client-id	105
9.2.1.5	P	2	M		T(255)	T(255)	Job-name	105
9.2.1.6	P		M		T(4095)	T(255)	Job-originator	106
9.2.1.7	P	1	O		T(4095)	T(255)	Job-owner	106
9.2.1.8	P		O		T(4095)	T(255)	Job-comment	106
9.2.1.9							Job-start-message	106
9.2.1.10							Job-end-message	107
9.2.1.11		1					Job-non-compulsory-attributes	107
9.2.1.12							Initial-value-job	107
	S		M			Oid	Job-source-type	
	S		M			Oid	Job-destination-type	
	P		M			PrtChannelType	job-source-channel-type (from rfc 1759)	
	P		M			PrtChannelType	job-destination-channel-type (from rfc 1759)	
	P		M			CodedCharSet	Coded character set that the submitting client used to encode text attributes (IANA MIBenum character set values)	
9.2.2							*Job-results-handling attributes:*	108
9.2.2.1							Results-profile	108
9.2.2.1	S		M		PosInt	Ordinal32	number-of-job-sets	
9.2.2.1	P		M		PosInt	Ordinal32	job-copies	108
9.2.2.1	P		M		NameOrOid	index32[2]	output-bin	
9.2.2.2							Job-finishing	111
9.2.2.3							Finishing-includes-job-sheets	111
9.2.2.4		2					Job-sheets	112
9.2.2.5		2					Document-sheets	112
9.2.3							*Job-event-handling attributes:*	112
9.1.6.8		2					Notification-profile	102
9.1.6.9							Logging-profile	103
9.2.3.1							Job-abort-criteria	113
9.2.3.2							Job-warning-criteria	113
9.2.3.3							Document-abort-criteria	114
9.2.4							*Job-scheduling-instruction attributes:*	114
9.2.4.1							Job-start-wait	114
9.2.4.2							Job-end-wait	114
9.2.4.3		2					Job-hold	115
9.2.4.4							Job-password	115
9.2.4.5	S	2	M		GenTime	DateAndTime DateAndTime	Job-print-after	116
9.2.4.6	S	2	O	E	PosInt(1..100)	Int(1..100)	Job-priority	116
9.2.4.7	S		O		GenTime	DateAndTime	Job-deadline-time	116

[2] The index for output-bin could be changed from index32 to index16, if a (1..65535) limit was put on prtOutputIndex in RFC 1579 as has been done with prtInputIndex.

