

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61

INTERNET-DRAFT

Ron Bergman  
Dataproducts Corp.  
February 10, 1998

Job Submission Protocol Mapping Recommendations  
for the Job Monitoring MIB

<draft-ietf-printmib-job-protomap-03.txt>

Expires August 10, 1998

Status of this Memo

This document is an Internet-Draft. Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress".

To learn the current status of any Internet-Draft, please check the "lid-abstracts.txt" listing contained in the Internet-Drafts Shadow Directories on ftp.is.co.za (Africa), nic.nordu.net (Europe), munnari.oz.au (Pacific Rim), ds.internic.net (US East Coast), or ftp.isi.edu (US West Coast).

Abstract

This Internet-Draft defines the recommended mapping for many currently popular Job submission protocols to objects and attributes in the Job Monitoring MIB.

TABLE OF CONTENTS

1.0	INTRODUCTION.....	3
2.0	LINE PRINTER DAEMON (LPR/LPD) PROTOCOL.....	4
2.1	jmJobSubmissionID Mapped to LPR/LPD.....	4
2.2	jmJobIndex Mapped to LPR/LPD.....	5
2.3	Other MIB Objects Mapped to LPR/LPD.....	5
2.4	The Attribute Group Mapped to LPD.....	5

62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107  
108  
109  
110  
111  
112  
113  
114  
115  
116  
117  
118  
119  
120  
121  
122  
123

3.0 APPLETLALK PROTOCOL.....6  
3.1 jmJobSubmissionID Mapped to AppleTalk.....6  
3.2 Other AppleTalk Mappings.....6  
4.0 INTERNET PRINTING PROTOCOL (IPP).....6  
4.1 jmJobSubmissionID Mapped to IPP.....7  
4.2 jmJobIndex Mapped to IPP.....7  
4.3 Other MIB Objects Mapped to IPP.....7  
4.4 The Attribute Group Mapped to IPP.....8  
5.0 INTELLIGENT PRINTER DATA STREAM (IPDS).....9  
5.1 jmJobSubmissionId Mapped to IPDS.....9  
5.2 The Attribute Group Mapped to IPDS.....10  
6.0 DOCUMENT PRINTING APPLICATION (DPA).....10  
6.1 jmJobSubmissionID Mapped to DPA.....11  
6.2 jmJobIndex Mapped to DPA.....11  
6.3 Other MIB Objects Mapped to DPA.....11  
6.4 The Attribute Group Mapped to DPA.....12  
7.0 NOVELL DISTRIBUTED PRINT SERVICE (NDPS).....13  
7.1 jmJobSubmissionID Mapped to NDPS.....13  
7.2 jmJobIndex Mapped to NDPS.....13  
7.3 Other MIB Objects Mapped to NDPS.....13  
7.4 The Attribute Group Mapped to NDPS.....14  
8.0 PRINTER JOB LANGUAGE (PJL).....15  
8.1 jmJobSubmissionID Mapped to PJL.....16  
8.2 jmJobIndex Mapped to PJL.....16  
8.3 Other MIB Objects Mapped to PJL.....16  
8.4 The Attribute Group Mapped to PJL.....16  
9.0 POSTSCRIPT.....17  
9.1 jmJobSubmissionID Mapped to PostScript.....17  
9.2 Other MIB Objects and Attributes Mapped to PostScript.....17  
10.0 NETWARE PSERVER.....17  
10.1 jmJobSubmissionID Mapped to PServer.....17  
10.2 jmJobIndex Mapped to PServer.....18  
10.3 Other MIB Objects Mapped to PJL.....18  
10.4 The Attribute Group Mapped to PServer.....18  
11.0 NETWARE NPRINT or RPRINT.....19  
12.0 SERVER MESSAGE BLOCK (SMB) PROTOCOL.....19  
12.1 jmJobSubmissionID Mapped to SMB.....19  
12.2 jmJobIndex Mapped to SMB.....19  
12.3 Other MIB objects Mapped to SMB.....20  
13.0 TRANSPORT INDEPENDENT PRINTER/SYSTEM INTERFACE (TIP/SI).....20  
13.1 jmJobSubmissionID Mapped to TIP/SI.....20  
13.2 jmJobIndex Mapped to TIP/SI.....20  
13.3 Other MIB Objects Mapped to TIP/SI.....21  
13.4 The Attribute Group Mapped to TIP/SI.....21  
14.0 REFERENCES.....21  
15.0 AUTHORS.....22

124  
125  
126  
127  
128  
129  
130  
131  
132  
133  
134  
135  
136  
137  
138  
139  
140  
141  
142  
143  
144  
145  
146  
147  
148  
149  
150  
151  
152  
153  
154  
155  
156  
157  
158  
159  
160  
161  
162  
163  
164  
165  
166  
167  
168  
169  
170  
171  
172  
173  
174  
175  
176  
177  
178  
179  
180  
181  
182  
183  
184  
185

## 1.0 INTRODUCTION

The Job Monitoring MIB [JobMIB] is intended to be implemented in a device or server that supports any job submission protocol. However, the information available and the method of presentation varies significantly by job submission protocol. A common method of mapping job submission information to the Job Monitoring MIB is essential for interoperability of Job MIB agents and monitoring applications. This document defines recommended mappings for most popular job submission protocols to insure this compatibility.

All mappings are unidirectional from the job submission protocol to the MIB. It is assumed that support of the job submission protocol in the printer implies that the reverse information flow is presently defined and does not require interaction from the MIB. This mapping is not defined in this document as it should be obvious.

This document refers to system configurations that are defined in the Job Monitoring MIB [JobMIB]. For those readers that are familiar with the configuration descriptions, a short summary appears here. Please see the Job MIB document for further details.

Configuration 1: This is a simple peer-to-peer system which contains only a client and a printer. The Job MIB agent is resident in the printer.

Configuration 2: This system contains a client, server, and a printer. The Jib MIB agent is resident in the server.

Configuration 3: This system, as in configuration 2, contains a client, server, and a printer. In this case the Job MIB agent is implemented within the printer.

The most important object to be mapped is jmJobSubmissionID, since this is a method for the user or client to determine the jmJobIndex for a submitted job. Therefore, jmJobSubmissionID is specified for all job submission protocols defined in this document. The remaining objects mapped include only those items that have the equivalent information presented to the printer by the job submission protocol.