9.2.4.8	S		O		GenTime	DateAndTime	Job-discard-time	117
9.2.4.9	S	2	M		DeltaTime	DeltaTime	Job-retention-period	117
9.2.4.10	S		O		Text(4095)	T(255)	Job-message-to-operator	117
9.2.4.11							Job-scheduling	117
9.2.4.12							Job-validate	118
9.2.5							*Printer-selection attributes:*	118
9.2.5.1	S	1	M		T(255)	T(255)	Printer-name-requested	118
9.2.5.2							Physical-printers-requested	119
9.2.5.3							Printer-locations-requested	119
9.2.5.4							Printer-models-requested	119
9.2.5.5							Printer-types-requested	119
9.2.5.6							Printer-speed-range-requested	120
9.2.6							*Access-and-accounting attributes:*	120
9.2.6.1	P		M		T(4095)	T(255)	User-name	120
9.2.6.2	P		M		O(255)	O(255)	Accounting-information	120
9.2.7							*Job-security-handling attributes:*	120
9.2.7.1							Job-security-confidentiality-level	121
9.2.7.2							Job-security-confidentiality-category	122
9.2.7.3							Job-security-confidentiality-policy	122
9.2.7.4							Job-security-integrity-level	123
9.2.7.5							Job-security-integrity-category	123
9.2.7.6							Job-security-integrity-policy	123
9.2.7.7							Job-security-label	124
9.2.8							*Job-status attributes:*	124
9.2.8.1	P	1	M	E	Oid	DPAJobState	Current-job-state	124
9.2.8.2	P	2	M	E	NameOrOid	bit-vector	Job-state-reasons	127
9.2.8.3	P		M		Oid	DPAJobState	Previous-job-state	128
9.2.8.4	S	1	M		DistNameStr	hrDeviceIndex	Devices-assigned	128
9.2.8.5	S		M	E	OidSequence	enum	Devices-state-of-devices-assigned	129
9.2.8.6	P		O		GenTime	DateAndTime	Estimated-completion-time	129
9.2.8.7	P	2	O		GenTime	DateAndTime	Submission-time	130
9.2.8.8							Modification-time	130
9.2.8.9	P		O		GenTime	DateAndTime	Started-printing-time	130
9.2.8.10	P		O		Cardinal32	Counter32	Job-copies-completed	130
9.2.8.11	P		O		Cardinal32	Counter32	Pages-completed	130
9.2.8.12	P		O		Cardinal32	Counter32	Impressions-completed	131
9.2.8.13	P		O		Cardinal32	32	Media-sheets-completed	131
PSIS	P		O		NameOrOid	index16	Media-consumed-type-index - table	
PSIS	P		O		PosInt	Counter32	Media-consumed - table	
PSIS?	P		O		NameOrOid	index16	Color-impressions-consumed-index - table	
PSIS?	P		O		Cardinal32	Counter32	Color-impressions-consumed - table	
9.2.8.14	P		O		Cardinal64	Counter64	Octets-completed	132
9.2.8.15	P		O		Cardinal64	Counter64	Total-job-octets	132
9.2.8.16	P		M		Cardinal	Cardinal32	Intervening-jobs	132
9.2.8.17		2					Print-checkpoint	132
9.2.8.18							New-job-identifier	133
9.2.8.19							On-request-resources-required	134

9.2.8.20	S	2	O	E	T(4095)	T(255)	Job-message-from-administrator	134
9.2.8.21							Last-job-events	134
9.2.8.22							Name-of-last-accessor	135
9.2.8.23	P		O		Cardinal	Cardinal32	Error-count	135
9.2.8.24	P		O		Cardinal	Cardinal32	Warning-count	135
9.2.8.25	P		O		Cardinal	Cardinal32	Processing-time	135
9.2.8.26	P	2	O		GenTime	DateAndTime	Completion-time	135
9.2.8.27	P	1m	M		Cardinal	Cardinal32	Number-of-documents	135
9.2.8.28		1m					Job-submission-complete	136
9.2.8.29							Ignored-attributes	136
9.2.9							*Job-size attributes:*	136
9.2.9.1	P		O		Cardinal	Cardinal32	Job-page-count	137
9.2.9.2							Job-impression-count	137
9.2.9.3							Job-media-sheet-count	138

Listing of document attributes

The following table lists all the ISO DPA document attributes and proposes which ones will be in the job monitoring MIB/MIF. The document table is a single table for all jobs on the printer, so the each row is indexed by the **hrDeviceIndex** from the host resources MIB, the **job-identifie**r generated by the server when it accepted the job, and the **document-sequence-number** (starts at 1 for each job).