While this document places a strong emphasis on jmJobSubmissionID mapping to obtain jmJobIndex, the preferred method is through the use of a bi-directional job submission protocol that returns the equivalent value of jmJobIndex to the client, such as IPP. When a bi-directional protocol that returns jmJobIndex is in use, the jmJobSubmissionID object has no value to the client. When the jmJobIndex cannot be returned, the use of a client defined jmJobSubmissionID is preferred over an agent derived value. The client defined version allows for retrieval of jmJobIndex using a single SNMP Get operation, since jmJobSubmissionID is the index into the jmJobIDTable. An agent derived value will require a search through multiple entries in the jmJobIDTable.

186  
187  
188  
189  
190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200  
201  
202  
203  
204  
205  
206  
207  
208  
209  
210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222  
223  
224  
225  
226  
227  
228  
229  
230  
231  
232  
233  
234  
235  
236  
237  
238  
239  
240  
241  
242  
243  
244  
245  
246  
247

The majority of the protocols mapped in this document are oriented towards network job submission. However, the Job Monitoring MIB is also intended to monitor print jobs received from other than network ports, such as parallel and serial ports. Some of the job submission protocols included that are used with non-networked ports are PjL, PostScript, and TIP/SI. In addition, the Job Monitoring MIB can be used with print jobs that are internally generated, such as self test pages. In this latter case, no mapping is required since all job submission protocols are bypassed.

## 2.0 LINE PRINTER DAEMON (LPR/LPD) PROTOCOL

The LPR/LPD printing protocol [LPD] is used with BSD UNIX systems in the client-server-printer configuration. Usage of the Job Monitoring MIB with LPR/LPD will most likely conform to Configuration 3, where the monitor application or the server uses SNMP to obtain job information from the printer. The client communicates with the UNIX server using the existing LPD protocol to obtain job information.

The LPR/LPD protocol is also used in the Windows environment to implement peer-to-peer printing, as shown in configuration 1. In this case, SNMP is used by the client and/or the monitor application to obtain the job information.

One of the major problems of LPR/LPD is the large number of vendor unique extensions currently used with the protocol and the resulting compatibility issues between available implementations. To avoid these issues, this mapping of LPR/LPD is restricted to the protocol as defined by RFC 1179.

The LPR/LPD protocol transfers print job data and control information in separate files, known as the Data File and Control File, respectively. Most of the information concerning the print job is contained in the Control File. In many LPD implementations, the Control File is transferred following the Data File. Thus much of the information concerning the job may not be available until the completion of the data transmission.

### 2.1 jmJobSubmissionID Mapped to LPR/LPD

The LPR/LPD Receive Data File command contains a parameter which defines the name of the data file. This name field is structured as follows:

dfaXXX<host-name> or daXXXX<host-name>

Where XXX or XXXX is the numeric job number assigned by the network entity submitting the print job to the printer. The recommended mapping of this name field to jmJobSubmissionID is:

248  
249  
250  
251  
252  
253  
254  
255  
256  
257  
258  
259  
260  
261  
262  
263  
264  
265  
266  
267  
268  
269  
270  
271  
272  
273  
274  
275  
276  
277  
278  
279  
280  
281  
282  
283  
284  
285  
286  
287  
288  
289  
290  
291  
292  
293  
294  
295  
296  
297  
298  
299  
300  
301  
302  
303  
304  
305  
306  
307  
308  
309

octet 1: '9'

octets 2-40: Contains the <host-name> portion of the name field. If the <host-name> portion is less than 40 octets, the left-most character in the string shall appear in octet position 2. Any unused portion of this field shall be filled with spaces. Otherwise, only the last 39 bytes shall be included.

octets 41-48: '00000XXX' or '0000XXXX', where XXX or XXXX is the decimal (ASCII coded) representation of the LPR/LPD job number.

### 2.2 jmJobIndex Mapped to LPR/LPD

The job index (jmJobIndex) is assigned by the SNMP job monitoring agent and is independent of the XXX (or XXXX) index assigned by the LPR/LPD client. This will allow the SNMP agent to track jobs received from multiple sources.

### 2.3 Other MIB Objects Mapped to LPR/LPD

MIB Object	LPR/LPD Parameter
jmJobKOctetsPerCopyRequested	Number of bytes as defined in the Data File
jmJobOwner	Control file command code = P (User Id)

### 2.4 The Attribute Group Mapped to LPD

Other attributes that are applicable, but not defined in this section such as attributes that map to a vendor unique extension, may also be included.

MIB attribute	LPR/LPD information	Data type
jobName	Job Name (notes 1, 2)	Octet String
queueNameRequested	Queue name from the Data File	Octet String
fileName	Source File Name (notes 1, 3)	Octet String

#### Notes:

-----

1. The information is optional in the Control File. The attribute should be included if present in the Control File.
2. Control file command code = J. If this optional field is omitted from the control file, then the agent returns the file name (command code = N), if present.
3. Control file command code = N.

310  
311  
312  
313  
314  
315  
316  
317  
318  
319  
320  
321  
322  
323  
324  
325  
326  
327  
328  
329  
330  
331  
332  
333  
334  
335  
336  
337  
338  
339  
340  
341  
342  
343  
344  
345  
346  
347  
348  
349  
350  
351  
352  
353  
354  
355  
356  
357  
358  
359  
360  
361  
362  
363  
364  
365  
366  
367  
368  
369  
370  
371

### 3.0 APPLE TALK PROTOCOL

AppleTalk was originally developed as a peer-to-peer network protocol, as described in configuration 1, for use with Apple Macintosh computers. Today, print spoolers are also available for use with Macintosh computer networks that conform to configurations 2/3. In addition, printing with the AppleTalk protocol is supported from both Windows NT servers and Novell servers also per configurations 2/3.

The AppleTalk protocol provides very little information that can be used with the Job Monitoring MIB. The Macintosh print drivers are able to provide information concerning the user and document name but imbed this information in the PDL, which is typically PostScript. The preferred jmJobSubmissionID is constructed from the information in the PostScript file, as defined in section 9.0.

#### 3.1 jmJobSubmissionID Mapped to AppleTalk

An alternative jmJobSubmissionID may be constructed from the Connection Identifier contained in the AppleTalk Printer Access Protocol (PAP) header. Since the Connection Id is not readily available in any of the defined AppleTalk implementations, this approach may be of little utility.

octet 1: 'A'

octets 2-40: Contains the AppleTalk printer name, with the first character of the name in octet 2. AppleTalk printer names are a maximum of 31 characters. Any unused portion of this field shall be filled with spaces.

octets 41-48: '00000XXX', where 'XXX' is the decimal (ASCII coded) representation of the Connection Id.

#### 3.2 Other AppleTalk Mappings

No other Job MIB objects or parameters can be derived from information available in the AppleTalk headers

### 4.0 INTERNET PRINTING PROTOCOL (IPP)

The Internet Printing Protocol [IPP] supports printing using any one of the three possible configurations. For configuration 2, the mapping defined herein is performed on an agent within the server. Otherwise, the mapping is performed on an agent within the printer.

372  
373  
374  
375  
376  
377  
378  
379  
380  
381  
382  
383  
384  
385  
386  
387  
388  
389  
390  
391  
392  
393  
394  
395  
396  
397  
398  
399  
400  
401  
402  
403  
404  
405  
406  
407  
408  
409  
410  
411  
412  
413  
414  
415  
416  
417  
418  
419  
420  
421  
422  
423  
424  
425  
426  
427  
428  
429  
430  
431  
432  
433

#### 4.1 jmJobSubmissionID Mapped to IPP

IPP contains a rich set of parameters which allow several methods of creating the jmJobSubmissionID object. To prevent interoperability problems, the preferred method is to use the IPP job-uri attribute as follows:

octet 1: '4'

octets 2-40: Contains the IPP job-uri job description attribute generated by the printer. (The job-uri is returned to the client by IPP.) If the job-uri is less than 40 octets, the left-most character in the string shall appear in octet position 2. Any unused portion of this field shall be filled with spaces. Otherwise, only the last 39 bytes shall be included.

octets 41-48: Contains the decimal (ASCII coded) representation of the job-id job description attribute. Leading zeros shall be inserted to fill the entire 8 octet field.

NOTE - Since IPP returns the "job-identifier" attribute with the jmJobIndex value for a job when the job is submitted, the use of the jmJobSubmissionID table should not be needed by a management application. See Section 1.0.

#### 4.2 jmJobIndex Mapped to IPP

The job index (jmJobIndex) assigned by the SNMP job monitoring agent is returned to the client by IPP as the job-id job description attribute. (Since IPP does not require consecutively generated job-ids, the agent may receive jobs from multiple clients and can assign jmJobIndex in an ascending sequence independent of the submitting job client.) The IPP job-id must be restricted to the range of 1 to 99,999,999 (decimal) to allow the value to be properly represented in jmJobSubmissionID.

#### 4.3 Other MIB Objects Mapped to IPP

MIB Object	IPP Job attribute
jmJobState	job-state
jmJobStateReasons1	job-state-reasons (note 1)
jmNumberOfInterveningJobs	number-of-intervening-jobs
jmJobKOctetsPerCopyRequested	job-k-octets
jmJobKOctetsProcessed	job-k-octets-processed
jmJobImpressionsPerCopyRequested	job-impressions
jmJobImpressionsCompleted	job-impressions-completed
jmJobOwner	job-originating-user-name

434  
435  
436  
437  
438  
439  
440  
441  
442  
443  
444  
445  
446  
447  
448  
449  
450  
451  
452  
453  
454  
455  
456  
457  
458  
459  
460  
461  
462  
463  
464  
465  
466  
467  
468  
469  
470  
471  
472  
473  
474  
475  
476  
477  
478  
479  
480  
481  
482  
483  
484  
485  
486  
487  
488  
489  
490  
491  
492  
493  
494  
495

Notes:

-----

1. jmJobStateReasons1 is a bit map which can describe up to 31 job state reasons. Also the IPP "job-state-reasons" attribute is a multi-valued attribute with each value being a keyword. The IPP condition may change multiple bits in this object. The IPP "job-state-reasons" attribute may also change one or more of the jobStateReasonsN attributes (see section 4.4).

4.4 The Attribute Group Mapped to IPP

The following mappings are required if the listed IPP job template attribute is provided.

MIB attribute	IPP job attribute	Data type
jobStateReasonsN(N=2, 3, 4)	job-state-reasons (note 3)	Integer
jobCodedCharSet	attributes-charset (note 1)	Octet String
jobNaturalLanguageTag	attributes-natural-language	Octet String
jobURI	job-uri	Octet String
jobName	job-name	Octet String
physicalDevice	output-device-assigned	Octet String
numberOfDocuments	number-of-documents	Integer
jobPriority	job-priority	Integer
jobHoldUntil	job-hold-until	Octet String
sides	sides (note 2)	Integer
finishing	finishings	Integer
printQualityRequested	print-quality	Integer
printerResolutionRequested	printer-resolution	Integer
jobCopiesRequested	copies (note 4)	Integer
documentCopiesRequested	copies (note 4)	Integer
jobCollationType	multiple-document-handling	Integer
sheetsRequested	job-media-sheets	Integer
sheetsCompleted	job-media-sheets-completed	Integer
mediumRequested	media	Octet String
jobSubmissionTime	time-at-submission	Integer
jobStartedProcessingTime	time-at-processing	Integer
jobCompletionTime	time-at-completed	Integer

Notes:

-----

1. jobCodedCharSet is an enum from the IANA registry which is also used in the Printer MIB. The IPP attributes-charset is the name (MIME preferred name) of the character set.
2. The Job MIB sides attribute uses the integer values "1" and "2". The IPP sides attribute uses three keywords.
3. jobStateReasonsN are three attributes (N=2, 3, 4). Also the IPP "job-state-reasons" attribute is a multi-valued attribute with each value being a keyword. The IPP condition may change multiple bits in one or more of these Job MIB attributes. See also



496  
497  
498  
499  
500  
501  
502  
503  
504  
505  
506  
507  
508  
509  
510  
511  
512  
513  
514  
515  
516  
517  
518  
519  
520  
521  
522  
523  
524  
525  
526  
527  
528  
529  
530  
531  
532  
533  
534  
535  
536  
537  
538  
539  
540  
541  
542  
543  
544  
545  
546  
547  
548  
549  
550  
551  
552  
553  
554  
555  
556  
557

jmJobStateReasons1 in section 4.3.

- 4. The IPP "copies" attribute maps to the Job MIB:
  - (1) jobCopiesRequested when the job has only one document OR IPP "multiple-document-handling" is 'single-valued'
  - (2) documentCopiesRequested, in which case the MIB value is the total number of document copies that the job will produce as a whole.

#### 5.0 INTELLIGENT PRINTER DATA STREAM (IPDS)

The IPDS datastream facilitates a close relationship between the print supervisor (Print Services Facility - PSF) and the printer. There are PSF applications for UNIX, Windows, OS/2, OS/400 and host operating systems such as VM, MVS and VSE. Together, PSF and IPDS represent a complete, mature and robust job management framework which includes font and resource management, page progress tracking, job cancellation, complete error recovery and end-user notification. Because PSF and the printer correspond via the use of locally assigned ID's, there is a limited amount of clear text information provided during submission for use by the Job MIB.