Section	MIB	L	M/ O	E	DPA Datatype	MIB/MIF Datatype	*Attribute*	page no
9.3							*Document object attributes:*	138
9.3.1							*Document-information attributes:*	139
9.3.1.1	P		M		T(255)	T(255)	Document-name	139
9.3.1.2	S		M		T(4095)	T(255)	Document-file-name	139
9.3.1.3							Document-authors	140
9.3.1.4							Document-comment	140
9.3.1.5							Document-revision-date	140
9.3.2							*Document production instructions:*	140
9.3.2.1	S	2	O		NameOrOid	index16	Default-medium	140
9.3.2.2	S		O		NameOrOid	index16	Default-input-tray	141
9.3.2.3		2					Default-font	142
9.3.2.4							Default-resources	143
9.3.2.5							Default-character-set	143
9.3.2.6							Default-character-repertoire	150
9.3.2.7							Default-character-mapping	150
9.3.2.8							Default-printer-resolution	151
9.3.2.9							Medium-substitution	151
9.3.2.10							Input-tray-select	152
9.3.2.11							Font-substitution	152
9.3.2.12							Resource-context	153
9.3.2.13	P?	2					Finishing [future?]	153
9.3.2.14							Finishing-includes-document-sheets	154
9.3.2.15	P		O		Oid	enum	Output [method]	154
9.3.2.16							*Imposition attributes:*	154
9.3.2.16.1		2					Number-up	155
9.3.2.16.2							Plex	159
9.3.2.16.3							Binding-edge	160
9.3.2.16.4							Binding-edge-image-shift	160
9.3.2.16.5							x-image-shift	161
9.3.2.16.6							y-image-shift	161
9.3.2.17							Print-quality	162
9.3.2.18							Medium-fidelity	162
9.3.2.19	P	2	M		PosInt(1..2)	Int(1..2)	Sides	163
9.3.2.20							Page-select	163
9.3.2.21							Page-media-select	164
9.3.2.22	P	2	M		Cardinal	Cardinal32	Copy-count	165
9.3.2.23		1m					Reset-printer	165
9.3.2.24							Initial-value-document	165
9.3.3							*Document-description attributes:*	166

9.3.3.1	S		M		Oid	enum	Document-type	166
9.3.3.2		2					Transfer-method	166
9.3.3.3	P	1	M		Oid	enum	Document-format	167
9.3.3.3	P	1	M		T(4095)	T(255)	Document-format-variants	167
9.3.3.3	P	1	M		T(255)	T(255)	Document-format-version	167
9.3.3.4		1					Document-content	167
9.3.3.5		1					Non-compulsory-attributes	168
9.3.4							*Document-characteristic attributes:*	
9.3.4.1							Intended-page-size	169
9.3.4.2							Content-orientation	170
9.3.4.3							Presentation-direction	171
9.3.4.4							Page-order-received	172
9.3.4.5		2					Media-used	172
9.3.4.6							Assured-reproduction-areas-used	173
9.3.4.7							Input-trays-used	173
9.3.4.8		2					Fonts-used	173
9.3.4.9							Resources-used	173
9.3.4.10							Character-sets-used	174
9.3.4.11							Character-repertoires-used	174
9.3.4.12							Character-mappings-used	174
9.3.4.13							Printer-resolutions-used	174
9.3.4.14							Content-orientations-used	175
9.3.4.15							Presentation-directions-used	175
9.3.4.16							*System-hint attributes:*	175
9.3.4.16.1	P		M		Cardinal64	Cardinal64	Octet-count	175
9.3.4.16.2							Page-count	175
9.3.4.16.3							Glyph-count	176
9.3.4.16.4							Font-count	176
9.3.4.16.5							Font-change-count	176
9.3.4.16.6							Maximum-fonts-per-page	176
9.3.4.16.7							Percent-graphics	176
9.3.4.16.8							Percent-images	176
9.3.5							*Document-status attributes:*	177
9.3.5.1		1m					Document-sequence-number	177
9.3.5.2	P		M	E	Oid	enum	Document-state	177
9.3.5.3	P		M		Cardinal	Cardinal32	Copies-completed	178
9.3.5.4							File-reference	178
9.3.5.5							Current-page-order	178

176

177

178 **Media Supported Table**

179 There will be a MediaSupported table which is Optional. It contains the media supported by this printer, whether
180 installed in the input tray(s) (ready) or not. Representing the supported (system Administrator's policy), as
181 opposed to what is ready, is a deviation from the strategy agreed to by the IETF Printer MIB working group in
182 developing RFC 1759. Indicating MediaSupported is moving away from representing just the output device and
183 moving towards representing the service.