#### 5.1 jmJobSubmissionId Mapped to IPDS

For IPDS on the MVS or VSE platform:

- octet 1: 'E'
- octets 2-40: Contains bytes 2-27 of the XOH Define Group Boundary Group ID triplet. Octet position 2 must carry the value x'01'. Bytes 28-40 must be filled with spaces.
- octets 41-48: Contains a decimal (ASCII coded) representation of the jmJobIndex assigned by the agent. Leading zeros shall be inserted to fill the entire 8 octet field.

For IPDS on the VM platform:

- octet 1: 'F'
- octets 2-40: Contains bytes 2-31 of the XOH Define Group Boundary Group ID triplet. Octet position 2 must carry the value x'02'. Bytes 32-40 must be filled with spaces.
- octets 41-48: Contains a decimal (ASCII coded) representation of the jmJobIndex assigned by the agent. Leading zeros shall be inserted to fill the entire 8 octet field.

558  
559  
560  
561  
562  
563  
564  
565  
566  
567  
568  
569  
570  
571  
572  
573  
574  
575  
576  
577  
578  
579  
580  
581  
582  
583  
584  
585  
586  
587  
588  
589  
590  
591  
592  
593  
594  
595  
596  
597  
598  
599  
600  
601  
602  
603  
604  
605  
606  
607  
608  
609  
610  
611  
612  
613  
614  
615  
616  
617  
618  
619  
620

For IPDS on the OS/400 platform:

- octet 1: 'G'
- octets 2-40: Contains bytes 2-36 of the XOH Define Group Boundary Group ID triplet. Octet position 2 must carry the value x'03'. Bytes 37-40 must be filled with spaces.
- octets 41-48: Contains a decimal (ASCII coded) representation of the jmJobIndex assigned by the agent. Leading zeros shall be inserted to fill the entire 8 octet field.

## 5.2 The Attribute Group Mapped to IPDS

For MVS/VSE:

MIB attribute	IPDS XOH DGB Group ID	Data type
jobSourcePlatformType sptMVS(7)	Byte 2 = x'01'	Integer
jobName	Bytes 4-11	Octet String

For VM:

MIB attribute	IPDS XOH DGB Group ID	Data type
jobSourcePlatformType sptVM(8)	Byte 2 = x'02'	Integer
fileName	Bytes 4-11	Octet String

For OS/400:

MIB attribute	IPDS XOH DGB Group ID	Data type
jobSourcePlatformType sptOS400(9)	byte 2 = x'03'	Integer
fileName	Bytes 23-32	Octet String
jobName	Bytes 37-46	Octet String

## 6.0 DOCUMENT PRINTING APPLICATION (DPA)

The ISO 10175 Document Printing Application (DPA) [DPA] supports printing using any one of the three possible configurations. For configuration 2, the mapping defined herein is performed on a server. Otherwise, the mapping is performed on an agent within the printer.

621  
622  
623  
624  
625  
626  
627  
628  
629  
630  
631  
632  
633  
634  
635  
636  
637  
638  
639  
640  
641  
642  
643  
644  
645  
646  
647  
648  
649  
650  
651  
652  
653  
654  
655  
656  
657  
658  
659  
660  
661  
662  
663  
664  
665  
666  
667  
668  
669  
670  
671  
672  
673  
674  
675  
676  
677  
678  
679  
680  
681  
682  
683

6.1 jmJobSubmissionID Mapped to DPA

DPA contains a rich set of parameters which allow several methods of creating the jmJobSubmissionID object. To prevent interoperability problems, the preferred method is to use the DPA job-owner attribute as follows:

octet 1: '0'

octets 2-40: Contains the DPA job-owner attribute supplied by the submitter. If the job-owner is less than 40 octets, the left-most character in the string shall appear in octet position 2. Any unused portion of this field shall be filled with spaces. Otherwise, only the last 39 bytes shall be included.

octets 41-48: Contains an 8-digit sequential decimal number.

6.2 jmJobIndex Mapped to DPA

The job index (jmJobIndex) assigned by the SNMP job monitoring agent is returned to the client by DPA as a decimal digit string as the value of the DPA job-identifier attribute. (Since DPA does not require consecutively generated job-identifiers, the agent may receive jobs from multiple clients and can assign the jmJobIndex in an ascending sequence independent of the submitting job client.) The DPA job-identifier must be restricted to the range of 1 to 99,999,999 (decimal) to allow the value to be properly represented in jmJobSubmissionID.

NOTE - Since DPA returns the "job-identifier" attribute with the jmJobIndex value for a job when the job is submitted, the use of the jmJobSubmissionID table should not be needed by a management application. See Section 1.0.

6.3 Other MIB Objects Mapped to DPA

MIB Object	DPA Job attribute
jmJobState	job-state
jmJobStateReasons1	job-state-reasons (note 2)
jmNumberOfInterveningJobs	intervening-jobs
jmJobKOctetsPerCopyRequested	total-job-octets (notes 1, 3)
jmJobKOctetsProcessed	job-octets-completed (note 1)
jmJobImpressionsPerCopyRequested	job-impression-count (note 3)
jmJobImpressionsCompleted	impressions-completed
jmJobOwner	job-owner

Notes:

-----

1. jmJobKOctetsPerCopyRequested and jmJobKOctetsProcessed is in K

684  
685  
686  
687  
688  
689  
690  
691  
692  
693  
694  
695  
696  
697  
698  
699  
700  
701  
702  
703  
704  
705  
706  
707  
708  
709  
710  
711  
712  
713  
714  
715  
716  
717  
718  
719  
720  
721  
722  
723  
724  
725  
726  
727  
728  
729  
730  
731  
732  
733  
734  
735  
736  
737  
738  
739  
740  
741  
742  
743  
744  
745  
746

- octets while the DPA job-total-octets and job-octets-completed is in octets and is 63-bits of significance.
2. jmJobStateReasons1 is a bit map which can describe up to 31 job state reasons. Also the DPA "job-state-reasons" attribute is a multi-valued attribute with each value being an object identifier (OID). The DPA condition may change multiple bits in this object. The DPA condition may also change one or more of the jobStateReasonsN attributes (see section 4.4)
  3. DPA octets include the multiplication factor due to job and document copies, while the MIB values do not.

#### 6.4 The Attribute Group Mapped to DPA

The following mappings are required if the listed DPA job attribute is provided.

MIB attribute	DPA job attribute	IPP Data type
jobStateReasonsN(N=2, 3, 4)	job-state-reasons (note 2)	Integer
jobCodedCharSet	(note 1)	Octet String
jobAccountName	accounting-information	Octet String
jobName	job-name	Octet String
deviceNameRequested	printer-name-requested	Octet String
physicalDevice	printers-assigned	Octet String
numberOfDocuments	number-of-documents	Integer
fileName	file-name	Octet String
documentName	document-name	Octet String
jobComment	job-comment	Octet String
documentFormat	document-format	Octet String
jobPriority	job-priority	Integer
jobProcessAfterDateAndTime	job-print-after	Octet String
outputBin	results-profile.output-bin	Octet String
sides	sides (note 3)	Integer
finishing	job-finishing, finishing	Integer
printQualityRequested	print-quality	Integer
printerResolutionRequested	default-printer-resolution	Integer
	(note 4)	
jobCopiesRequested	results-profile.job-copies	Integer
jobCopiesCompleted	job-copies-completed	Integer
documentCopiesRequested	copy-count (note 5)	Integer
documentCopiesCompleted	copies-completed (note 6)	Integer
sheetsRequested	job-media-sheet-count	Integer
sheetsCompleted	job-media-sheets-completed	Integer
pagesRequested	job-page-count	Integer
pagesCompleted	pages-completed	Integer
mediumRequested	page-media-select, default-medium	Octet String
jobSubmissionTime	submission-time (note 7)	Octet String
jobStartedProcessingTime	started-printing-time (note 7)	Octet String
jobCompletionTime	completion-time (note 7)	Octet String

747  
748  
749  
750  
751  
752  
753  
754  
755  
756  
757  
758  
759  
760  
761  
762  
763  
764  
765  
766  
767  
768  
769  
770  
771  
772  
773  
774  
775  
776  
777  
778  
779  
780  
781  
782  
783  
784  
785  
786  
787  
788  
789  
790  
791  
792  
793  
794  
795  
796  
797  
798  
799  
800  
801  
802  
803  
804  
805  
806  
807  
808  
809

Notes:

-----

1. Every DPA attribute is tagged indicating the coded character set to be used for that attribute.
2. jobStateReasonsN are three attributes (N=2, 3, 4). The DPA condition may change one or more of the bits in one or more of these Job MIB items. Also the DPA job-state-reasons is a multi-valued attribute with each value being an OBJECT IDENTIFIER (OID).
3. The Job MIB sides attribute is an integer '1' or '2' while the DPA sides attribute has one of six OID values that includes plex.
4. printerResolutionRequested has x and y resolution and is intended to override the resolution instruction in the document, if any, while the DPA default-printer-resolution is the same in x and y and only takes effect if the document does not contain a resolution instruction
5. The DPA "copy-count" attribute is a per-document attribute, so the MIB value is the sum of the documents' "copy-count" values times the job's "results-profile.job-copies" value.
6. The DPA "copies-completed" attribute is a per-document attribute, so the MIB value is the sum of the documents' "copies-completed" values times the job's "results-profile.job-copies" value.
7. The DPA GeneratlizedTime data type is defined by ISO 8824 (ISO-8824) while the MIB DateAndTime is defined by SNMPv2-TC (SNMPv2-TC).

7.0 NOVELL DISTRIBUTED PRINT SERVICE (NDPS)

Novell Distributed Print Services is a DPA based job submission protocol that conforms to configuration 3.

7.1 jmJobSubmissionID Mapped to NDPS

NDPS supports the generation of a properly formatted jmJobSubmissionID for use in the Job MIB, via the attribute ndps-att-job-identifier.

7.2 jmJobIndex Mapped to NDPS

NDPS defines the attribute ndps-att-job-identifier-on-printer that can be used to return the value of jmJobIndex to the NDPS client. See Section 1.0.

7.3 Other MIB Objects Mapped to NDPS

MIB Object	NDPS Parameter
jmJobState	ndps-att-current-job-state (note 1)
jmJobStateReasons1	ndps-att-job-state-reasons (note 2)

810  
811  
812  
813  
814  
815  
816  
817  
818  
819  
820  
821  
822  
823  
824  
825  
826  
827  
828  
829  
830  
831  
832  
833  
834  
835  
836  
837  
838  
839  
840  
841  
842  
843  
844  
845  
846  
847  
848  
849  
850  
851  
852  
853  
854  
855  
856  
857  
858  
859  
860  
861  
862  
863  
864  
865  
866  
867  
868  
869  
870  
871  
872

jmNumberOfInterveningJobs		ndps-att-intervening-jobs
jmJobKOctetsPerCopyRequested		ndps-att-total-job-octets (notes 3,4)
jmJobKOctetsProcessed		ndps-att-octets-completed (note 3)
jmJobImpressionsPerCopyRequested		ndps-att-job-impressions-count
jmJobImpressionsCompleted		ndps-att-impressions-completed
jmJobOwner		ndps-att-job-owner (note 5)

Notes:

-----

1. Some of the NDPS job states must be represented by both a jmJobState and a jmJobStateReasons1 object or a jobStateReasonsN attribute (N=2, 3, 4).
2. The NDPS job state reasons may be mapped to either the object jmJobStateReasons1 or the attribute jobStateReasonsN (N=2, 3, 4).
3. jmJobKOctetsPerCopyRequested and jmJobKOctetsProcessed is in K octets while the NDPS ndps-att-job-total-octets and ndps-att-job-octets-completed is in octets and is 63-bits of significance.
4. NDPS octets include the multiplication factor due to job and document copies, while the MIB values do not.
5. The Job MIB object must be multiplied by the attribute jobCopiesRequested to obtain the NDPS attribute value, if multiple copies have been requested.

7.4 The Attribute Group Mapped to NDPS

The following mappings are required if the listed PJI attribute or command option is provided.