Section	MIB	L	M /O	E	DPA Datatype	MIB Datatype	Attribute	page no
	P		O				*MediaSupported (table):*	
	P		O			A(255)	ASCII-name	
	P	2	O		T(255)	T(255)	Name	
	P		O		T(4095)	T(255)	Description	
	P		O			enum	MediaSizeUnit (.0001 inches or micrometers)	
	P		O		MediumDimensions	Ordinal32	X-dimension	
	P		O		MediumDimensions	Ordinal32	Y-dimension	
	P		O		Oid	A(255)	Type	
	P		O		Cardinal	Cardinal32	Weight	
	P		O		NameOrOid	A(255)	Color	

184

185 ## Change History

186 The following changes have been made:

187 **The following changes were made from version 0.7, dated 18-Oct-1995 to make version 0.8, dated, 2-**
188 **Dec-1995:**

189 1. Reduced the scope to job monitoring performed by printers, not by spooling systems. Changed the
190 name to "Printer Job Monitoring MIB". Now there are only 25 mandatory printer job monitoring
191 MIB/MIF objects/attributes and 31 optional printer job monitoring MIB/MIF objects/attributes. There
192 are 9 mandatory spooler job monitoring MIB/MIF objects/attributes and 4 optional spooler job
193 monitoring MIB/MIF objects/attributes.

194 2. Eliminated the goal of making this MIB useful by itself for non-printing, so removed the concept of
195 conditional mandatory. If a scan job monitoring MIB is every developed, it can call out for groups
196 from the printer job monitoring MIB, so we will still segragate objects that are not print-specific from
197 print-specific ones by putting them in separate groups. Then a scan job monitoring MIB could simply
198 require implementation of the non-print groups in this MIB.

199 3. Added terminology and diagrams. Clarified that a client can be any of: an end-user PC or
200 workstation, a spooling system, or a printer superivsor control program.

201 4. Added a column indicating which job monitoring MIB: **P** for printer job monitoring MIB or **S** for
202 spooler job monitoring MIB.

The following changes were made from version 0.6, dated 19-Sep-1995 to make version 0.7, dated 18-Oct-1995:

1. Added a column showing the ISO DPA conformance levels: 1, 2, 1m and 2m.
2. Divided job-channel-type into two attributes: job-source-channel-type and job-destination-channel-type, since they can be different.
3. Added JobSubmittedCodedCharSet, so that a management station can determine the character set of job and document attributes. Also corresponds to the coded character set field of the ISO DPA operation-locale attribute that specifies the locale of the client that submitted the job.
4. Changed the name of Printers-assigned to Devices-assigned and Printer-state-of-printers-assigned to Devices-state-of-devices-assigned, so that they can be used for other multifunction devices.
5. Changed Devices-assigned from optional to mandatory, since Devices-state-of-devices-assigned is mandatory in order to give the whole picture on the state of a job that is in the processing or printing states.
6. Changed Job-identifier-on-client from mandatory to optional, since it is only needed for situations where jobs are forwarded to other servers.
7. Changed the print-centric number-of-job-sets and job-copies job attributes from Mandatory to Conditional Mandatory (C), i.e., Mandatory when implementing a (spooling) print system (as opposed to a printer).
8. Changed the print-centric output-bin, job-print-after, printer-name-requested, started-printing-time, job-copies-completed, pages-completed, impressions-completed, media-sheets-completed, octets-completed, and total-job-octets job atttributes from Optional to Conditionally Mandatory, i.e., Mandatory when implementing a (spooling) print system (as opposed to a printer).
9. Changed printer-centric default-medium, default-input-tray, and output document attributes from Optional to Conditionally Mandatory, i.e., to Mandatory if a printer or print system is being supported.
10. Changed print-centric sides, copy-count, and copies-completed document attributes from Mandatory to Conditionally Mandatory, i.e., Mandatory if a printer or print system is being supported.
11. Deleted document-template-name, since it is for scanners. Add attributes for scanners as a separate MIB, so that conformance is simpler.
12. Split document-format into its three parts: document-format, document-format-variants, and document-format-version, since the single DPA attribute will have three corresponding MIB objects. These three objects correspond to the same three objects in the Printer MIB InterpreterFamily table (Family, Level, and Version).