MIB attribute		NDPS parameter		Data type
jobStateReasonsN(N=2, 3, 4)		ndps-job-state-reasons		Integer
jobAccountName		ndps-att-job-owner		Octet String
jobName		ndps-att-job-name		Octet String
jobOriginatingHost		ndps-att-job-originator		Octet String
deviceNameRequested		ndps-att-printer-name-- requested		Octet String
numberOfDocuments		ndps-att-number-of-documents		Integer
fileName		ndps-att-document-file-name		Octet String
documentName		ndps-att-document-name		Octet String
jobComment		ndps-att-job-comment		Octet String
documentFormatIndex		ndps-att-prtInterpreterIndex		Integer
documentFormat		ndps-att-document-format		Integer
jobPriority		ndps-att-job-priority		Integer
jobProcessAfterDateAndTime		ndps-att-job-print-after		Octet String
outputBin		ndps-att-results-profile (note 1)		Integer
sides		ndps-att-sides (note 2)		Integer
finishing		ndps-att-job-finishing		Integer
printQualityRequested		ndps-att-print-quality		Integer

873  
874  
875  
876  
877  
878  
879  
880  
881  
882  
883  
884  
885  
886  
887  
888  
889  
890  
891  
892  
893  
894  
895  
896  
897  
898  
899  
900  
901  
902  
903  
904  
905  
906  
907  
908  
909  
910  
911  
912  
913  
914  
915  
916  
917  
918  
919  
920  
921  
922  
923  
924  
925  
926  
927  
928  
929  
930  
931  
932  
933  
934  
935

printerResolutionRequested	ndps-att-default-printer-- resolution (note 3)	Integer
printerResolutionUsed	ndps-att-default-resolutions-- used	Integer
jobCopiesRequested	ndps-att-results-profile (note 4)	Integer
jobCopiesCompleted	ndps-att-job-copies-completed	Integer
documentCopiesRequested	ndps-att-copy-count (note 5)	Integer
documentCopiesCompleted	ndps-att-copies-completed (note 6)	Integer
sheetsRequested	ndps-att-job-media-- sheet-count	Integer
sheetsCompleted	ndps-att-media-sheets-- completed	Integer
mediumConsumed	ndps-att-media-used	Integer
jobSubmissionToServerTime	ndps-att-submission-time (note 7)	Octet String
jobSubmissionTime	ndps-att-started-printing-time (note 7)	Octet String
jobCompletionTime	ndps-att-completion-time (note 7)	Octet String

Notes:

-----

1. The output-bin field in ndps-att-results-profile is to be used.
2. The Job MIB sides attribute is an integer '1' or '2' while the NDPS sides attribute has one of six OID values that includes plex.
3. printerResolutionRequested has x and y resolution and is intended to override the resolution instruction in the document, if any, while the ndps-att-default-printer-resolution is the same in x and y and only takes effect if the document does not contain a resolution instruction
4. The job-copies field in ndps-att-results-profile is to be used.
5. The NDPS "copy-count" attribute is a per-document attribute, so the MIB value is the sum of the documents' "copy-count" values times the job's "results-profile.job-copies" value.
6. The NDPS "copies-completed" attribute is a per-document attribute, so the MIB value is the sum of the documents' "copies-completed" values times the job's "results-profile.job-copies" value.
7. The NDPS GeneratlizedTime data type is defined by ISO 8824 (ISO-8824) while the MIB DateAndTime is defined by SNMPv2-TC (SNMPv2-TC).

8.0 PRINTER JOB LANGUAGE (PJL)

PJL [PJL] has been developed by Hewlett-Packard to provide job control information to the printer and status information to applications, independent of the PDL.

936  
937  
938  
939  
940  
941  
942  
943  
944  
945  
946  
947  
948  
949  
950  
951  
952  
953  
954  
955  
956  
957  
958  
959  
960  
961  
962  
963  
964  
965  
966  
967  
968  
969  
970  
971  
972  
973  
974  
975  
976  
977  
978  
979  
980  
981  
982  
983  
984  
985  
986  
987  
988  
989  
990  
991  
992  
993  
994  
995  
996  
997  
998

8.1 jmJobSubmissionID Mapped to PjL

PjL has defined the SUBMISSIONID option for the JOB command which indicates a properly formatted jmJobSubmissionID for use in the Job MIB. The PjL JOB command is presented at the start of a print job with options that apply only the attached job. The syntax for this command option is:

        @PjL JOB SUBMISSIONID = "id string"

Driver software that implements this PjL command option must provide the "id string" in one of the client version formats specified in the Job MIB for jmJobSubmissionID.

For drivers that are not able to create the SUBMISSIONID option, it is recommended that jmJobSubmissionID format 0 be created by the agent using the PjL attribute DocOwner or DocOwnerId.

        octet 1:     '0'

        octets 2-40: Contains the string associated with DocOwner or DocOwnerId. If the string is less than 40 octets, the left-most character in the string shall appear in octet position 2. Otherwise, only the last 39 bytes shall be included. Any unused portion of this field shall be filled with spaces. If DocOwner or DocOwnerId cannot be obtained, this field shall be blank.

        octets 41-48: Contains the value of jmJobIndex associated with the job. Leading zeros shall be inserted to fill the entire 8 octet field.

8.2 jmJobIndex Mapped to PjL

PjL does not provide a value that can be mapped to jmJobIndex.

8.3 Other MIB Objects Mapped to PjL

MIB Object		PjL Job attribute
-----+-----		
jobOwner		DocOwner or DocOwnerId attribute

8.4 The Attribute Group Mapped to PjL

The following mappings are required if the listed PjL attribute or command option is provided.



999

1000 INTERNET-DRAFT

Job Submission Protocol Mapping

Feb 10, 1998

1001

1002

1003

1004

1005 MIB attribute

| PJL attribute or command option

| Data type

1006

1007 serverAssignedJobName

| DocName attribute or the command

| Octet String

1008

| @PJL JOB Name = "string"

| Octet String

1009

submittingServerName

| SrcServerName attribute

| Octet String

1010

jobOriginatingHost

| SrcPort attribute

| Octet String

1011

queueNameRequested

| SrcQ attribute

| Octet String

1012

fileName

| JobFName attribute

| Octet String

1013

jobComment

| JobDesc attribute

| Octet String

1014

jobSubmissionTime

| TimeSubmit attribute

| Octet String

1015

1016

1017

1018

## 9.0 POSTSCRIPT

1019

1020

The PostScript PDL permits comment fields which can be used by application drivers to include job information. Although there are no restrictions or requirements as to what information may be included, many drivers include job owner and/or document name.

1021

1022

1023

1024

1025

1026

### 9.1 jmJobSubmissionID Mapped to PostScript

1027

1028

The use of a standard format job submission id comment string will allow interoperability of printers and drivers from multiple vendors. The following comment string format is recommended for use with PostScript level 1 and level 2 data streams.

1029

1030

1031

1032

1033

```
    %%JMPJobSubmissionId:(id-string)
```

1034

1035

where "id string" can be any jmJobSubmissionID format reserved for

1036

clients.

1037

1038

### 9.2 Other MIB Objects and Attributes Mapped to PostScript

1039

1040

No Other mappings from PostScript comment strings are recommended, but many Job MIB objects and attributes can be defined using vendor unique comment strings.

1041

1042

1043

1044

1045

1046

## 10.0 NETWARE PSERVER

1047

1048

The NetWare PServer job submission protocol is implemented in a client-

1049

server-printer system on the server to printer link as defined in

1050

configuration 3.

1051

1052

1053

### 10.1 jmJobSubmissionID Mapped to PServer

1054

1055

```
    octet 1: 'B'
```

1056

1057

1058

1059

1060

Bergman

Informational

[page

1061

17]1

1062  
1063  
1064  
1065  
1066  
1067  
1068  
1069  
1070  
1071  
1072  
1073  
1074  
1075  
1076  
1077  
1078  
1079  
1080  
1081  
1082  
1083  
1084  
1085  
1086  
1087  
1088  
1089  
1090  
1091  
1092  
1093  
1094  
1095  
1096  
1097  
1098  
1099  
1100  
1101  
1102  
1103  
1104  
1105  
1106  
1107  
1108  
1109  
1110  
1111  
1112  
1113  
1114  
1115  
1116  
1117  
1118  
1119  
1120  
1121  
1122  
1123  
1124

octets 2-40: Contains the Directory Path Name of the agent as recorded by the Novell File Server in the queue directory. If the string is less than 40 octets, the left-most character in the string shall appear in octet position 2. Otherwise, only the last 39 bytes shall be included. Any unused portion of this field shall be filled with spaces.

octets 41-48: '000XXXXX' The decimal (ASCII coded) representation of the Job Number as per the NetWare File Server Queue Management Services.

### 10.2 jmJobIndex Mapped to PServer

The job index (jmJobIndex) is assigned by the SNMP job monitoring agent and is independent of the Job Number assigned by the NetWare File Server Queue Management Services. This will allow the SNMP agent to track jobs received from multiple sources.

### 10.3 Other MIB Objects Mapped to PJJL

MIB Object		PServer Job attribute
-----		-----
jobOwner		Client Id Number

### 10.4 The Attribute Group Mapped to PServer

The following mappings are required if the listed PServer parameter is provided in the Novell File Server queue directory.

MIB attribute		PServer parameter		Data type
-----		-----		-----
serverAssignedJobName		Job File Name		Octet String
queueNameRequested		Queue Id		Integer
physicalDevice		Server Id Number		Integer
jobComment		Job Description		Octet String
jobPriority		(note 1)		Integer
jobProcessAfterDateAndTime		Target Execution Time		Octet String
jobCopiesRequested		Number of Copies		Integer
mediumRequested		Form Name		Octet String
jobSubmissionToServerTime		Job Entry Time		Octet String

#### Notes:

-----

1. The job priority is determined by the priority assigned to the queue that contains the job. Each queue can be assigned a unique priority and the priority of the job is inherited from the queue.

1125  
1126  
1127  
1128  
1129  
1130  
1131  
1132  
1133  
1134  
1135  
1136  
1137  
1138  
1139  
1140  
1141  
1142  
1143  
1144  
1145  
1146  
1147  
1148  
1149  
1150  
1151  
1152  
1153  
1154  
1155  
1156  
1157  
1158  
1159  
1160  
1161  
1162  
1163  
1164  
1165  
1166  
1167  
1168  
1169  
1170  
1171  
1172  
1173  
1174  
1175  
1176  
1177  
1178  
1179  
1180  
1181  
1182  
1183  
1184  
1185  
1186  
1187

11.0 NETWARE NPrinter or RPrinter

The NetWare NPrinter/RPrinter protocol was designed to transfer print data from a Novell File Server to a printer attached directly to a local port (e.g. parallel or serial) on a PC. NPrinter/RPrinter is an extremely lightweight printing protocol. Consequently, no information required by the Job Monitoring MIB is provided and a meaningful jmJobSubmissionID cannot be generated.

It is recommended that an additional job submission layer, such as PjL or another vendor private protocol, be included on top of NPrinter/RPrinter to provide the required information. The mapping should then be performed according to the recommendations of the higher layer submission protocol.

12.0 SERVER MESSAGE BLOCK (SMB) PROTOCOL

The Server Message Block protocol is used with several PC Network operating systems, such as Microsoft Windows for Workgroups, IBM LAN Server, and Artisoft Lantastic. SMB systems supporting the Job Monitoring MIB will conform to either configuration 1 or 3.

12.1 jmJobSubmissionID Mapped to SMB

- octet 1: 'C'
- octets 2-40: Contains a decimal (ASCII coded) representation of the 16 bit SMB Tree Id field, which uniquely identifies the connection that submitted the job to the printer. The most significant digit of the numeric string shall be placed in octet position 2. All unused portions of this field shall be filled with spaces. The SMB Tree Id has a maximum value of 65,535.
- octets 41-48: Contains a decimal (ASCII coded) representation of the File Handle returned from the printer agent to the client in response to a Create Print File command. Leading zeros shall be inserted to fill the entire 8 octet field.

12.2 jmJobIndex Mapped to SMB

It is strongly recommended that the File Handle returned from the printer agent be identical to jmJobIndex. If these items are identical, there is no need for the client application to perform a search on

1188  
1189  
1190  
1191  
1192  
1193  
1194  
1195  
1196  
1197  
1198  
1199  
1200  
1201  
1202  
1203  
1204  
1205  
1206  
1207  
1208  
1209  
1210  
1211  
1212  
1213  
1214  
1215  
1216  
1217  
1218  
1219  
1220  
1221  
1222  
1223  
1224  
1225  
1226  
1227  
1228  
1229  
1230  
1231  
1232  
1233  
1234  
1235  
1236  
1237  
1238  
1239  
1240  
1241  
1242  
1243  
1244  
1245  
1246  
1247  
1248  
1249  
1250

jmJobSubmissionID. To be compatible with the 16 bit field allocated to this value by SMB, the maximum jmJobIndex is 65,535.

12.3 Other MIB objects Mapped to SMB

MIB Object	SMB Parameter
jmJobOwner	SMB User Id field (note 1)

Notes:  
-----

1. A decimal (ASCII coded) representation of the SMB User Id numeric shall be presented as jmJobOwner.

13.0 TRANSPORT INDEPENDENT PRINTER/SYSTEM INTERFACE (TIP/SI)

The TIP/SI protocol, although currently specified as a part of the IEEE 1284 parallel port standards [TIP/SI], was originally developed as a network protocol. TIP/SI thus has the potential of being integrated into any network or non-network configuration.