The following changes were made from version 0.5, dated 14-Sep-1995 to make version 0.6, dated 19-Sep-1995 as a result of review of the goals at the IETF/DMTF Printer Working Group (PWG) meeting, 18-Sep-1995:

1. Clarified that the mandatory objects are for a printer and the optional attributes are for print spooling systems.
2. Indicated that the job information retained by the agent after a job completes is intened for use by: management stations used by system operators, a remote console capability, end-user monitoring, system accounting, and system usage programs.
3. Clarified that the job monitoring MIB is intended to be used with print systems that do not implement ISO DPA, as well as for ones that do.

4. Added the goal that the current proposal is for print jobs, but that the MIB should be designed so that a future MIB could augment this job monitoring MIB for scan and FAX jobs.
5. Indicated that this job monitoring MIB must be designed to be used with SNMPv1 and SNMPv2, including the different security mechanisms provided.
6. Clarified that if job control functions (cancel job, etc.) are to be provided, they should be provided by a separate job control MIB, that would be a companion MIB to this job monitoring MIB.
7. Removed the idea that the agent keeps a client job id to server job id map, since such complication in an agent is against SNMP philosophy of keeping agents simple (and putting the smarts into management stations).
8. Clarified the goal about legacy protocols.
9. Added goal of supplying only objects that are of interest to the system operator and system administrator, as opposed to the end user, since that is the focus of job managment MIBs.

The following changes were made from version 0.4, dated 1-Sep-1995 to make version 0.5, dated 14-Sep-1995:

1. Added previous-job-state to the Mandatory group and the trap list. Then clients can more rapidly decide whether to query the MIB on a trap.
2. Changed the data type of job-source-type and job-destination-type from enum to OID, so that the OIDs defined by the host-resources MIB can be used.
3. The accounting objects: user-name and accounting-information was moved from the optional to the mandatory groups, since they are needed for accounting.
4. Changed MediaSupported group from mandatory to optional.
5. Changed the size of the media in the MediaSupported table to use a MediaSizeUnit read-only textual-convention from RFC 1759 controlled by a new read-only object in the MediaSupportedTable, instead of supplying sizes in both units.

The following changes were made from version 0.3, dated 26-Aug-1995 to make version 0.4, dated 1-Sep-1995:

1. Changed the title to reflect that this proposal is to be a new MIB, not an extension to the Printer MIB. Then the job MIB can be used with other types of devices, such as scanners and faxes.
2. Added the issue as to whether to have a writeable object to perform operations on jobs, such as CancelJob.
3. Changed the DPAText textual-convention so that it is a single object of type OCTET STRING containing one of the four DPA standard character sets. Changed the T to T notation, since only one object.
4. Added a mandatory GeneralCurrentLocalization object and a mandatory client job id to server generated job id table.
5. Added DPA Printers-assigned to the MIB, since systems implementing logical printers need to be able to indicate which physical printer(s) the job is assigned to so that the client can find the printer state that is really an augmentation of the state of the job. Since some print systems can assign a print job to multiple devices, the printers-assigned is represented as a table. The mandatory printers-state-of-printers-assigned attribute was also put into this PrintersAssigned table so the entrie table is mandatory..
6. Changed octets-completed and total-job-octets from mandatory to optional as sugggested at the MFPA WG meeting, August 28-29 in Bellevue WA.

7. Deleted submitting-product-name, and submitting product instance qualifier which had been taken from the DMTF printer finisher MIF work, not from DPA. Discussions with Harry Lewis, DMTF printer finisher WG chair, the LMO product name is really a name for a set of jobs. However, if we use the formulation agreed to at the MFPA WG meeting, Aug 28-29, that jobs can contain other jobs, then such a container job is the same as an LMO product. So the job-name attribute can be used on a job that contains other jobs in order to ge the functionality needed by LMO of a product name.
8. Deleted job-ticket-name, since the set of job and document attributes is the representation of the job ticket.
9. Changed GeneralizedTime (from ASN.1 standard) to DateAndTime (from SNMPv2 textual-conventions).