13.1 jmJobSubmissionID Mapped to TIP/SI

- octet 1: 'D'
- octets 2-40: Contains the Job Name from the Job Control-Start Job (JC-SJ) command. If the Job Name portion is less than 40 octets, the left-most character in the string shall appear in octet position 2. Any unused portion of this field shall be filled with spaces. Otherwise, only the last 39 bytes shall be included.
- octets 41-48: Contains a decimal (ASCII coded) representation of the jmJobIndex assigned by the agent. Leading zeros shall be inserted to fill the entire 8 octet field.

13.2 jmJobIndex Mapped to TIP/SI

jmJobIndex is returned to the client as the Printer Assigned Job Id in a Job Control-Start Job (JC-SJ) response packet. To be compatible with the 16 bit field allocated to this value by TIP/SI, the maximum jmJobIndex is 65,535.

1257 13.3 Other MIB Objects Mapped to TIP/SI  
1258

MIB Object	TIP/SI Parameter
-----+-----	-----+-----
1261 jmJobOwner	User string

1264 13.4 The Attribute Group Mapped to TIP/SI  
1265

MIB attribute	TIP/SI information	Data type
-----+-----+-----	-----+-----+-----	-----+-----
1268 jobName	Job Name string	Octet String
1269 jobComment	Additional Information string	Octet String

1273 14.0 REFERENCES  
1274

1275 [DPA] ISO/IEC 10175-1:1996(E), "Information technology - Text and  
1276 office systems - Document Printing Application (DPA) - Part 1: Abstract  
1277 service definition and procedures", JTC1/SC18.  
1278

1279 [IPP] The Internet Printing Protocol RFC XXXX, Model RFC XXXX  
1280

1281 [ISO-8824] ISO/IEC 8824:1990, "Information technology - Open Systems  
1282 Interconnection - Specification of Abstract Syntax Notation (ASN.1)".  
1283

1284 [JobMIB] The Job Monitoring MIB, work in progress, <draft-ietf-  
1285 printmib-job-monitoring-07.txt>, to be published as an Informational RFC  
1286 as a Printer Working Group (PWG) standard.  
1287

1288 [LPD] Line Printer Daemon Protocol, RFC 1179, IETF informational  
1289 document.  
1290

1291 [PJL] Printer Job Language Technical Reference Manual, Hewlett-Packard  
1292 part number 5021-0328.  
1293

1294 [PrtMIB] The Printer MIB, RFC 1759, IETF standards track document.  
1295

1296 [SNMPv2-TC] Case, J., McCloghrie, K., Rose, M., Waldbusser, S.,  
1297 "Textual Conventions for Version 2 of the Simple Network Management  
1298 Protocol (SNMPv2), RFC 1903, January 1996.  
1299

1300 [TIP/SI] IEEE Standard 1284.1, Transport Independent Printer/System  
1301 Interface.  
1302  
1303  
1304  
1305  
1306  
1307  
1308  
1309  
1310

1314  
1315  
1316  
1317  
1318  
1319  
1320  
1321  
1322  
1323  
1324  
1325  
1326  
1327  
1328  
1329  
1330  
1331  
1332  
1333  
1334  
1335  
1336  
1337  
1338  
1339  
1340  
1341  
1342  
1343  
1344  
1345  
1346  
1347  
1348  
1349  
1350  
1351  
1352  
1353  
1354  
1355  
1356  
1357  
1358  
1359  
1360  
1361  
1362  
1363  
1364  
1365  
1366  
1367  
1368  
1369  
1370  
1371  
1372  
1373  
1374  
1375  
1376

15.0 AUTHORS

This document was created with significant contributions from the following individuals.

Ron Bergman (Editor)  
Dataproducts Corp.  
1757 Tapo Canyon Road  
Simi Valley, CA 93063-3394

Phone: 805-578-4421  
Fax: 805-578-4001  
Email: rbergman@dpc.com

Tom Hastings  
Xerox Corporation, ESAE-231  
701 S. Aviation Blvd.  
El Segundo, CA 90245

Phone: 310-333-6413  
Fax: 310-333-5514  
EMail: hastings@cpl0.es.xerox.com

Scott A. Isaacson  
Novell, Inc.  
122 E 1700 S  
Provo, UT 84606

Phone: 801-861-7366  
Fax: 801-861-4025  
EMail: scott\_isaacson@novell.com

Harry Lewis  
IBM Corporation  
6300 Diagonal Hwy  
Boulder, CO 80301

Phone: (303) 924-5337  
Fax: (303) 924-4662  
Email: harryl@us.ibm.com

Bob Pentecost  
Hewlett-Packard Corporation  
11311 Chinden Boulevard  
Boise, ID 83714

1377  
1378  
1379  
1380  
1381  
1382  
1383  
1384  
1385  
1386  
1387  
1388  
1389  
1390  
1391  
1392  
1393  
1394  
1395  
1396  
1397  
1398  
1399  
1400  
1401  
1402  
1403  
1404  
1405  
1406  
1407  
1408  
1409  
1410  
1411  
1412  
1413  
1414  
1415  
1416  
1417  
1418  
1419  
1420  
1421  
1422  
1423  
1424  
1425  
1426  
1427  
1428  
1429  
1430  
1431  
1432  
1433  
1434  
1435  
1436  
1437  
1438  
1439

INTERNET-DRAFT

Job Submission Protocol Mapping

Feb 10, 1998

Phone: (208) 396-3312  
Fax: (208) 396-4122  
Email: bpenteco@boi.hp.com

Send comments to the printmib WG using the Job Monitoring Project  
(JMP) Mailing List: jmp@pwg.org

For further information, access the PWG web page under "JMP":  
<http://www.pwg.org/>

Other Participants:

Chuck Adams - Tektronix  
Keith Carter - IBM Corporation  
Angelo Caruso - Xerox  
Jeff Copeland - QMS  
Andy Davidson - Tektronix  
Mabry Dozier - QMS  
Lee Ferrel - Canon  
David Kellerman - Northlake Software  
Rick Landau - Digital  
Jay Martin - Underscore  
Ira McDonald - Xerox  
Stuart Rowley - Kyocera  
Bob Setterbo - Adobe  
Gail Songer - EFI  
Mike Timperman - Lexmark  
William Wagner - DPI/Osicom  
Chris Wellens - Interworking Labs  
Rob Whittle - Novell  
Don Wright - Lexmark  
Lloyd Young - Lexmark

1440  
1441  
1442